SURVEY OF MOTORCYCLE AND SCOOTER SAFETY FOR PROJECT: COMPENDIUM OF BEST PRACTICES ON MOTORCYCLE AND SCOOTER SAFETY

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EXECUTIVE SUMMARY

Throughout the Asia Pacific Economic Cooperation (APEC) and across the world, riders and passengers of motorcycles and scooters are among the most vulnerable road users. There is considerably greater likelihood of death or injury from use of these vehicles compared with other motor vehicles. Such vulnerability is especially pertinent for economies that more often use motorcycles and scooters as a method of transportation. In developing effective countermeasures to reduce motorcycle and scooter death and injury across multiple regions consideration is required of various situational and socio-cultural factors that vary across APEC economies.

The study presented here sought to understand important motorcycle and scooter safety issues across APEC economies and any current barriers that might exist in implementing potentially effective countermeasures. This is the first stage of a wider project which also includes a literature review and ultimately the production of a compendium to facilitate implementation of best practice countermeasures.

Approximately half of APEC economies responded to the survey, with half of these from high income economies (HIE) and half from low or middle income economies (LMIE). Overall, and consistent with previous research, there appears to be more motorcycle and scooter riding compared with car use in LMIEs than there is in the HIEs. This wasr eflected in a greater proportion of LMIE road user deaths that were a result of motorcycle and scooter use compared with car use than there was for HIE. However importantly, all economies with available data indicated that there was a greater proportion of motorcycle and scooter injuries and deaths relative to the proportion of motorcycle and scooter use in respective economies. This is also concerning given that the majority of responding economies also indicated that there is a likely trend of increased motorcycle and scooter use.

There was a clear picture from the survey data of some key contributing factors to motorcycle and scooter crashes. Most economies reported that speeding was key contributory factor. Additionally, riding after drinking and inattention were frequently mentioned contributory factors. LMIEs also typically rated a number of rider factors as contributory factors, including inexperience, lack of knowledge of road rules, decision making errors and distraction.

With regard to potentially effective countermeasures, there was evidence of widespread support for enforcement as an effective countermeasure. The survey data was able to provide information about the issues aligned with enforcement countermeasures and specific barriers to implementing greater enforcement for particular risk issues. In addition, education, training and information provision through campaigns were seen as a potentially effective countermeasure to a number of key issues.

Few economies were able to provide comprehensive information on differences by sex. Compared with females, there were more male motorcycle and scooter riders and more deaths. The differences in motorcycle and scooter passenger deaths was less consistent, with five economies having more female than male deaths and two economies having more male than female deaths. Also, generally it was considered that causes of crashers were likely to be equally important for males and females except for speeding, drink riding, unlicenced riding whereby at least half of respondents reported they were more important for males. This was similar for injury crashes except that rider decision making error was also included.

The identification and reporting of barriers to such countermeasures provides key information about the potential implementation effectiveness for countermeasures in particular economies. The recognition of such issues also provides key data on the issues that would need to be clarified and considered in implementing particular countermeasures in the different economies and with an understanding of any gender differences. Given that not all safety measures are likely to be effective and that the evidence of effectiveness varies across measures, standards for inclusion will need to be developed. The understanding of key contributory factors (for example, speed, rider alcohol use, rider inexperience) potentially effective countermeasures and identified barriers to implementation will provide some key information used in the development of a compendium of effective best practice motorcycle and scooter safety. For example, some potential countermeasures might include compulsory helmet wearing legislation, helmet design standards and graduated licensing for motorcyclists.

The findings must be viewed in light of limitations in the numbers of economies who responded to the survey and the large number of items for which some economies were not able to provide information.

TABLE OF CONTENTS

LIST OF TABLES

1. INTRODUCTION

1.1 Background

Internationally, motorcyclists are among the most vulnerable road users. Motorcycle riding is much more likely to result in injury than car travel, and the resulting injuries are likely to be more severe for motorcyclists than for vehicle occupants. Studies in developed countries have found fatality and serious injury rates to be 30 to 35 times greater for motorcyclists than car drivers, with brain and orthopaedic injuries prevalent (Johnston, Brooks & Savage, 2008; National Center for Statistics and Analysis Research and Development, 2008). The factors that have been identified as contributing to the over-representation of motorcycles in serious crashes include (Haworth, Mulvihill & Clark, 2007):

- Vulnerability to injury
- Inexperience or lack of recent experience
- Driver failures to see motorcycles
- Instability and braking difficulties
- Road surface and environmental hazards
- Risk taking

There is no clear estimate available of the total numbers of motorcyclists killed and injured throughout the world. However, motorcyclists generally comprise a higher proportion of fatalities in low and medium income countries (LMICs) than in high income countries (HICs). The large number of deaths in LMICs is likely to reflect both the greater use of motorcycles and the high risk of suchriders being involved in crashes involving fatalities (WHO, 2006). The pattern of riding motorcycles and scooters and fatality rates represent only part of the picture of differences between countries and therefore potential differences in effective countermeasures. Socio-cultural factors may be different across countries, for example the personal and social significance of riding, the quality of protective gear and quality of the motorcycle, and the potential impact and medical treatment following a crash. Patterns of use, injuries and associated socio-cultural factors associated with riding have

important implications for the development and implementation of effective countermeasures. Strifelt (2008) stresses the differences among riders, in terms of why they ride, whether or not they belong to organised rider groups and their level of safety awareness. Strifelt (2008) also points out that motorcycling provides an affordable means of transporting goods in Asia. In large cities of some developed countries, motorcycles are commonly used for commuting, while in the US and Canada for example, use for touring is more common than commuting.

Rogers (2008) noted that enjoyment was an important factor in many high-income countries but that employment/entrepreneurship was important in many low- and middle-income countries. Ease of use is an important factor in locations where significant traffic congestion exists. Economy of purchase and use is also an important factor in many low and middle-income countries.

The types of motorcycles and their main purposes of use also differ markedly between developed countries and emerging and developing countries. In developed countries, many motorcycles are leisure vehicles which have larger engine capacities. In emerging and developing countries, motorcycles are largely used as a means of mobility and most motorcycles are low and medium engine capacity motorcycles and scooters (Rogers, 2008). Perversely, larger motorcycles in developed countries tend to be used by single riders, while the smaller motorcycles and scooters in developing countries frequently carry passengers and are used with a variety of attachments for carriage, delivery, vending and passenger transport.

However, the profiles of types of motorcycles across economies are changing that is likely to reflect a shift from primarily use of motorcycles as transport to leisure use and more older riders. Congestion does not appear to have boosted sales in Japan, where sales have been falling since 1982. Scooter and moped sales have increased in Australia (Haworth & Nielson, 2008), with a suggestion that this may be part of an increase in use of motorised two-wheelers for transport (rather than recreation). With increasing fuel prices, commuting to work on a scooter or moped may be becoming increasingly attractive. Furthermore with the increasing expense and space limitations of parking in metropolitan areas, commuters may be looking toward two wheeled transport as a means of reducing parking fees (Wigan, 2000).

Over and above these differences are the variations across economic, institutional and social and cultural factors. These influence the degree to which the use of motorcycles can be

regulated in practice, the capacity of governments, agencies and road safety practitioners to implement change, and the receptiveness of motorcyclists to measures aimed at improving safety.

Motorcycling has traditionally been more popular among males than females and the role of gender differences in motorcycle safety remains an important, if under-researched, topic. In many countries, females have been more common as motorcycle pillion passengers than riders. Australian data shows that while females make up only about 3% of motorcycle riders killed, about half of the pillion passengers killed are female (ATSB, 2004). Further, there is some evidence that motorcycle and scooter use by women is increasing.

1.2 Asia Pacific Economic Cooperation

The Asia Pacific Economic Cooperation (APEC) "is the premier forum for facilitating economic growth, cooperation, trade and investment in the Asia-Pacific region" (see http://www.apec.org/). There are 21 member economies with diverse economies, populations and motorcycle and scooter riding patterns (see Appendix A). The APEC Transportation Working Group (TPT-WG) aims to enhance the safety and security of APEC transportation systems and thus encourage economic development in the Asia-Pacific region (see http://www.apec-tptwg.org.cn/). The Road Safety Sub-group of the APEC Transportation Working Group (TPT-WG) has commissioned the Centre for Accident Research and Road Safety-Queensland (CARRS-Q) to develop a compendium of best practice measures to improve motorcycle and scooter safety that can be used to reduce crashes, post-crash trauma and associated socio-economic costs.

1.3 Objectives

This research aims to investigate motorcycle and scooter safety across APEC economies. This report was commissioned by the APEC TPT-WG as part of a larger program of research that aims to develop a compendium of best practice on motorcycle and scooter safety. The overall aim of the project is comprised of three stages of research;

(1) survey of APEC economies current motorcycle and scooter safety issues;

(2) review of the academic literature and government reports in relation to measures that address motorcycle and scooter safety including information on practical and cost-effective safety measures that can be implemented in APEC economies.

(3) develop a compendium of best practice with an additional workshop presentation of the compendium to facilitate implementation of best practice countermeasures. The intended audience for the compendium will be road safety policy makers, practitioners and professionals in APEC economies; and when the compendium is translated into other languages, also other non-APEC economies.

The additional workshop component will present the safety measures in the compendium and facilitate their implementation. It will be held preceding a TPT-WG meeting or in conjunction with some other appropriate event. The workshop will focus on developing economies and key stakeholders from both government and industry.

1.3.1 Objectives of the survey research

This report addresses stage 1 of the overall project objectives. The objectives of this report (Stage 1) are to identify the most important motorcycle safety issues in APEC economies and any current (including gender) barriers to addressing these issues. The needs assessment that was conducted included the distribution of a survey to all economies. The results from the survey (including sex disaggregated data as far as possible) are analysed and presented in this reference document.

1.4 Structure of the report

The report is structured around key chapters that focus on the methodology, survey results, survey outcomes and recommendations. The methodology includes details about the survey design and questionnaire development as well as the procedure used to distribute and follow-

up on the survey. Coding and analyse issues are also discussed with reference also to confidence in the data, missing data and common and different responses. The survey results are then presented and include details of the response rate and nature of responses. Further, details from each section of the survey are presented, including,

- Response rate
- Numbers of vehicles and licensing practices
- Death and injury statistics
- Rider and passenger characteristics
- Purpose of riding and engine size
- Trends and predictions
- Factors contributing to crashes and severity outcomes
- Interventions to improve motorcycle and scooter safety
- Case studies of successful initiatives.

A discussion chapter of outcomes draws on the key findings presented in the results chapter to outline the most important motorcycle safety issues in APEC economies, gender effects in motorcycling safety and current barriers to addressing motorcycle safety. All the findings are taken together to present recommendations for the development of the compendium.

2. METHOD

The methodology described in this chapter includes information regarding each of the following:

- Participant identification and selection
- Development and construction of the survey
- Survey distribution and follow-up procedures
- Coding and analysis of survey responses

The survey protocol was approved from the Queensland University of Technology Human Research Ethics Committee. The survey fell under the classification of low risk research.

2.1 Identification of participants

A representative from all APEC economies was to be approached to complete the survey. The Project Overseer (and other members of the Road Safety Group of the TPT-WG) took primary responsibility for identifying the most appropriate individuals within government or non-government organisations to send the survey to.

2.2 Development and construction of the survey

2.2.1 Development and identification of survey items

The development of survey items was informed by a preliminary literature review of currently available material that describes motorcycle and scooter safety issues. Where appropriate, some of the issues were disaggregated by sex. In addition and where appropriate, distinction was made between issues related to riders and passengers and those under or over 16 years of age (adults and children). There was consideration given (in consultation with the Project Overseer) about the most appropriate grouping and ordering of the survey items.

There were eight overall sections to the survey covering the following areas:

- Number of motorcycles and scooters and cars and licensing

- Injuries and deaths associated with motorcycle and scooter use
- Rider and passenger characteristics
- Purpose of riding and engine size
- Trends and predictions
- Factors contributing to crashes and severity outcomes
- Interventions to improve motorcycle and scooter safety
- Case studies of successful initiatives

As mentioned, issues of sex, passengers and rider distinctions and adults and children were elicited and as such the survey areas were often divided accordingly. In addition, respondents were asked to indicate their confidence in the accuracy of the data on a three-point scale (1 – uncertain, little data, 2 – reasonably certain, some data 3 – strong certainty, good data). Given potential for limited certainty with data space for comments on the data was provided. A copy of the survey is in Appendix B.

