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Road safety status and analysis in Thailand and other Asian countries

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Abstract

Based on the Global Status Report on Road Safety 2018, the interrelationship of important road safety elements (such as Road Traffic Fatalities (RTFs), population, income levels, registered vehicles, law enforcement and others) of Thailand and other Asian countries could be achieved via a literature review and critical analysis. RTFs per 100,000 people had moderate correlations with motorization (registered vehicles per capita), while RTFs per 100,000 vehicles showed reasonable correlations with the number of registered vehicles per 100,000 people. When the number of registered vehicles per 100,000 people increased, the RTFs per 100,000 vehicles decreased. The vehicles involved in RTFs in Thailand and other Asian countries were primarily 2/3-wheelers. As the proportion of 2/3- and 4-wheeled vehicles in Asian countries increased, the percentages of RTFs caused by 2/3- and 4-wheeled vehicles were enhanced. As the Gross National Incomes (GNIs) per capita of Asian countries enhanced, the road safety law enforcement was slightly better. Based on RTFs per 100,000 people, Thailand is one of the most hazardous countries for road transport in the world. In Thailand, a RTF (per 100,000 population) prediction model was derived using a limited time series with three RTF database sources. Motorization can potentially be used to predict the RTFs per 100,000 population in Thailand. In 2020, the anticipated RTFs per 100,000 people will be 29.4. That is greater than the target (18.0). Consequently, Thailand is unlikely to achieve its Sustainable Development Goals (SDGs) for road safety issues in the near future.

Keywords: Road Traffic Fatalities (RTFs), Fatalities per vehicle, Fatalities per population, Asian countries, Road safety status and analysis

1. Introduction

In 2015, United Nations (UN) officially announced 17 Sustainable Development Goals (SDGs) with 169 targets aiming to support and promote a balance among economic, societal and environment components for sustainable development and encourage appropriate actions in the next 15 years [1]. One of SDGs is strongly associated with global road safety issues, SDG 3: "*Ensure healthy lives and promote well-being for all at all ages"* with Target 3.6: *"By 2020, halve the number of global deaths and injuries from road traffic accidents*". The SDGs and their related targets were set up to urge people from both developed and developing countries to address the global road safety crisis [2].

Based on the Global Status Report on Road Safety 2018 [3], Thailand was ranked 9th (with 32.7 road traffic fatalities (RTFs) per 100,000 people) out of 175 countries in 2016. The country clearly demonstrated improvement from its 2nd place rank (with 36.2 RTFs per 100,000 people) in 2013 [4]. However, such road safety status clearly indicates that Thailand still has one of the most dangerous road transport systems in the world. The total economic cost of road accidents in Thailand was approximately US$15,148 million (3 percent of the gross domestic product (GDP)). Following the UN decade of action for road safety determination (from 2011 to 2020), Thailand set an ambitious target of 18.0 RTFs per 100,000 people by 2020. To develop the appropriate vision, strategies, plans and measures as well as to propose the appropriate urgent actions to immediately tackle the road safety crisis in Thailand and other Asian countries, an in-depth comprehensive road safety analysis of Thailand and other Asian countries is crucially important.

The key objectives of this paper are as follows**:** (i) to analyze the relationship of RTFs per 100,000 people, RTFs per 100,000 vehicles, motorization (registered vehicles per 100,000 people) and income levels (gross national per capita income) among 40 Asian countries; (ii) to examine the relationship between vehicle type and the proportion of