2.2.2 Identification of survey format

The questionnaire format needed to consider the format of distribution, the format of survey items (e.g. multiple choice, short answer etc.) and the language of survey items (e.g. terminology used, see Glossary, Appendix C). The survey also included instructions and information about how to complete items and provided an example completion of the first page of the survey from one economy. It was decided that the primary means of distribution of the survey was to email an electronic copy of the survey to APEC representatives. Participants would then have options to complete the survey electronically or print out and then mail or fax the survey to the Project Team. As such, this procedure then provided flexible options for the return of the survey for different organisations and economies.

Discussion was held with the Project Overseer particularly regarding the format of the survey and the language used for individual items within the survey. The inclusion of multiple sections within the survey facilitated distinction between key motorcycle and scooter safety issues, for example numbers of riders and licensing issues and injury and death statistics from motorcycle and scooter safety. Given potential differences in terminology of some of the key issues, it was decided to include a glossary of terms at the beginning of the document as well as seek the advice of the Project Overseer.

2.2.3 Selecting additional sources of data

Given the potential for conflicting responses from organisations within the same economy it was decided that a single point of contact would be made with each economy. The individual contact was then able to consult others or identify any additional data sources if required. There was also additional space on the survey to identify further contacts with regard to potential case studies..

2.3 Distribution of survey and follow-up procedures

The survey was distributed by the APEC TWT Working Group representative by email to the contacts in the Working Group in each economy by the Project Overseer. The email included an attachment of the survey and contact details of the CARRS-Q research team. A follow-up reminder email was sent to all APEC TWT-WG representatives after 2 months which included a thank you note to all those economies who had already responded.

2.4 Coding and analysis of questionnaire responses

The extent to which individual responses from each economy could be aggregated in the analysis was decided on an item-by-item basis. Primarily grouping was made between (a) high income economies and (b) middle and low income economies. Disaggregation of data was examined where possible, for example across sex, motorcycle or scooter user type (rider or passenger and age (those younger or older than 16 years).

The analyses comprised both qualitative and quantitative techniques with percentages, ratings and also quotations, where appropriate, to draw out the main themes and issues.

3. RESULTS

This chapter describes findings with regard to patterns of motorcycle and scooter registrations and licences held, the sex and age of riders and passengers and the death and injury statistics as a result of motorcycle and scooter use. The chapter also includes findings on predictions and trends of riding and use from the last ten years to the next ten years. Factors contributing to crashes and severity are outlined along with potential countermeasures that have been implemented or were identified as important to implement to address such crash risks. Where information is available, detail regarding challenges and facilitators to implementing particular countermeasures is described. Some comparisons are drawn with other motor vehicle and car use and where possible disaggregated by sex. There is however uncertainty identified by respondents in some of the data presented and in many cases respondents were unable to present any data. Approximately half of all APEC economies responded to the survey (11 responses received). Results are presented without naming individual economies to preserve the confidential nature of the data.

3.1 Motorcycles, scooters and cars

3.1.1 Registrations

A comparison was made between high income economies (HIEs) and low and middle income economies (LMIEs). Overall, there were fewer motorcycle and scooter riders (compared with car drivers) in HIEs relative to LMIEs. In HIEs there were between 9 and 33 times more cars than motorcycles (with the exception of one HIE in which there were four times the number of motorcycles than cars). In LMIEs there were typically more motorcycles than cars, with between 1.05 and 1.9 times more motorcycles than cars across the LMIEs economies. Almost all respondents had strong certainty with such registration data provided. One HIE and two LMIEs were reasonably certain about the data. Much of this data was taken from registration figures for the years between 2008 and 2009.

3.1.2 Licensing

All economies reported that, at least in some part of their jurisdiction, a licence was required. One HIE indicated that individual jurisdictions have authority but domestically a car licence was required and requirements for a motorcycle specific licence varied by jurisdictions. A similar pattern when comparing HIEs and LMIEs registration data was evident in the licensing data. There were between 3.7 and 6.6 times more car licence holders than motorcycle licence holders in HIEs (4 economies provided data). In another HIE there were considerably greater car licence holders (54 times as many). In LMIEs there were more, or similar numbers, of motorcycle licence holders compared with car licence holders (2 economies provided data). The level of certainty with this data ranged from two to three including both HIEs and LMIEs having reasonable to strong certainty about the data.

3.1.3 Number of riders and drivers

Respondents generally used registration data to estimate the number of riders of motorcycles and scooters and the number of car drivers. The alternative data source used to estimate the number of riders and drivers was licensing data. However one economy reported on data collected in its region that specifically addressed the number of riders and drivers and reported being reasonably certain of the accuracy of such data. The rate of riding in this economy (a HIE) was similar to the number of registered motorcycles however much lower than the number of licence holders (around 3.5 times more than licence holders).

The differences between number of car drivers, registered vehicles and number of licence holders varied across economies; in HIEs there were around three to four times more licence holders than registered motorcycles. There were similar number of licence holders and registrations for the two LMIEs who had available data. There were generally more car licence holders than registered cars (for 2 LMIEs and 1 HIE). There was however a HIE in which there were more registered cars than licence holders. Important however the data required for such calculations was available from only half the responding economies. Another three economies could not complete the section on numbers of riders and drivers.

3.1.4 Distance travelled

There was variability and missing data for the average distance ridden by motorcycle and scooter riders across economies. Primarily HIEs had an average distance ridden between

2,000 to 4,000 kilometres per year (with one HIE exception that reported citizens travelled on average 13,000 kilometres per year on a motorcycle or scooter). For the LMIEs there was information available from two of the LMIE respondents and they reported 16 and 429 kilometres per year travelled. With regard to data certainty, the LMIEs had strong certainty and the HIEs had reasonable certainty. In another LMIE the average trip distance was reported. This was estimated at 16km per trip.

3.1.5 Motorcycles and scooters as a proportion of the motor vehicle fleet

Some economies were able to provide data regarding the percentage of motorised vehicles that were motorcycles or scooters. For the HIEs this was between 3% and 6%, with one exception of 16%, and for the LMIEs the percentage of motorised vehicles that were motorcycles ranged between 51% and 68%. Few however were able to provide a disaggregation of the numbers of riders in the city (or urban) and countryside (or rural). Two HIEs who responded indicated that around two-thirds of the riding in the economy is done in the city and another HIE indicated close to half is done in the city (54%). One LMIE indicated that around seven times the amount of riding is done in the countryside compared with the city.

3.2 Death and injury statistics

3.2.1 Motorcycle and scooter deaths

Not all economies were able to provide data on death and injury statistics among motorcycle and scooter users (3 LMIEs provided some data and 5 HIEs provided some data). In the LMIEs motorcyclist deaths represented around 60% of all road user deaths. In the HIEs the range of motorcycle and scooter deaths as a proportion of all road user deaths ranged from 8.1% to 15% (with one exception whereby 48.4% of all road user deaths were motorcycle and scooter users). Motorcycle user deaths were greater than car user deaths for the LMIEs (around 2.7 to 2.9 times). In contrast among the HIEs, car deaths were greater than motorcycle user deaths with between 1.5 and 9 times more car user deaths than motorcycle user deaths (with the exception of one HIE whereby there were more motorcycle deaths, around 6 times the number of car deaths).

Few economies were able to disaggregate the data according to sex. However there were more motorcycle and scooter user deaths among males compared with females. HIEs reported male motorcycle and scooter users represented 90 to 93% of motorcycle deaths (with 2 to 3% female deaths).

The pattern of differences between deaths among males and females was different for passengers whereby for the five economies that were able to provide data; there were for the HIEs - 6% female and 1% male; 6% female and less than 1%, male; 2.2% female and 1.3% male; and 7% female and 14% male; and for the LMIE 1% female and 10% male passenger deaths of all motorcycle and scooter user deaths.

There were very few, less than 1% of under 16 year olds who died as a motorcycle and scooter user across the economies that provided data. However there were two exceptions, whereby approximately 8% of the motorcycle and scooter deaths were among those under 16 years. In one of these economies, licensing age was 15 years and below this age there were less than 2% of the motorcycle and scooter deaths among those under 15 years.

3.2.2 Motorcycle and scooter injuries

With regard to injury statistics there were few economies with available data. The percentage of all road users that were hospitalised from motorcycle or scooter use ranged from 10% to 65% across economies. This included 3 HIEs between 10% and 20% and 1 HIE at 54% and a LMIE at 65%. There were more riders than passengers who were hospitalised due to injuries associated with motorcycle or scooter use (with 67% to 95% of motorcycle and scooter user injuries being to riders). This does not take into account potential differences in exposure between riders and passengers.

3.3 Rider and passenger characteristics: sex and age

There were few economies that reported data on the percentage of motorcycle riders who were male and the percentage of riders who were female. Most economies that provided data indicated there was reasonable certainty about the data (rated 2 out of 3). With regard to the two LMIEs that responded and reported, 58% and 73% were male and in the HIEs that responded 78% and 96% of riders were reported to be male. One other LMIE was able to provide absolute figures of male and female riders, which when divided by the number of

licence holders in the economy, represented 70% male riders and 30% female riders. For the few economies that were able to provide such data, very few riders across all economies were under the age of 16 years (except in the case of one economy where licensing age is less than 16 years). Another economy reported 23% of motorcycle and scooter users injured were under 16 years although indicated uncertainty, little data (data was assumed to represent the same number as fatalities of young people).

With regard to passenger characteristics, only two economies provided information. A HIE reported 16% of motorcyclists were likely to carry passengers and a LMIE reported this to be 33%. Reasonable certainty, good data was attributed to these percentages. These economies were also unable to disaggregate passenger use by sex.

3.4 Purpose of riding

There was one economy that provided information about the purpose of riding evidenced in their economy. In this case, 11% was for business use, 23% for use riding to and from work and 66% for personal and other use. It is also noted that there was reasonable certainty with the data.

3.5 Engine size of motorcycles and scooters ridden

There were a number of economies that were unable to provide information about the use of motorcycles and scooters disaggregated according to engine capacity (see table 1). It was also noted that data quality was rated as reasonable or strong certainty in accuracy. One of the LMIEs was able to disaggregate the use of different capacity engine size by sex. For this economy, females typically rode motorcycles and scooters with lower engine capacity than males. For engine capacities of 50cc or less, 65% of females and 15% of males used these motorcycles, 20% of females and 50% of males rode between 51 and 125cc motorcycles, 10% of females and 25% of males rode 126 to 250cc motorcycles and 5% of females and 10% of males rode motorcycles greater than 251cc.

Table 1. Percentages of each HIE and LMIE response to engine capacity

	<50cc[#]	51-125cc^		126-250cc	>250c[†]
HIE	<1, 28, 53	29, 4, 44		50, 15	22, 55, 3
LMIE	<1, 10, 28	89, 45	-72*-	10, 25	<1, 20, >15

Note. *72% ride motorcycles between 51cc and 250cc; one HIE classified as [#]<60cc, [^]<100cc, [†]>260cc

In addition, two LMIEs were able to provide data on the breakdown of moped, scooter and motorcycle use. There were fewest mopeds (10%, 28%) and many more scooters (30%, 62%) and motorcycles (10%, 60%). One HIE provided some data regarding new motorcycles/scooters/all terrain vehicles (ATVs) sold in a twelve month period. From this data, 37% were road motorcycles, 37% were off-road motorcycles, 16% were ATVs and 10% were scooters. Certainty around such data ranged from uncertain to certain depending on the economy and across individual survey items in this section. Another economy indicated this data was unavailable but included estimates based on data on motorcycle engine capacity.

3.6 Trends and predictions

Many economies, particularly LMIEs, were able to provide estimates of the trends and predictions of use (see table 2). In particular, overall motorcycle use. For all respondents, an increase in use was the trend across the previous 10 years with the exception of one HIE that indicated use had remained the same. For two HIEs that were able to detail additional trends, both agreed that there will likely be an increase in motorcycle use for commuting, work and recreation for males and females and as an aggregate of both males and females over the next ten years. Another HIE however indicated an increase except in using motorcycles for work and overall use for males, and a likely decrease among all female riding.

Among those LMIEs that responded, there were two economies that estimated that motorcycle and scooter use would stay the same for use in commuting and work-related activities for males and increase for females and two economies that indicated riding would increase for commuting and recreation. For males it was predicted by two LMIEs to stay the

same and by two other LMIEs to increase. However for travel to and from work it was predicted by three LMIEs to stay the same and by one to increase. For females a greater increase in riding was predicted for recreation (3 of 4 predicted an increase) and for riding for work and commuting two LMIEs predicted it would stay the same and by two an increase was predicted.

Table 2. Number of economies reporting trends and predictions of motorcycle use

	Increase	Stayed the same	Decrease
Past 10 years			
General motorcycle use			
Overall	7	0	0
Males	6	0	0
Females	6	0	0
Next 10 years			
General motorcycle use			
Overall	7	0	0
Males	6	0	0
Females	6	0	0
Commuting			
Overall	4	2	0
Males	4	2	0
Females	4	2	0
Work			
Overall	4	2	0
Males	3	3	0
Females	4	2	0
Recreation			
Overall	5	1	0
Males	4	2	0
Females	5	1	0

3.7 Factors contributing to crashes and severity outcomes leading to death and injury

To examine the relative importance of causes of death and injury from motorcycle or scooter use across APEC economies in the last year, a list of likely causes were presented to participants who rated the cause as a high, medium or low importance in their economy and rated whether the factor was of greater or lesser important for males or females. There were many differences between the HIEs and LMIEs however there were some similarities (see Table 2).

3.7.1 Speeding and drink driving

All economies reported that speeding was of high importance in causing both death and injury among motorcycle and scooter users with the exception of one LMIE whereby speeding was of medium importance in causing injury crashes. Drink driving similarly was considered of high importance in causing both death and injury by all economies excluding two HIEs that rated it of medium importance in causing injury and one LMIE rated it of low importance in causing crashes leading to death or injury.

3.7.2 Other rider factors

A number of economies indicated that rider factors were of high importance in causing crashes leading to death and injury. Rider rule violation was rated of high importance by four of five LMIEs (the other rated the factor to be of medium importance). Half of the LMIEs indicated that unlicenced riding, rider inexperience, rider's lack of road rule knowledge, rider decision making errors, and rider fatigue and distraction were of high importance in leading to crashes involving deaths. The remainder indicated they were of medium importance with the exception of rider fatigue rated of low importance by one LMIE. For the HIEs, such factors were typically considered of medium importance in leading to crashes involving deaths. Unlicensed riding however was more commonly rated of high importance among HIEs. Rider distraction and fatigue were rated of low importance by one HIE. Also rated of low importance by at least one HIE were unlicensed riding, rider lack of knowledge of road rules, rider decision making error, rider road rule violations, and rider inexperience (rated by two HIE). Riders' lack of knowledge of road rules was rated as an unknown contributory factor by many HIEs.

With regard to injury, more causes were rated of medium importance. Few were rated of high importance, with the exception of unlicensed riding (2 HIEs), rider road rule violation (3 LMIE), rider distraction (1 HIE, 2 LMIEs) and rider fatigue (1 HIE and 1 LMIEs). There were also a number of causes rated of low importance; unlicensed riding (1 HIE), rider road rule violation (1 HIE), rider lack of knowledge (1HIE), rider decision making error and rider inexperience (1 HIE).

3.7.3 Other vehicle factors

Around half of the LMIE rated all the other vehicle factors as of high importance as causes of death in a motorcycle or scooter crashes; including other vehicle drivers', decision making error, rule violation, distraction or fatigue. The remaining LMIEs rated these factors of medium importance with the exception of fatigue which was rated of low importance by one LMIE or they were rated as being of unknown importance.

For HIEs other vehicle factors were generally rated as being of medium or low importance (decision making error - 2 medium, 1 low; rule violation - 4 medium; distraction - 2 medium, 1 low and fatigue - 2 low and 1 medium).

With regard to causes of crashes in which there was serious injury, primarily other vehicle factors were rated with high or medium importance, with one exception of other vehicle user factor; decision making error (1 HIE rated as low), other vehicle user distraction (2 LMIEs rated as high, 1 HIE rated as low); violation of road rules (1 HIE), distraction (1 HIE).

3.7.4 Motorcycle factors

The overloading of motorcycles or scooters and motorcycle defects were rated by most to be of low importance (with the exception of 2 LMIEs rating both of high importance) in crashes causing deaths. With regard to injuries however, motorcycle overloading and defects were rated of high importance for two LMIEs and low importance for two LMIEs and two HIEs as a cause of crashes resulting in injury. Another HIE however rated defects as being of medium importance in causing crashes.

3.7.5 Environmental factors

Environmental factors included weather conditions, poor road surface and animals on the road. Many of the environmental factors were rated with low importance in causing a motorcycle or scooter crash that resulted in death for HIEs (with the exception of road surface rated as medium for one HIE and weather conditions rated as high importance for another HIE). For the LMIEs there was a mixed pattern for weather conditions (2 rated as high, 1 as medium and 1 as low importance). With regard to road surface and animals on the road there were rated as highly important (by 1), of medium importance (by 2) and of low importance (by 1).

However with regard to such factors as causes of crashes resulting in serious injury all were rated with high importance by LMIEs. All the HIE reported these factors were of low importance (with one exception of a HIE reporting road surface was of medium importance and one HIE rating weather conditions as being of high importance). The remaining responding LMIE rated weather conditions and road surface to be of medium importance.

3.7.6 Additional factors

Some economies provided additional causal factors that were not originally specified. These additional details included, for two HIEs, important factors resulting in death of; losing control of the motorcycle and for one HIE failing to keep a proper look out for other vehicles or road users and disobeying traffic light signals resulting in collision with other vehicles.

In addition, two LMIEs provided further detail of factors of high importance in causing crashes resulting in death; driver or rider distraction by making calls or texting and diminishing reaction and cognitive function for older drivers of medium importance for crashes resulting in death.

Further, for injury, the additional factors included, losing control of the motorcycle (44.8%), failing to keep a proper look out for other vehicles or road users (28.5%) and 4.9% failing to give way to traffic with right of way.

3.7.7 Sex disaggregation of causes of crashes resulting in injury or death

Predominantly crash factors were seen to be of equal importance for males and females (see Table 3). The factors most often reported as a cause of crash resulting in injury or death to be more important for males than for females was speeding, riding after drinking alcohol (or taking drugs) and unlicenced riding. Such differentiation was evident across HIEs and LMIEs (although two LMIEs reported these to be of equal importance for males and females). A table is reported in Appendix C of the different responses according to HIEs and LMIEs.

In addition, one HIE reported that for males compared with females the cause of crashes by loss control of the vehicle, violation of road rules by rider, rider distracted motorcycle defects, poor road surface and animals on the road were of higher importance. Whereas in this economy, for females compared with males; loss of control was a more important cause of injury crashes and rider decision making error was of greater importance for crashes resulting in deaths.

In one LMIE other male and female differences were noted, including greater importance of crashes leading to death or injury for road rule violations by the rider and greater importance for females than males included rider inexperience and rider decision making error.

Table 3. Overall rating of importance of selected causes of death from a motorcycle or scooter user in APEC economies in the last year[a]

	Importance in crashes involving death			Importance in crashes involving serious injury		
	High	Medium	Low	High	Medium	Low
Speeding	8	0	0	6	1	0
Drink riding (or drug riding)	9	0	1	5	2	1
Unlicenced riding	6	2	1	4	2	2
Rider inexperience	2	5	1	2	2	1
Rider –road rules lack knowledge	2	2	1	1	3	1
Rider – decision making error	2	5	1	2	5	0
Rider – road rule violation	4	4	1	3	4	1
Rider - distraction	2	3	1	3	3	0
Rider - fatigue	2	1	4	3	2	0
OV – decision making error	2	3	2	3	2	1
OV – rule violation	2	4	1	2	2	0
OV - distraction	2	2	2	1	2	2
OV - fatigue	2	1	3	2	1	3
Overloading of motorcycle	2	0	3	2	0	4
Motorcycle defect	2	1	4	1	2	4
Weather condition	3	1	4	2	2	3
Road surface	1	3	4	2	3	0

3.8 Interventions to improve motorcycle and scooter safety

Respondents were asked to indicate the most important contributory factor to motorcycle scooter crashes and injuries, followed by the three potentially most effective interventions and whether or not it had been implemented. Respondents were also asked to indicate the importance of certain barriers to the implementation of the intervention on a five point scale (1- '*not at all important*' to 5 – '*very important*'). Respondents were then asked to indicate

the next two most important contributory factors to motorcycle and scooter crashes and injuries and again detail potentially effective interventions and barriers.

3.8.1 Speeding

The most important contributory factor for the responding HIEs was typically speeding. Two economies provided detail about potential interventions and barriers. Another HIE also identified speeding as an important human factor and identified important barriers to implementation as unsuitable climate and geography (rated 4 out of 5) with less important barriers as costs to the individuals, constitutionally or legally unacceptable and culturally inappropriate (rated 2 out of 5). For the first HIE, the potentially effective interventions included;

(1) enforcement through frontal identification, not implemented due to rider opposition and being technically unrealistic (identified as very important barriers), and

(2) better alignments of speed limits with road infrastructure, not implemented due to costs for government, rider opposition and lack of perceived need (identified as very important barriers).

For the second responding economy, the potentially effective interventions included;

(1) increased targeted enforcement (not implemented). The highest rated important barriers included; costs to individual, costs to government, rider opposition, perceived lack of effectiveness and being technically unrealistic (rated 3 out 5) and the lowest rated barriers included; being constitutionally or legally unacceptable, culturally inappropriate, perceived lack of need, unsuitable climate and geography (rated 1 out of 5).

(2) The second potential intervention identified by this economy was, targeted speed campaigns for motorcyclists (not implemented). The highest rated important barriers included; costs to government, perceived lack of effectiveness (rated 4 out 5) and the lowest rated barriers included; costs to individual, being technically unrealistic, constitutionally or legally unacceptable, culturally inappropriate, unsuitable climate and geography (rated 1 out of 5).

(3) The third most effective potential intervention reported was, front identifiers (not implemented). The highest rated important barriers included; rider opposition, being

technically unrealistic (rated 5 out 5) and the lowest rated barriers included; culturally inappropriate, unsuitable climate and geography (rated 1 out of 5).

3.8.2 Alcohol use and riding

Alcohol impaired riding was identified by one HIE as the second most important contributor and one HIE and one LMIE as the third most important contributor in causing motorcycle and scooter crashes and injuries. Another HIE also identified drink riding (or drug riding) as the second most important human factor and identified important barriers to implementation as costs to government, rider opposition and lack of perceived effectiveness (rated 3 out of 5) with less important barriers as costs to the individuals, constitutionally or legally unacceptable, unsuitable climate and geography, lack of perceived need, technically unrealistic and culturally inappropriate (rated 2 out of 5).

The potential interventions identified included;

(1) the introduction of zero BAC (not implemented). Identified very important barriers to implementation included, for one HIE, costs for government, rider opposition and being culturally inappropriate and for another HIE, rider opposition and perceived lack of need. This HIE also noted of little importance as barriers were, it being culturally inappropriate, unsuitable climate, and unsuitable geography.

(2) An additional intervention included strengthening random breath testing (not implemented) with very important barriers including, costs for government and rider opposition.

(3) Another HIE, indicated that reducing the legal BAC limit from 0.08 to 0.05 (not implemented) was the second most important intervention. The more important barriers included, costs to the individual and rider opposition (rated 4 out of 5) and least important barriers included being constitutionally or legally unacceptable, being technically unrealistic, culturally inappropriate, unsuitable climate, and unsuitable geography (rated 1 out of 5).

(4) This HIE also indicated a third potentially most effective intervention; alcohol interlocks (not implemented). The more important barriers to implementation included, costs to individual and being technically unrealistic (rated 4 out of 5) and least important barriers as constitutionally or legally unacceptable, culturally inappropriate, unsuitable climate, and unsuitable geography (rated 1 out of 5).

One LMIE also identified three possible most effective interventions to reducing alcohol related crashes to be;

(1) improve enforcement (implemented) with the most important barriers indentified being; unsuitable climate and geography (rated 4 out of 5) and the least important being constitutionally or legally unacceptable and perceived lack of need;

(2) improve education and publicity (implemented) with the most important barriers identified being costs to the individual (rated 4 out of 5) and least important being rider opposition, constitutionally or legally unacceptable, culturally unacceptable, perceived lack of need or effectiveness and unsuitable geography (rated 1 out of 5).

(2) Another important potentially effective intervention was implement indepth investigation (implemented) with the most important barriers indentified being costs to individual and government (rated 3 out of 5) and least important barriers including, rider opposition, constitutionally or legally unacceptable and perceived lack of need (rated 1 out of 5).

3.8.3 Inattention

Inattention was rated by one HIE as the second most important contributor and by another HIE as the most important contributor. Further, one LMIE rated inattention as an important contributor.

One intervention indicated by a HIE as potentially effective included, implementing a GDLS for novice motorcyclists (implemented). Of note however is that this HIE rated inattention alongside driving too fast, that is reported the important contributor as '*inattention/ driving too fast'*. Important barriers to implementation were costs to individual and government (rated 3 out of 5) and least important barriers included, being constitutionally or legally unacceptable, technically unrealistic, culturally inappropriate, unsuitable climate, and unsuitable geography (rated 1 out of 5).

This HIE also indicated the second most effective intervention would be compulsory rider training (not implemented). The important barriers to implementation were costs to the individual and perceived lack of effectiveness (rated 4 out of 5) and least important being

rider opposition, constitutionally or legally unacceptable, culturally unacceptable, technically unrealistic and unsuitable climate and geography (rated 1 out of 5).

One LMIE indicated potentially effective interventions to inattention included;

(1) improved enforcement (implemented) with the most important barriers including unsuitable climate, geography (rated 4 out of 5) and least important as constitutionally/ legally unacceptable and perceived lack of need (rated 1 out of 5);

(2) improve education and publicity (implemented) with the most important barriers including costs to the individual (rated 4 out of 5) and rider opposition, constitutionally/ legally unacceptable, lack of perceived need, culturally inappropriate and unsuitable geography (rated 1 out of 5);

(3) implement in-depth investigation (implemented) with the most important barriers including costs to citizens, government, lack of perceived effectiveness, technically unrealistic, unsuitable climate, unsuitable geography (rated 3 out of 5) and rider opposition, constitutionally or legally unacceptable, culturally inappropriate, unsuitable climate and unsuitable geography (rated 1 out of 5);

3.8.4 Unlicensed riding

Unlicensed riding was identified by one HIE as an important contributing factor. The potentially most effective intervention was reported as greater enforcement (not implemented). The costs for government was identified as a very important barrier to implementation.

Another HIE also identified unlicensed riding as the third most important human factor and identified important barriers to implementation as unsuitable climate and geography (rated 4 out of 5) with less important barriers as costs to the individuals, constitutionally or legally unacceptable, and technically unrealistic (rated 2 out of 5).

3.8.5 Loss of control

Loss of control was identified by a HIE and a LMIE as an important contributing factor. However there was no indication of ratings of barriers to implementation.

3.8.6 Failure to yield

One LMIE identified failure to yield as an important contributory factor with three potential effective interventions;

(1) improve enforcement (implemented). The most important barrier to implementation included, unsuitable climate and geography (rated 4 out of 5) and least important barriers included, constitutionally or legally unacceptable, and perceived lack of need (rated 1 out of 5);

(2) improve education and publicity (implemented). The most important barrier to implementation included, costs to the individual (rated 4 out of 5) and least important barriers included, rider opposition, constitutionally or legally unacceptable, lack of perceived need, culturally inappropriate and unsuitable geography (rated 1 out of 5);

(3) implement in-depth investigation (implemented). The most important barrier were costs to citizens and government, lack of perceived effectiveness, technically unrealistic, unsuitable climate and unsuitable geography (rated 3 out of 5) and least important barriers included, rider opposition, constitutionally or legally unacceptable, culturally inappropriate, unsuitable climate and unsuitable geography (rated 1 out of 5).

3.8.7 Road rules and legislation

One LMIE indicated a potentially effective contributory factor includes, formulation and implementation of *specific 'rules and regulations* on the use and operation of motorcycles and scooters on highways' in 2008. This implemented approach includes (1) mandatory helmets with most important barriers being costs for the individual and least important being, costs for government, constitutionally or legally unacceptable, culturally inappropriate, perceived lack of need and technically unrealistic and (2) prohibition against lane-splitting (implemented). All barriers were rated 5 out of 5 on importance for this later intervention.

A HIE also identified *road rules* as an important contributory factor with potentially effective interventions focused on change associated with (1) road rules, (2) the law and (3) the system (implemented). For this economy the most important barriers were costs to the individual (rated either 4 or 5 out of 5), unsuitable climate or geography (rated 4 out 5) and with regard to targeting the law, rider opposition, culturally inappropriate and perceived lack of need were important barriers (rated 4 out of 5).

Another HIE identified *enforcement* as important contributory factor with potentially effective interventions focused on (1) planning and strategising, (2) advanced equipment and systems and (3) manpower (all implemented). For this economy the most important barriers were overall costs to the government or costs to the individual (rated either 5 out of 5). All other factors were rated of little importance as a barrier (rated 1 out of 5).

3.8.8 Other rider factors

One LMIE identified a number of *rider factors* as most important contributors to motorcycle and scooter crashes and injuries. This included helmet wearing and wearing a coloured jacket (implemented). All barriers were rated 4 out of 5 on importance.

In addition, a HIE identified a number of *poor riding factors* as most important contributors to motorcycle and scooter crashes and injuries. Potential interventions included (1) enforcement, (2) graduated licensing system (GLS) and (3) road safety education (all implemented except GLS). The important barriers for each included costs for government (rated 3 or 5 out of 5). All other factors were rated of little importance as a barrier (rated 1 out of 5).

3.8.9 Vehicle and environment factors

One LMIE identified a number of *vehicle factors* as most important contributors to motorcycle and scooter crashes and injuries. This included brake (not implemented), flashlight (headlight) and rear-view mirror (not implemented). All barriers were rated 4 out of 5 on importance.

This economy also identified *infrastructure* issues as an important contributing factor to motorcycle and scooter crashes and injuries, including traffic sign, traffic light and road type (all implemented).

A HIE also identified *road environment conditions* as an important contributing factor to motorcycle and scooter crashes and injuries, including weather conditions, road section and road conditions as important areas of intervention (implemented). For these intervention areas important barriers were more commonly unsuitable geography and climate (rated 4 out of 5) and less important were costs to the individual, constitutionally or legally unacceptable, culturally unacceptable and technically unrealistic (rated 2 out of 5). For another HIE, key intervention areas for road environment factors included (1) motorcycle only lanes, (2) black

spot programs and (3) auditing (all implemented). The important barriers for each included costs for government (rated 5 out of 5). All other factors were rated of little importance as a barrier (rated 1 out of 5).

3.9 Interventions to improve motorcycle and scooter safety

Participants were asked to rate whether a number of motorcycle and scooter interventions that had been implemented in their economy and the coverage of such implementation (geographically, population compliant). A summary of this data is provided in Table 4.

3.9.1 Helmet wearing and protective clothing

Overall for those that responded, at least some of a jurisdiction in each economy had compulsory helmet wearing for riders and passengers and many of the HIEs also indicated helmet design standards had been implemented. Two HIEs and one LMIE indicated that there was no implementation of promotion of protective clothing implemented with two HIEs and two LMIEs indicating that it had been implemented. The remaining respondents did not provide an answer.

3.9.2 Licensing and registration

All economies indicated that a licence was required to ride a motorcycle or scooter with most economies indicating that there was a graduated licensing system for motorcycle or scooter riding (3 HIEs, 4 LMIEs – yes; 1 HIE, 1 LMIE – no). All economies also indicated that registration of was required.

3.9.3 Inspection and environmental solutions

For both compulsory periodic inspection of motorcycles or scooters and random roadside inspection of motorcycles and scooters there were three HIEs and three LMIEs who indicated that this had been implemented and two HIEs and two LMIEs who indicated that they had not had such processes implemented.

With regard to implementation of motorcycle only lanes, one HIE and three LMIEs had implemented the intervention and three HIEs and one LMIE had not implemented such an intervention. Further, one HIE and two LMIE had implemented motorcycle black spot programs and three HIEs and two LMIE had not.

3.9.4 Educational campaigns

Generally all economies had implemented sharing the road and campaigns to reduce riding after consuming alcohol or drugs with the exception of one LMIE and one HIE. Similarly economies had typically implemented enforcement programs specific to motorcycles, with the exception of two HIEs.

Table 4. Overall implementation of various countermeasures across APEC economies[a]

	Number of economies where implemented		Number of economies per coverage across geographical area			Range of % compliance where implemented
	Yes	No	Entire	Part	None	
Compulsory helmet wearing for riders	10 [b]	0	8	1	1	3-100 (mean = 64)
Compulsory helmet wearing for passengers	8	0	7	2	0	3-100 (mean = 61)
Helmet design standards	5	1	3	2	1	3-100 (mean = 50)
Promotion of protective clothing	4	2	2	0	2	Nil responses
Motorcycle licence requirement	10	0	7	0	0	100[c]
Graduated licensing system for motorcyclists	6	3	6	0	4	0-100 [c]
Motorcycle registration requirement	10	0	6	1	0	100 [c]
Compulsory periodic inspection of motorcycles	6	3	4	2	0	100 [c]
Random roadside motorcycle inspections	5	2	2	2	1	2-100 (median = 100)
Motorcycle only lanes	4	3	1	2	2	Nil responses
Motorcycle black spot programs	3	4	2	1	2	Nil responses
Sharing the road campaigns	7	1	2	4	1	Nil responses
Enforcement programs (specific to motorcycles)	6	2	4	2	1	Nil responses
Campaigns to reduce alcohol and drug riding	9	1	5	3	1	Nil responses

Note. [a]Data not available from all economies, [b]varies by jurisdiction within 2/3 covered, [c] responses from 2 or fewer economies, some of the nil responses also include *don't know* responses

4. DISCUSSION

The aim of this research was to identify important motorcycle safety issues in APEC economies and any current (including gender) barriers to addressing these issues. A needs assessment was carried out by means of a survey sent to all economies. The results from the survey (including sex disaggregated data as far as possible) are discussed in the sub-sections below.

APEC economies differ in terms of the proportion of vehicles that are motorcycles and scooters, the purposes for which they are used and the characteristics of riders and passengers. These differences are likely to affect the contribution of factors such as risk taking, rider impairment, and violation of right of way by other drivers to crash occurrence and severity. Use factors and the contributory factors to crashes must be considered, along with cultural and governmental factors, when selecting appropriate safety measures for motorcycles and scooters. Yet the fundamental vulnerability of riders and passengers is common to all economies and provides a clear rationale to focus on improving the degree of protection provided to riders and passengers by better and more widespread use of effective helmets and protective clothing.

4.1 Motorcycle and scooter use

The diversity of importance of motorcycles and scooters across the APEC economies is striking. Many of the APEC economies are among the jurisdictions in the world with the greatest use of motorcycles and scooters. On an absolute scale, China has the most powered-two wheelers in the world, followed by Indonesia, and then Thailand (Rogers, 2008). Overall, the APEC economies represent a large amount of the world's motorcycle use and therefore the compendium of best practice has the potential to make a major difference.

Consistent with other reports, the survey showed that LMIEs typically have greater motorcycle use compared with car use than HIEs. This was evident in both the licensing and registration data. HIEs typically had more than 20 times more cars than motorcycles and more than 4 times the number of licenced car drivers whereas in LMIEs there were 1.0 to 1.9 times more motorcycles and similar numbers of licence holders. The survey findings thus

confirm the reliance on motorcycles and scooters among many APEC economies and the potential safety needs across APEC.

The licensing and registration data provides additional information that could be used to understand the pattern of motorcycle and scooter use in economies. For example, in HIEs there were around three to four times more licence holders than registered motorcycles however in the LMIEs the numbers of licence holder and registered vehicles was similar. The less ownership of motorcycles (registered) compared with those licensed to ride suggests that many HIE riders may not actively ride or may not ride on a regular basis. Of note, is that car registration figures and car licensing figures are somewhat similar for HIEs. The pattern of riding and licensing provides salient data for countermeasures. Riding that is done regularly perhaps affects the skills and attitudes of riders and thus the likely training and education needs of different riders.

Little data was available for most economies with regard to the location in which riding is commonly undertaken, that is, whether it was predominantly concentrated in the city or urban areas compared with countryside or rural areas. However for the HIE that responded, it was indicated that there was more city riding than countryside riding whereas the single LMIE that responded indicated more countryside riding than city riding.

Similarly there was little data available regarding the disaggregate use of motorcycles and scooters for recreation, work or commuting. One economy was able to provide some information and this HIE reported that the majority of riding was for personal use (66%) with only 11% for business and 23% for commuting. There is however literature that suggests this pattern is common among high income countries. Such limited data however hinders some conclusions that can be drawn about the likely effectiveness of different countermeasures as they relate to the type of motorcycle use undertaken in economies. For example countermeasures targeted at reduced alcohol use (as one of the commonly identified causes of crashes) may differ depending on whether riding is done for work or commuting compared with recreation. It may be more prevalent during recreational riding compared with riding to commute.

Related to the type of trip more commonly undertaken, is potentially the size of the motorcycle ridden. Thus consistent with the findings that citizens of HIEs were more likely to ride for personal use is that they are also more likely to ride motorcycles of a larger engine

cubic capacity (cc). A larger motorcycle might be more suited to recreation riding for many pragmatic reasons. The findings from this survey showed that LMIEs more commonly rode motorcycles with a smaller engine capacity (particularly those less than 125cc) and HIEs more commonly rode motorcycles with a larger engine capacity (particularly those greater than 126cc). There is likely to be differing countermeasures with predominantly small motorcycles ridden to commute for example, implementing particular engineering solutions such as motorcycle only lanes may be more appropriate in certain regions and be of a certain size.

A key implication of such proportionally greater riding in LMIEs is that a greater proportion of the population is potentially more vulnerable to injury and death. Around the world, motorcycle and scooter users are at greater risk of injury and death than car users. The focus on the car for HIEs also suggests potentially different reasons or motivations for riding and differing dependence on the motorcycle as a method of transportation.

4.3 Trends in motorcycle and scooter use

For the responding economies there was consensus that motorcycle and scooter use has increased over the past ten years. This also held true for economies who were able to present the disaggregated data by sex. Both male and female use had typically increased over the past ten years. The increase in use over the past ten years had the potential to test resources of economies in terms of implementing safety measures for the increasing number of motorcycle and scooter users.

For the next ten years it was typically predicted that motorcycle and scooter use would continue to increase. There was however always an exception of around two LMIEs indicating use for both males and females for work or commuting is likely to stay the same. However it was reported in only one economy (a LMIE) that use for recreation would stay the same for males or females, the remainder reported it would likely increase in the ten period. The overall predicted increase suggests that motorcycle and scooter safety will continue to be an important issue for economies and potential high priorities in terms of safe travelling.

4.4 Motorcycle and scooter related deaths and injuries

Overall, most economies were able to provide data on the number of motorcycle and scooter deaths occurring over a year. The percentage of motorcycle and scooter user deaths of all road users was considerably higher among the LMIEs. Such differences are likely to a large extent reflect the increased riding in the LMIEs however it might not reflect the entire picture with potential for increased vulnerability among motorcycle users compared with car users. Around 60% of all road user deaths were related to motorcycle or scooter use in LMIEs yet the licensing and registration data indicate similar to 1.9 times the use of cars. Such vulnerability among motorcyclists represents a key need to develop and promote safety. While primarily deaths occurred among riders rather than passengers, there were still between 10% and 20% of all motorcycle deaths across the economies that were passengers.

With regard to the age of riders, most economies reported that there were very few riders under the age of 16 years. A few economies noted that licensing age was a few years later at 18 years. There were few under 16 year old deaths. In one economy in which there were around 8% of motorcycle fatalities among the under 16 year olds it was also noted that licensing age was 15 years. The few young persons who are injured or killed at this age suggests that countermeasures should focus riders of licensing age. Further, such data also potentially indicates the safety implications of a higher licensing age.

Taken together, these findings suggest motorcycle and scooters are vulnerable road users. Across economies there are many deaths and serious injuries that warrant the development and implementation of effective countermeasures.

4.5 Contributory factors to crashes

In order to develop countermeasures that have relevance and meet the specific needs of economies an examination of important contributory factors to motorcycle and scooter crashes was undertaken. Whilst there was variation in the importance of contributory factors across the responding economies, there was clear importance given by all of the importance of speeding in motorcycle crashes. Further riding after consuming alcohol was almost always noted as a key contributory factor. The third more commonly reported contributory factor was unlicensed riding recognised by most as a key contributory factor. Such key factors may represent an overall focus of potential countermeasures.

Selected other rider factors were also noted of high importance, particularly by LMIEs. This included factors such as rider inexperience, rider's lack of knowledge of road rules, rider decision making errors and rider distraction. There was less consensus of the importance of rider fatigue as a contributory factor. Such factors were generally noted as being of medium or low importance for the HIEs. Similarly potentially contributory factors from another vehicle were typically rated as being of medium or low importance. This included factors such as other vehicle drivers' decision making, rule violation and distraction. Again, fatigue was more commonly identified as being of low importance. Environmental factors and those factors associated with the motorcycle itself were typically rated as being of low importance and sometimes of medium importance across economies.

The diversity of importance among economies on some rider, other vehicle and environment factors suggests there is potential for different countermeasures to be a priority in different regions. These factors however have the potential to interact with some of the higher priority factors. For example, speeding and poor road conditions may combine to increase crash risk. Thus rather than being isolated, the potential priorities of interventions might be include targets of a combination of factors.

4.6 Countermeasures

Economies also differ with respect to factors which influence both their current motorcycle safety concerns and the safety measures that have been implemented, e.g. the effectiveness of enforcement, the budget and governance capacity of government agencies, etc (King, 2007). There was however evidence of repeated support for enforcement as an effective countermeasure. Whilst this is consistent with the literature, the survey data was able to provide information about the issues aligned with enforcement countermeasures and specific barriers to implementing greater enforcement for particular risk issues. Greater enforcement was identified as a potentially effective countermeasure for reducing speeding, drink riding, unlicensed riding, failure to yield and inattention. Barriers to such enforcement centred on rider opposition, technical issues (e.g. front identifiers), unsuitable geography and climate and costs to government. The importance of such barriers however differed by economies suggesting that the promotion of enforcement across economies would differ.

In addition, education, training and information provision through campaigns were seen as a potentially effective countermeasure to a number of key issues. However across a number of

economies costs to the individual, costs to government and perceived lack of effectiveness were identified as potential barriers. Additionally, a number of legislative countermeasures were proposed or identified as being potentially effective for example, altering speed limits, reducing legal blood alcohol content (BAC) and introducing a graduated licensing system.

The identification and reporting of barriers to such countermeasures provides information about the potential implementation effectiveness for countermeasures in particular economies. The recognition of such issues also provides key data on the issues that would need to be clarified and considered in implementing particular countermeasures in the different economies. For example with reducing BAC, important barriers were identified as being rider opposition and costs to the individual. In introducing any reduced BAC strategies such barriers would need to be included in the proposed strategy if the implementation was likely to be effective.

4.7 Differences between males and females

There was little data available from many economies that could be disaggregated by sex. There was however a clear overall pattern of more males than female motorcycle and scooter users across all economies. Of note also, is that there was a general pattern of smaller motorcycles ridden by females. Although two economies were able to provide estimates on the number of motorcycles with passengers (16% and 33%) there were no economies that were able to provide sex disaggregation for this data. Few economies were able to provide data, however 85% of females typically rode motorcycles less than 125cc whereas 65% of males were riding motorcycles of a similar engine capacity. The potential tailoring of safety strategies would thus need to consider the potentially different motorcycle and scooters ridden by males and females. Perhaps importantly greater detail of information may need to be collected.

With regard to differences in trends, two LMIEs indicated use for both males and females for work or commuting is likely to stay the same. However it was reported in only one economy (a LMIE) that use for recreation would stay the same for males or females, the remainder reported it would likely increase in the ten period.

The majority of the rider deaths occur among males and this holds true for LMIEs and HIEs. The picture of disaggregated passenger deaths however is a little more mixed with generally more economies reporting more female passenger deaths than males. With regard to

perceptions of causes of crashes resulting in death or injury, generally factors were considered equally important for both male and females. However, in the case of speeding, drink riding and unlicenced riding, such factors were considered more important for males in causing crashes leading to death. In addition to such factors, rider decision making errors were considered more important for males in leading to crashes resulting in injury.

There were a number of economies who did not have available data that could be disaggregated which has key implications for data collection and reporting on motorcycle and scooter issues to understand the scope of the problem and necessary safety measures.

4.8 Research limitations

There are a number of limitations that must be considered in light of the findings of the research. With regard to participation rates, around half of APEC economies responded to the survey and whilst an even representation was obtained across high and middle/ low income economies there may are some limits to generalizability across APEC. There are also potential limitations with the responding economies not reporting at each item. While this is likely to reflect an absence of data collected it is not known for certain. Attempts were made to encourage respondents to report 'best guesses' by including a column on data certainty however it is not know the extent to which respondents may have estimated certainty.

Importantly, the issues raised in the survey required expert opinion in a number of areas for example, *importance of particular factors in causing crashes leading to death.* There are however potential limitations to identifying the particular expertise of those responding as this was not asked, in an effort to maintain confidentiality. There are also potential limitations with regard to the timing of data used in the report. Across economies there is likely variation in the recency of data used. Attempts were however made to enable respondents to identify further information, such as year of reports.

To avoid identifying individual economies and thereby uphold confidentiality requirements, data was presented in an aggregate form. While generally percentages and ranges of responses were reported there is potential for more detailed information to be lost.

4.8.1 Survey design

Although the survey provides some valuable information on which to develop a compendium of best practice countermeasures, there were a number of potential improvements to the

survey that may have yielded additional data. In particular, there were a number of sections in which economies did not have available data. A potential future survey might undertake a different approach which elicits more information based on 'best guesses' rather than strong available data. Further an additional process of interviews, which although more costly, may have enabled better explanation of terms and facilitated consistency in understanding terminology.

4.9 Implications for the compendium development

Based on the safety issues identified by the survey and the measures identified by the literature review, safety measures will be selected for inclusion in the compendium. Given that not all safety measures are likely to be effective and that the evidence of effectiveness varies across measures, standards for inclusion will need to be developed. These standards will take into consideration both the size of the likely benefit of the measure and the strength of evidence supporting the measure. While measures that are likely to have a large benefit and for which there is clear evidence to support their effectiveness (e.g. helmets) should clearly be included, it is likely that most measures will not fall into this category. In a literature review of motorcycle safety measures prepared by Haworth, Mulvihill and Clark (2007) it was noted that many motorcycle safety measures had not been evaluated. While there have been a number of large evaluations of rider training, most of these studies have identified flaws. Thus, it may be necessary to categorise safety measures into "proven effective", "potentially effective" and "unlikely to be effective", with an understanding that a measure might fall into different categories in different cultural settings.

The degree to which any of these measures will be suitable for introduction or adaptation will depend on the economic, institutional, social and cultural context, and the compendium will provide advice on how to assess these factors and how they will influence the choice of safety measure. The intended audience for the compendium will be road safety policy makers, practitioners and professionals in APEC economies; and when the compendium is translated into other languages, also other non-APEC economies. The nature of the intended audience must also be considered when selecting the most appropriate structure.

To ensure that economies have access to the information a workshop to further disseminate findings is proposed. Thus as a next step for road safety capacity building (Stage 3), it has

been proposed that a workshop be held after the completion of the project to present the safety measures in the compendium and to facilitate their implementation.

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APPENDIX A

VEHICLES AND ROAD USER DEATHS FOR POWERED TWO WHEELERS AND ESTIMATED DOMESTIC HELMET WEARING RATES FOR EACH APEC MEMBER ECONOMY

Table 1 - Percentage of all vehicles and percentage of road user deaths for powered two wheelers (PTWs) and estimated domestic helmet wearing rates for each APEC member economy

Member Economy	Population (2007 estimation)*	PTWs as % of all vehicles	PTWs as % of road user deaths*	Helmet Wearing Rates (%)
Australia	20,743,179	4**	14.8	...**
Brunei Darussalam	390,056	4**	11.1	98**
Canada	32,876,047	3***	7.3	
Chile	16,634,760	2***	2.6	100***
People's Republic of China	1,336,317,116 G	?	28.1** (all of China)	16 (Guangxi province only)**
Hong Kong, China	7,003,700 A	?		
Indonesia	231,626,978	73	61.0	93†
Japan	127,966,709	14**	17.6	...*
Republic of Korea	48,223,853	10**	20.7	85*
Malaysia	26,571,879	47**	58.0	90(drivers) 70% passengers**
Mexico	106,534,880	3***	5.5	-***
New Zealand	4,178,525	3**	9.0	-**
Papua New Guinea	6,331,011	2**	0.0	...**
Peru	27,902,760	0	0	-***
The Republic of the Philippines	87,960,117	48**	34	34**
The Russian Federation	142,498,532	8****	2.1	
Singapore	4,436,281	17**	47.7	56**
Chinese Taipei	26 million$^{\Delta}$	13 million in 2006, 356 vehicles per sq km$^{\Delta}$		
Thailand	63,883,662	63	69.7	27†
United States of America	305,826,246	2.8$^{\neq}$	11.3$^{\neq}$	63^
Viet Nam	87,375,196	95**	59	85**

*Data from WHO, 2009a, except for economies People's Republic of China, Hong Kong, China and Chinese Taipei. Data for the Republic of the Philippines and Viet Nam taken from WHO2009b

** Data from WHO, 2009b

*** Data from WHO, 2009c

**** Data from WHO, 2009d

† WHO 2009e

$^{\Delta}$ Best practice report, Nearly every 2 persons owns a motorcycle approx popn

$^{\neq}$ FHWA 2008

^NHTSA 2009- National Occupant Protection Use Survey in 2008 –63% use of DOT compliant helmets

APPENDIX B

SURVEY DISTIBUTED TO REPRESENTATIVES OF APEC ECONOMIES TO ASSESS MOTORCYCLE AND SCOOTER SAFETY IN THEIR ECONOMY

APEC TPT-WG Project: Compendium of Best Practices on Motorcycle and Scooter Safety

SURVEY OF MOTORCYCLE AND SCOOTER SAFETY

APEC TPT-WG-ROAD SAFETY SUB-GROUP

Subject: Survey of motorcycle and scooter safety for the above project.

Purpose: To use the outcomes of the survey to develop a **compendium of best practice measures to improve motorcycle and scooter safety** that can be used to reduce crashes, post-crash trauma and associated economic costs.

Action Required: Economies are requested to respond to the attached survey. To provide a guide, sample responses for Australia have been provided for the first section of the survey. The completed survey should be forwarded by email or fax to the project consultant:

Professor N. Haworth (email n.haworth@qut.edu.au, phone: +61 7 3138 8417, facsimile: +61 7 3138 0111)
Centre for Accident Research & Road Safety-Queensland
Queensland University of Technology
130 Victoria Park Road, Queensland, Australia, 4059

Deadline for Responses: 30 April 2010

Background: At TPT-WG32 in Singapore in July 2009, the Road Safety Sub-group noted that the Centre for Accident Research and Road Safety – Queensland (CARRS-Q) was selected as the consultant to conduct the project. The first stage of the project involves a survey on motorcycle and scooter safety issues in APEC economies. The results of the survey will assist in developing a compendium of best practices in motorcycle and scooter safety. The second stage will include a review and assessment of relevant literature. Information will be collated from both stages and will be shared with all economies. A workshop is proposed to present the findings of the compendium. The compendium will provide guidance to economies regarding where efforts should best be applied in terms of improving motorcycle and scooter safety.

There are **8 parts to the survey** covering:

1. Motorcycles, scooters and cars
2. Death and injury statistics
3. Rider and passenger characteristics
4. Purpose of riding and engine size
5. Trends and predictions
6. Factors contributing to crashes and severity outcomes
7. Interventions to improve motorcycle and scooter safety
8. Case studies of successful initiatives

Filling in the survey – Instructions

The survey is designed to provide an extensive coverage of motorcycle and scooter safety issues, while remaining as simple as possible to fill out. The survey is in Microsoft Word format to enable it to be filled out electronically. As an example, a section from Section 1 of the survey is reproduced on the next page. There are specific instructions at the start of each section. Many of the questions have supplementary parts to obtain more detail in the area.

The column on the right hand side of the survey is provided to enable you to give any comments, for example brief details, existing or potential benefits, any associated difficulties or other matters that have been encountered regarding the issue. The size of each column box will automatically expand as further text is added.

Throughout the survey there may be some questions for which you do not have official or reliable data, but you are able to provide a useful indication of the likely answer. Please complete the form as best you can and provide information even if this is only an indication. Please take the opportunity at the end of the survey to add any comments or further information that you may consider relevant to the matters covered by the survey. Also, at the end of the survey, we ask that you provide an example case study and contact details if we require further information about the case study.

There are many different meanings for key terms. The following are some key terms and what we mean when they are used in this survey.

Motorcycle	is a two- or three-wheeled motor vehicle. It does not include power-assisted bicycles (PABs) or electric bicycles (EBs).
Scooter	is a type of motorcycle which is a step-through design and often has automatic transmission.
Moped	is a two- or three-wheeled motor vehicle with an engine capacity not exceeding 50cc and a top speed not exceeding 50km/hour. Most (but not all) mopeds are of scooter design.
Motorcyclist	includes riders (those in the driving position) and passengers, unless specified.
Injured person	is someone admitted to hospital.
Speeding	includes both riding or driving above the posted speed limit and riding or driving at an inappropriate speed for the conditions.
Licence	includes learner permits.
Geographical coverage	is how much of your economy that is covered by legislation or program (e.g. all of it, or some states or provinces only)
Commuting	is travel to and from home to work and return
Work travel	is travel as part of work for example travel to deliver goods or travel between work locations e.g. delivering mail or police riding or delivering goods
Last year	refers to the last year in which you have data

References to motorcycles or motorcyclists in the survey also include scooters or scooter riders

Thank you for your time and consideration in undertaking this survey. The sharing of information is fundamental to making progress in improving motorcycle and scooter safety.

SAMPLE RESPONSES FOR AUSTRALIA
SECTION 1: Motorcycles, scooters and cars

	In your economy?	**please write in a number**	**Check the box to indicate how sure you are** 1 – uncertain, little data 2 – reasonably certain, some data 3 – strong certainty, good data			**Comments**
			1	2	3	
1.1	How many on-road motorcycles and scooters are there?	624,090	☐	☐	☒	No. of registered motorcycles from Aust Bureau of Statistics (ABS) Motor Vehicle Census for 31 March 2009 – includes mopeds, scooters, motor trikes
1.2	How many cars are there? (this includes stationwagons, SUVs)	12,023,098	☐	☐	☒	Same source as above but for "passenger vehicles"
1.3	How many people were riders of motorcycles or scooters (as the driver/ in control)?	624,090	☒	☐	☐	Data not available – assume same as no. of registered motorcycles
1.4	How many people were car drivers? (this includes stationwagons, SUVs)	12,023,098	☐	☒	☐	Data not available – assume same as no. of registered passenger vehicles, probably more accurate than answer to 1.3
1.5	How many people hold a car licence?	12,023,098	☐	☒	☐	Data not available – assume same as no. of registered passenger vehicles, probably more accurate than answer to 1.3
1.6	How many people hold a motorcycle licence?	2,500,000	☒	☐	☐	National data not available – there are more licences than registered motorcycles in each State and about 20% of car drivers hold motorcycle licence
1.7	Is a licence required to ride a motorcycle on the road?	Yes ☒ / No☐				Mopeds can be ridden with car licence in some States
1.8	What was the average distance ridden per rider in the last year? (select either km or miles)	3,700 km	☐	☒	☐	Distance traveled per registered motorcycle estimate from ABS Survey of Motor Vehicle Usage year ended 31 Oct 2007 – estimated error up to 25% noted by ABS
1.9	What percentage of motorised vehicles are motorcycles or scooters…					
1.9.1	overall?	4%	☐	☐	☒	From Aust Bureau of Statistics (ABS) Motor Vehicle Census for 31 March 2009
1.9.2	in cities?	4%	☒	☐	☐	No published data for cities only, so assume same as overall
1.9.3	in the countryside?	4%	☒	☐	☐	No published data for countryside only, so assume same as overall

SECTION 1: Motorcycles, scooters and cars

	In your economy?	**Please write in a number**	**Check the box to indicate how sure you are** 1 – uncertain, little data 2 – reasonably certain, some data 3 – strong certainty, good data			**Comments**
			1	2	3	
1.1	How many on-road motorcycles and scooters are there?		☐	☐	☐	
1.2	How many cars are there? (this includes stationwagons, SUVs)		☐	☐	☐	
1.3	How many people are riders of motorcycles or scooters (as the driver/ in control)?		☐	☐	☐	
1.4	How many people are car drivers? (this includes stationwagons, SUVs)		☐	☐	☐	
1.5	How many people hold a car licence?		☐	☐	☐	
1.6	How many people hold a motorcycle licence?		☐	☐	☐	
1.7	Is a licence required to ride a motorcycle on the road?	Yes ☐ / No☐				
1.8	What was the average distance ridden per rider in the last year? (select either km or miles)	_____km	☐	☐	☐	
1.9	What percentage of motorised vehicles are motorcycles or scooters…					
1.9.1	overall?	%	☐	☐	☐	
1.9.2	in cities?	%	☐	☐	☐	
1.9.3	in the countryside?	%	☐	☐	☐	

SECTION 2: Death and injury statistics

	In your economy?	**Please write in a number**	**Check the box to indicate how sure you are** 1 – uncertain, little data 2 – reasonably certain, some data 3 – strong certainty, good data			**Comments**
			1	2	3	
2.1	How many motorcyclists (riders & passengers) were killed in the last year?		☐	☐	☐	
2.2	How many **male** motorcyclists (riders & passengers) were killed in the last year?		☐	☐	☐	
2.3	How many **female** motorcyclists (riders & passengers) were killed in the last year?		☐	☐	☐	
2.4	In the last year, what percentage of all motorcyclist deaths were …					
2.4.1	riders?	%	☐	☐	☐	%
2.4.2	male riders?	%	☐	☐	☐	%
2.4.3	female riders?	%	☐	☐	☐	%
2.4.4	passengers?	%	☐	☐	☐	%
2.4.5	male passengers?	%	☐	☐	☐	%
2.4.6	female passengers?	%	☐	☐	☐	%
2.4.7	people under 16 years?	%	☐	☐	☐	%
2.5	What percentage of **all** road deaths were motorcyclists in the last year?	%	☐	☐	☐	%
2.6	How many car occupants were killed last year?		☐	☐	☐	%
2.7	How many people were admitted to hospital in the last year following a motorcycle crash?		☐	☐	☐	
2.8	What percentage of motorcyclists admitted to hospital as a result of their injuries were…					
2.8.1	riders?	%	☐	☐	☐	
2.8.2	passengers?	%	☐	☐	☐	
2.9	What percentage of **all** road users admitted to hospital as a result of their injuries were motorcyclists in the last year?	%	☐	☐	☐	

SECTION 3: Rider and passenger characteristics

	In your economy?	**Please write in a percentage**	**Check the box to indicate how sure you are** 1 – uncertain, little data 2 – reasonably certain, some data 3 – strong certainty, good data	**Comments**
			1 2 3	
3.1	What percentage of motorcycle riders (drivers/ those in control) are …			
3.2.1	males 16 years of age and over?	%	☐ ☐ ☐	
3.2.2	females 16 years of age and over?	%	☐ ☐ ☐	
3.2.3	aged under 16 years?	%	☐ ☐ ☐	
3.4	What percentage of motorcycles are carrying passengers?	%	☐ ☐ ☐	
3.5	What percentage of motorcycle passengers are …			
3.5.1	males 16 years of age and over?	%	☐ ☐ ☐	
3.5.2	females 16 years of age and over?	%	☐ ☐ ☐	
3.5.3	aged under 16 years?	%	☐ ☐ ☐	

SECTION 4: Purpose of riding and engine size

	In your economy?	**Please write in a percentage**	**Check the box to indicate how sure you are** 1 – uncertain, little data 2 – reasonably certain, some data 3 – strong certainty, good data	**Comments**
			1 2 3	
4.1	**OVERALL,** what percentage of motorcycling is …			
4.1.1	general transport including travel to work?	%	☐ ☐ ☐	
4.1.2	working as part of police and emergency services/armed forces?	%	☐ ☐ ☐	
4.1.3	work to deliver small items (e.g. mail & documents)?	%	☐ ☐ ☐	
4.1.4	work to deliver large items (e.g. goods to market)?	%	☐ ☐ ☐	
4.1.5	for recreation?	%	☐ ☐ ☐	
4.2	**For MALE riders,** what percentage of motorcycling is …			
4.2.1	general transport including travel to work?	%	☐ ☐ ☐	
4.2.2	working as part of police and emergency services/armed forces?	%	☐ ☐ ☐	
4.2.3	work to deliver small items (e.g. mail & documents)?	%	☐ ☐ ☐	
4.2.4	work to deliver large items (e.g. goods to market)?	%	☐ ☐ ☐	
4.2.5	for recreation?	%	☐ ☐ ☐	
4.3	**For FEMALE riders,** what percentage of motorcycling is …			
4.3.1	general transport including travel to work?	%	☐ ☐ ☐	
4.3.2	working as part of police and emergency services/armed forces?	%	☐ ☐ ☐	
4.3.3	work to deliver small items (e.g. mail & documents)?	%	☐ ☐ ☐	
4.3.4	work to deliver large items (e.g. goods to market)?	%	☐ ☐ ☐	
4.3.5	for recreation?	%	☐ ☐ ☐	

	In your economy?	Please write in a percentage	Check the box to indicate how sure you are 1 – uncertain, little data 2 – reasonably certain, some data 3 – strong certainty, good data	Comments
			1 2 3	
4.4	**OVERALL,** what percentage of motorcycles and scooters have an engine capacity …			
4.4.1	less than 50cc?	%	☐ ☐ ☐	
4.4.2	51-125cc?	%	☐ ☐ ☐	
4.4.3	126-250cc?	%	☐ ☐ ☐	
4.4.4	>251cc?	%	☐ ☐ ☐	
4.5.1	**For MALE RIDERS**, What percentage of motorcycles have an engine capacity …			
4.5.1	less than 50cc?	%	☐ ☐ ☐	
4.5.2	51-125cc?	%	☐ ☐ ☐	
4.5.3	126-250cc?	%	☐ ☐ ☐	
4.5.4	>251cc?	%	☐ ☐ ☐	
4.6	**For FEMALE RIDERS,** What percentage of motorcycles have an engine capacity …			
4.6.1	less than 50cc?	%	☐ ☐ ☐	
4.6.2	51-125cc?	%	☐ ☐ ☐	
4.6.3	126-250cc?	%	☐ ☐ ☐	
4.6.4	>251cc?	%	☐ ☐ ☐	
4.7	**OVERALL**, what percentage of motorcycles and scooters are…			
4.7.1	mopeds (less than 50cc)?	%	☐ ☐ ☐	
4.7.2	scooters (greater than 50cc, step through)?	%	☐ ☐ ☐	
4.7.3	motorcycles (greater than 50cc, not step through)?	%	☐ ☐ ☐	

SECTION 5: Trends & predictions

	In your economy?	**Check the box to indicate the most appropriate.**			**Comments**
		Decreased	Stayed the same	Increased	
	Trends & predictions - **OVERALL**				
5.1	In the **last ten years**, has the amount of **overall** motorcycle use …	☐	☐	☐	
5.2	In the **next** decade do you expect motorcycle use for …				
5.2.1	commuting to	☐	☐	☐	
5.2.2	work to	☐	☐	☐	
5.2.3	recreation to	☐	☐	☐	
	Trends & predictions – **MALES**				
5.3	In the **last** decade, has the amount of riding by **males**…	☐	☐	☐	
5.4	In the **next** decade do you expect motorcycling by males for …				
5.4.1	commuting to	☐	☐	☐	
5.4.2	work to	☐	☐	☐	
5.4.3	recreation to	☐	☐	☐	
	Trends & predictions – **FEMALES**				
5.5	In the **last** decade, has the amount of riding by **females** …	☐	☐	☐	
5.6	In the **next** decade do you expect motorcycling by females for …				
5.6.1	commuting to	☐	☐	☐	
5.6.2	work to	☐	☐	☐	
5.6.3	recreation to	☐	☐	☐	

SECTION 6: Factors contributing to crashes and severity of outcomes

For your economy classify the causes of MOTORCYCLE CRASHES RESULTING IN DEATH according to importance – low, medium or high (or unknown).
Then identify whether this cause is more important for males (by checking M), equally important for males and females (by checking E) or more important for females (by checking F).

	CAUSES OF CRASHES RESULTING IN DEATH	Please check the box to classify the importance of the factor as: L – low M – medium H – high or U - unknown				Please check the box to classify who it is most important for: M - more important for males E - equally important for males and females F - more important for females			**Comments**
		L	M	H	U	M	E	F	
a.	Speeding by rider	☐	☐	☐	☐	☐	☐	☐	
b.	Drink riding (or drug riding)	☐	☐	☐	☐	☐	☐	☐	
c.	Unlicensed riding	☐	☐	☐	☐	☐	☐	☐	
d.	Rider inexperience/ lack of recent experience	☐	☐	☐	☐	☐	☐	☐	
e.	Rider lack of knowledge of road rules	☐	☐	☐	☐	☐	☐	☐	
f.	Rider decision making error (e.g. following too close)	☐	☐	☐	☐	☐	☐	☐	
g.	Other vehicle driver decision making error	☐	☐	☐	☐	☐	☐	☐	
h.	Violation of road rules by rider	☐	☐	☐	☐	☐	☐	☐	
i.	Violation of road rules by other vehicle driver	☐	☐	☐	☐	☐	☐	☐	
j.	Rider distracted	☐	☐	☐	☐	☐	☐	☐	
k.	Other vehicle driver distracted	☐	☐	☐	☐	☐	☐	☐	
l.	Rider fatigued	☐	☐	☐	☐	☐	☐	☐	

m.	Other vehicle driver fatigued	☐	☐	☐	☐	☐	☐	☐	
n.	Overloading of motorcycle/ scooter	☐	☐	☐	☐	☐	☐	☐	
o.	Motorcycle defects (e.g. brakes, tyres)	☐	☐	☐	☐	☐	☐	☐	
p.	Weather conditions	☐	☐	☐	☐	☐	☐	☐	
q.	Poor road surface	☐	☐	☐	☐	☐	☐	☐	
r.	Animals on the road	☐	☐	☐	☐	☐	☐	☐	

Please write in the box below if there are any other important causes of motorcycle crashes resulting in death.

Please write in this column any other important causes of motorcycle crashes resulting in death	Please check the box to classify who it is most important for: M - more important for males E - equally important for males and females F - more important for females			**Comments**
	M	E	F	
	☐	☐	☐	
	☐	☐	☐	
	☐	☐	☐	
	☐	☐	☐	

For your economy classify the causes of motorcycle crashes resulting in INJURY according to importance – low, medium or high (or unknown). Then identify whether this cause is more important for males (by checking the box for M), equally important for males and females (by checking the box for E) or more important for females (by checking the box for F).

	CAUSES OF INJURY CRASHES	Please check the box to classify the importance of the factor as: L – low M – medium H – high or U - unknown				Please check the box to classify who it is most important for: M - more important for males E - equally important for males and females F - more important for females			**Comments**
		L	M	H	U	M	E	F	
a.	Speeding by rider	☐	☐	☐	☐	☐	☐	☐	
b.	Drink riding (or drug riding)	☐	☐	☐	☐	☐	☐	☐	
c.	Unlicensed riding	☐	☐	☐	☐	☐	☐	☐	
d.	Rider inexperience/ lack of recent experience	☐	☐	☐	☐	☐	☐	☐	
e.	Rider lack of knowledge of road rules	☐	☐	☐	☐	☐	☐	☐	
f.	Rider decision making error (e.g. following too close)	☐	☐	☐	☐	☐	☐	☐	
g.	Other vehicle driver decision making error	☐	☐	☐	☐	☐	☐	☐	
h.	Violation of road rules by rider	☐	☐	☐	☐	☐	☐	☐	
i.	Violation of road rules by other vehicle driver	☐	☐	☐	☐	☐	☐	☐	
j.	Rider distracted	☐	☐	☐	☐	☐	☐	☐	
k.	Other vehicle driver distracted	☐	☐	☐	☐	☐	☐	☐	
l.	Rider fatigued	☐	☐	☐	☐	☐	☐	☐	
m.	Other vehicle driver fatigued	☐	☐	☐	☐	☐	☐	☐	

n.	Overloading of motorcycle/ scooter	☐	☐	☐	☐	☐	☐	☐	
o.	Motorcycle defects (e.g. brakes, tyres)	☐	☐	☐	☐	☐	☐	☐	
p.	Weather conditions	☐	☐	☐	☐	☐	☐	☐	
q.	Poor road surface	☐	☐	☐	☐	☐	☐	☐	
r.	Animals on the road	☐	☐	☐	☐	☐	☐	☐	

Please write in the box below if there are any other important causes of motorcycle crashes resulting in injury.

Please write in this column any other important causes of injury crashes	Please check the box to classify who it is most important for: M - more important for males E - equally important for males and females F - more important for females			**Comments**
	M	E	F	
	☐	☐	☐	
	☐	☐	☐	
	☐	☐	☐	
	☐	☐	☐	

SECTION 7: Interventions to improve motorcycle and scooter safety

For each of the following interventions, indicate whether it has been implemented in your economy and if so, when. Then rate the amount of geographical coverage for the intervention, 1 – none of the economy, 2 – part of the economy or 3 – entire economy. Please indicate/estimate the percent of the population complying with the intervention followed by the percent of the population of the entire economy complying.

Interventions	Has it been implemented?	If yes, Write the date/ year this was implemented	**Geographical coverage** 1- None of 2 – Part of 3 – Entire economy	Percent of overall population complying where implemented	Percent of population of economy complying	Comments (e.g. include age groups covered)
	Yes No		1 2 3			
Compulsory helmet wearing legislation						
for riders	☐ ☐		☐ ☐ ☐	%	%	
for passengers	☐ ☐		☐ ☐ ☐	%	%	
Helmet design standards	☐ ☐		☐ ☐ ☐	%	%	
Promotion of protective clothing	☐ ☐		☐ ☐ ☐	%	%	
Motorcycle licence requirement	☐ ☐		☐ ☐ ☐	%	%	
Graduated licensing system for motorcyclists	☐ ☐		☐ ☐ ☐	%	%	
Motorcycle registration requirement	☐ ☐		☐ ☐ ☐	%	%	
Compulsory periodic inspection of motorcycles	☐ ☐		☐ ☐ ☐	%	%	
Random roadside motorcycle inspections	☐ ☐		☐ ☐ ☐	-	-	
Motorcycle only lanes	☐ ☐		☐ ☐ ☐	-	-	
Motorcycle black spot programs (hazardous road locations)	☐ ☐		☐ ☐ ☐	-	-	
Sharing the road campaigns	☐ ☐		☐ ☐ ☐	-	-	
Motorcycle specific enforcement programs (eg speed enforcement, random breath testing etc)	☐ ☐		☐ ☐ ☐	-	-	
Campaigns to reduce alcohol and drug impaired riding (eg advertising, publicity)	☐ ☐		☐ ☐ ☐	-	-	

Please write in the box below if there are any other interventions implemented in your economy

Write the most important contributing factor to motorcycle and scooter crashes and injures for your economy in the first column. For that most important contributing factor, write three of the most effective interventions in the second column and then indicate whether they have been implemented in the third column. Please rate the importance of current barriers to implementing each intervention in the fifth column.

Most important contributing factor _____ _____	Potentially **most** effective intervention is… _____	Has it been implemented? Yes ☐ No ☐	Barriers to implementation	Importance of barrier: Not at all important 1 2 3 4 5 Very important
				1 2 3 4 5
			Costs for individual citizens	☐ ☐ ☐ ☐ ☐
			Costs for government	☐ ☐ ☐ ☐ ☐
			Rider opposition	☐ ☐ ☐ ☐ ☐
			Constitutionally or legally unacceptable	☐ ☐ ☐ ☐ ☐
			Culturally inappropriate	☐ ☐ ☐ ☐ ☐
			Perceived lack of need	☐ ☐ ☐ ☐ ☐
			Perceived lack of effectiveness	☐ ☐ ☐ ☐ ☐
			Technically unrealistic	☐ ☐ ☐ ☐ ☐
			Unsuitable climate	☐ ☐ ☐ ☐ ☐
			Unsuitable geography (eg terrain)	☐ ☐ ☐ ☐ ☐
	Potential **2nd** most effective intervention is… _____	Has it been implemented? Yes ☐ No ☐	Barriers to implementation	Not at all important Very important
			Costs for individual citizens	☐ ☐ ☐ ☐ ☐
			Costs for government	☐ ☐ ☐ ☐ ☐
			Rider opposition	☐ ☐ ☐ ☐ ☐
			Constitutionally or legally unacceptable	☐ ☐ ☐ ☐ ☐
			Culturally inappropriate	☐ ☐ ☐ ☐ ☐
			Lack of perceived need	☐ ☐ ☐ ☐ ☐
			Lack of perceived effectiveness	☐ ☐ ☐ ☐ ☐
			Technically unrealistic	☐ ☐ ☐ ☐ ☐
			Unsuitable climate	☐ ☐ ☐ ☐ ☐
			Unsuitable geography (eg terrain)	☐ ☐ ☐ ☐ ☐
	Potential **3rd** most effective intervention is… _____	Has it been implemented? Yes ☐ No ☐	Barriers to implementation	Not at all important Very important
			Costs for individual citizens	☐ ☐ ☐ ☐ ☐
			Costs for government	☐ ☐ ☐ ☐ ☐
			Rider opposition	☐ ☐ ☐ ☐ ☐
			Constitutionally or legally unacceptable	☐ ☐ ☐ ☐ ☐
			Culturally inappropriate	☐ ☐ ☐ ☐ ☐
			Lack of perceived need	☐ ☐ ☐ ☐ ☐
			Lack of perceived effectiveness	☐ ☐ ☐ ☐ ☐
			Technically unrealistic	☐ ☐ ☐ ☐ ☐
			Unsuitable climate	☐ ☐ ☐ ☐ ☐
			Unsuitable geography (eg terrain)	☐ ☐ ☐ ☐ ☐

Write your economy's second most important contributing factor to motorcycle and scooter crashes and injuries in the first column. For that contributing factor, write three of the most effective interventions in the second column and then indicate whether they have been implemented in the third column. Please rate the importance of current barriers to implementing each intervention in the fifth column.

Second most important contributing factor _____ _____	Potentially **most** effective intervention is… _____	Has it been implemented? Yes ☐ No ☐	Barriers to implementation	Importance of barrier: Not at all important 1 2 3 4 5 Very important
				1 2 3 4 5
			Costs for individual citizens	☐ ☐ ☐ ☐ ☐
			Costs for government	☐ ☐ ☐ ☐ ☐
			Rider opposition	☐ ☐ ☐ ☐ ☐
			Constitutionally or legally unacceptable	☐ ☐ ☐ ☐ ☐
			Culturally inappropriate	☐ ☐ ☐ ☐ ☐
			Perceived lack of need	☐ ☐ ☐ ☐ ☐
			Perceived lack of effectiveness	☐ ☐ ☐ ☐ ☐
			Technically unrealistic	☐ ☐ ☐ ☐ ☐
			Unsuitable climate	☐ ☐ ☐ ☐ ☐
			Unsuitable geography (eg terrain)	☐ ☐ ☐ ☐ ☐
	Potential **2nd** most effective intervention is… _____	Has it been implemented? Yes ☐ No ☐	Barriers to implementation	Not at all important Very important
			Costs for individual citizens	☐ ☐ ☐ ☐ ☐
			Costs for government	☐ ☐ ☐ ☐ ☐
			Rider opposition	☐ ☐ ☐ ☐ ☐
			Constitutionally or legally unacceptable	☐ ☐ ☐ ☐ ☐
			Culturally inappropriate	☐ ☐ ☐ ☐ ☐
			Lack of perceived need	☐ ☐ ☐ ☐ ☐
			Lack of perceived effectiveness	☐ ☐ ☐ ☐ ☐
			Technically unrealistic	☐ ☐ ☐ ☐ ☐
			Unsuitable climate	☐ ☐ ☐ ☐ ☐
			Unsuitable geography (eg terrain)	☐ ☐ ☐ ☐ ☐
	Potential **3rd** most effective intervention is… _____	Has it been implemented? Yes ☐ No ☐	Barriers to implementation	Not at all important Very important
			Costs for individual citizens	☐ ☐ ☐ ☐ ☐
			Costs for government	☐ ☐ ☐ ☐ ☐
			Rider opposition	☐ ☐ ☐ ☐ ☐
			Constitutionally or legally unacceptable	☐ ☐ ☐ ☐ ☐
			Culturally inappropriate	☐ ☐ ☐ ☐ ☐
			Lack of perceived need	☐ ☐ ☐ ☐ ☐
			Lack of perceived effectiveness	☐ ☐ ☐ ☐ ☐
			Technically unrealistic	☐ ☐ ☐ ☐ ☐
			Unsuitable climate	☐ ☐ ☐ ☐ ☐
			Unsuitable geography (eg terrain)	☐ ☐ ☐ ☐ ☐

Write your economy's third most important contributing factor to motorcycle and scooter crashes and injuries in the first column. For that contributing factor, write three of the most effective interventions in the second column and then indicate whether they have been implemented in the third column. Please rate the importance of current barriers to implementing each intervention in the fifth column.

Third most important contributing factor _____ _____	Potentially **most** effective intervention is… _____	Has it been implemented?	Barriers to implementation	Importance of barrier Not at all important … Very important				
				1	2	3	4	5
		Yes ☐ No ☐	Costs for individual citizens	☐	☐	☐	☐	☐
			Costs for government	☐	☐	☐	☐	☐
			Rider opposition	☐	☐	☐	☐	☐
			Constitutionally or legally unacceptable	☐	☐	☐	☐	☐
			Culturally inappropriate	☐	☐	☐	☐	☐
			Perceived lack of need	☐	☐	☐	☐	☐
			Perceived lack of effectiveness	☐	☐	☐	☐	☐
			Technically unrealistic	☐	☐	☐	☐	☐
			Unsuitable climate	☐	☐	☐	☐	☐
			Unsuitable geography (eg terrain)	☐	☐	☐	☐	☐
	Potential **2nd** most effective intervention is… _____	Has it been implemented?	Barriers to implementation	Not at all important … Very important				
		Yes ☐ No ☐	Costs for individual citizens	☐	☐	☐	☐	☐
			Costs for government	☐	☐	☐	☐	☐
			Rider opposition	☐	☐	☐	☐	☐
			Constitutionally or legally unacceptable	☐	☐	☐	☐	☐
			Culturally inappropriate	☐	☐	☐	☐	☐
			Lack of perceived need	☐	☐	☐	☐	☐
			Lack of perceived effectiveness	☐	☐	☐	☐	☐
			Technically unrealistic	☐	☐	☐	☐	☐
			Unsuitable climate	☐	☐	☐	☐	☐
			Unsuitable geography (eg terrain)	☐	☐	☐	☐	☐
	Potential **3rd** most effective intervention is… _____	Has it been implemented?	Barriers to implementation	Not at all important … Very important				
		Yes ☐ No ☐	Costs for individual citizens	☐	☐	☐	☐	☐
			Costs for government	☐	☐	☐	☐	☐
			Rider opposition	☐	☐	☐	☐	☐
			Constitutionally or legally unacceptable	☐	☐	☐	☐	☐
			Culturally inappropriate	☐	☐	☐	☐	☐
			Lack of perceived need	☐	☐	☐	☐	☐
			Lack of perceived effectiveness	☐	☐	☐	☐	☐
			Technically unrealistic	☐	☐	☐	☐	☐
			Unsuitable climate	☐	☐	☐	☐	☐
			Unsuitable geography (eg terrain)	☐	☐	☐	☐	☐

SECTION 8: Case studies of successful initiatives

The motorcycle and scooter safety compendium will feature case studies of successful implementation of safety initiatives. Would you please describe below **one or two potential examples** from your economy. Please provide **contact details** of people and organisations involved so that we can contact them for further information.

APPENDIX C

OVERALL RATING OF IMPORTANCE OF SELECTED CAUSES OF DEATH FROM A MOTORCYCLE OR SCOOTER USER IN APEC ECONOMIES IN THE LAST YEAR

Table: Overall rating of importance of selected causes of death from a motorcycle or scooter user in APEC economies in the last year[a]

	Death			Injury		
	Rated High	Rated medium	Rated Low	Rated High	Rated medium	Rated Low
Speeding	3 HIE, 5 LMIE			3 HIE, 3 LMIE	1 LMIE	
Drink driving (or drug driving)	5 HIE, 4 LMIE		1 LMIE	4 LMIE, 1 HIE	2 HIE	1 LMIE
Unlicenced riding	3 HIE, 3 LMIE	2 LMIE	1 HIE	2 HIE, 2 LMIE	2 LMIE	1 HIE, 1 LMIE
Rider inexperience	2 LMIE	3 HIE, 2 LMIE	1 HIE	2 LMIE	2 HIE	1 HIE
Rider –road rules lack knowledge	2 LMIE	2 LMIE	1 HIE	1 LMIE	3 LMIE	1 HIE
Rider – decision making error	2 LMIE	3 HIE, 2 LMIE	1 HIE	2 LMIE	3 HIE, 2 LMIE	
Rider – road rule violation	4 LMIE	3 HIE, 1 LMIE	1 HIE	3 LMIE	2 HIE, 2 LMIE	1 HIE
Rider - distraction	2 LMIE	2 HIE, 1 LMIE	1 HIE	1 HIE, 2 LMIE	2 HIE, 1 LMIE	
Rider - fatigue	2 LMIE	1 HIE	3 HIE,1 LMIE	1 HIE, 2 LMIE	2 HIE	
OV – decision making error	2 LMIE	2 HIE, 1 LMIE	2 HIE	1 HIE 2 LMIE	1 LMIE, 1 HIE	1 HIE
OV – rule violation	2 LMIE	3 HIE, 1 LMIE	1 HIE	2 LMIE	1 HIE, 1 LMIE	
OV - distraction	2 LMIE	1 HIE, 1 LMIE	2 HIE	1 LMIE	1 HIE, 1 LMIE	1 LMIE, 1 HIE
OV - fatigue	2 LMIE	1 HIE	1 LMIE 2 HIE	2 LMIE	1 HIE	1 HIE, 2 LMIE
Overloading of motorcycle	2 LMIE		1 HIE 2 LMIE	2 LMIE		2 HIE 2 LMIE
Motorcycle defect	2 LMIE	1 HIE	3 HIE 1 LMIE	1 LMIE	1 LMIE, 1 HIE	2 HIE 2 LMIE
Weather condition	2 LMIE, 1 HIE	1 LMIE	3 HIE 1 LMIE	1 LMIE, 1 HIE	2 LMIE	3 HIE
Road surface	1 LMIE	1 HIE, 2 LMIE	3 HIE 1 LMIE	1 HIE, 1 LMIE	1 HIE, 2 LMIE	
Animals on the road	1 LMIE	2 LMIE	2 LMIE 4 HIE	1 LMIE	1 LMIE	2 LMIE

APPENDIX D

IMPLEMENTATION OF COUNTERMEASURES ACROSS ECONOMIES FOR HIEs AND LMIEs

Table. Overall implementation of various countermeasures across APEC economiesa

	Implemented	Coverage
Compulsory helmet wearing for riders	All 6 HIE – note varies by jurisdiction within 2/3 covered, all 4 LMIE	LMIE 50 & 90 otherwise no answer, HIE – 95-100% comply
Compulsory helmet wearing for passengers	All 6 HIE – note varies by jurisdiction within 2/3 covered, 3 LMIE, 1 no response	LMIE 40 & 90% otherwise no answer, HIE – 95-100% comply
Helmet design standards	3 HIE yes, remaining no answer	3 HIE - Entire economy, remaining no answer
Promotion of protective clothing	2 HIE yes, 2 HIE no, 2 HIE no answer; 2 LMIE yes, 1 LMIE no	1 HIE & 1 LMIE – coverage entire economy
Motorcycle licence requirement	all 6 HIE , 4 LMIE yes	all 5 HIE & 3 LMIE – coverage entire economy
Graduated licensing system for motorcyclists	2 HIE yes, 1 HIE no answer, 3 HIE no; 3LMIE yes, 1 LMIE no	4 HIE coverage entire economy, 1 no answer, & 3 LMIE – coverage entire economy
Motorcycle registration requirement	All 5 HIE, 4 LMIE yes	4 HIE coverage entire economy, 1 part of economy; & 3 LMIE – coverage entire economy
Compulsory periodic inspection of motorcycles	3 HIE yes, 2 no; 3 LMIE yes, 1 LMIE no	2 HIE coverage entire economy , 1 HIE coverage part economy, 2 no answer & 1 LMIE – coverage entire economy, 1 LMIE part of economy, 1 no answer
Random roadside motorcycle inspections	3 HIE yes, 2 no; 3 LMIE yes, 1 LMIE no	1 HIE coverage entire economy , 1 HIE coverage part economy, 3 no answer & 1 LMIE – coverage entire economy, 2 LMIE part of economy,
Motorcycle only lanes	1 HIE yes, 3 HIE no, 2 LMIE yes, 1 LMIE no, 1 no ans	1 HIE part coverage, 2 HIE no coverage & 1 LMIE – coverage entire economy, 1 LMIE part of economy, 1 no answer
Motorcycle black spot programs	1 HIE yes, 3 HIE no, 2 LMIE yes, 1 LMIE no, 1 no ans	1 HIE part coverage, 1 HIE no coverage 1 full coverage & 1 LMIE – coverage entire economy, 1 LMIE part of economy, 1 no answer
Sharing the road campaigns	3 HIE yes; 4 LMIE yes, 1 HIE no	1 HIE part coverage, 1 HIE full coverage & 2 LMIE – coverage entire economy, 1 LMIE part of economy,
Enforcement programs (specific to motorcycles)	2 HIE no, 2 HIE yes; 3 LMIE yes, 1 no ans	1 HIE part coverage, 1 HIE no coverage, 1 entire coverage & 2 LMIE – coverage entire economy, 1 no answer
Campaigns to reduce alcohol and drug riding	All 5 HIE yes, 4 LMIE yes, 1 HIE no	2 HIE coverage entire economy, 3 HIE coverage part economy & 3 LMIE – coverage entire economy

[a]Note. Data not available from all economies

Glossary

There were many different meanings for key terms. The following are some key terms and what was meant when used in this survey and throughout the report.

Term	Meaning
Motorcycle	is a two- or three-wheeled motor vehicle. It does not include power-assisted bicycles (PABs) or electric bicycles (EBs).
Scooter	is a type of motorcycle which is a step-through design and often has automatic transmission.
Moped	is a two- or three-wheeled motor vehicle with an engine capacity not exceeding 50cc and a top speed not exceeding 50km/hour. Most (but not all) mopeds are of scooter design.
Motorcyclist	includes riders (those in the driving position) and passengers, unless specified.
Injured person	is someone admitted to hospital.
Speeding	includes both riding or driving above the posted speed limit and riding or driving at an inappropriate speed for the conditions.
Licence	includes learner permits.
Geographical coverage	is how much of your economy is covered by legislation or program (e.g. all of it, or some states or provinces only)
Commuting	is travel to and from home to work and return
Work travel	is travel as part of work; for example, travel to deliver goods or travel between work locations e.g. delivering mail or police riding or delivering goods
Last year	refers to the last year for which you have data