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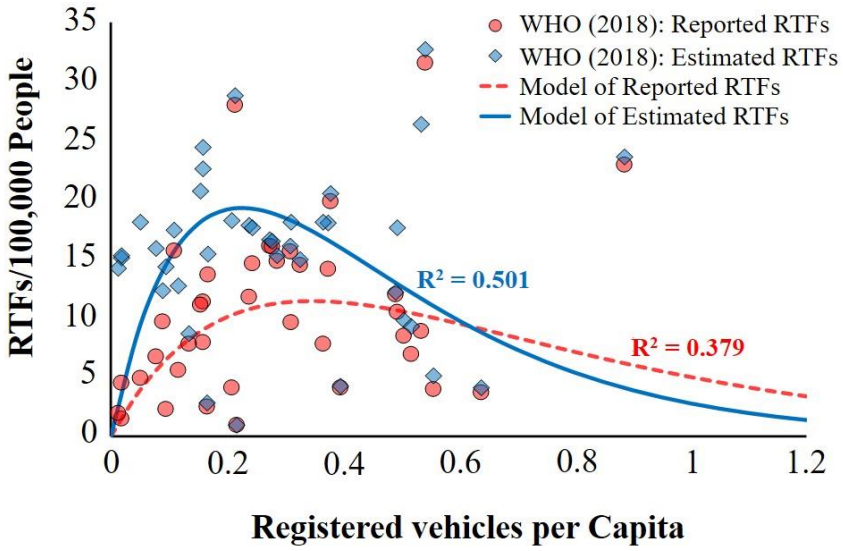


Figure 1 The relationship between RTFs per 100,000 people and vehicles per capita [3]

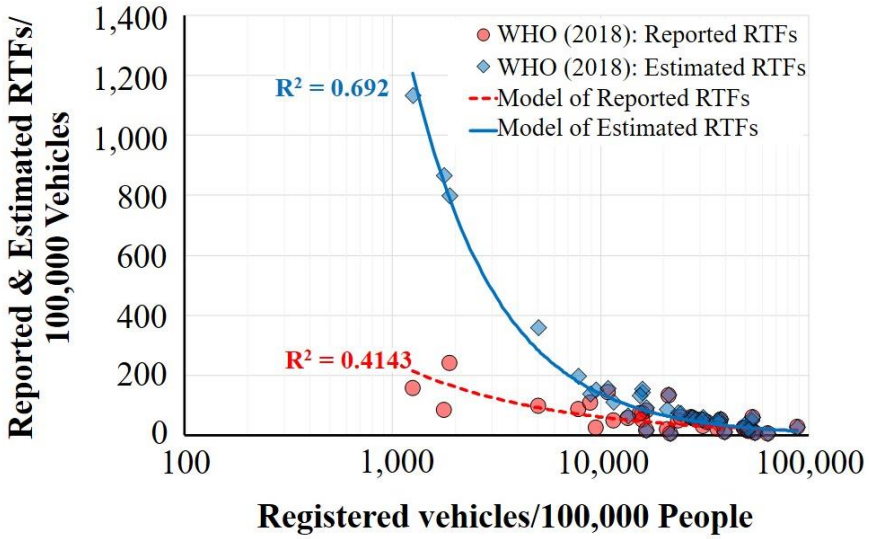


Figure 2 The relationship between RTFs per 100,000 vehicles and vehicles per 100,000 people [3]

RTFs of each road vehicle type; (iii) to analyze the degree of the enforcement of each national road safety law; (iv) to analyze the current road safety status of Thailand to identify the main causes of the road safety crisis; (v) to model RTFs per 100,000 people as a function of motorization in Thailand, and finally (vi) to evaluate road safety achievement of Thailand with respect to its ambitious future targets.

2. Road safety status and analysis of Thailand and other Asian countries

2.1 Trends of RTFs per population and RTFs per vehicles

Based on WHO statistics [3], RTFs and other related information of the 39 Asian countries were determined and are shown in Table 1. In Figure 1, both reported and estimated RTFs per 100,000 people demonstrated moderate correlations with motorization (registered vehicles per capita). Inverted U shaped curves are illustrated for both the reported and the estimated RTFs per 100,000 people. With the values of registered vehicles per capita between zero and 0.6, the estimated RTFs per 100,000 people in several Asian countries were generally higher than reported. As the registered vehicles per capita became greater than 0.6, the values of both the reported and the estimated TRFs per 100,000 people became similar.

As shown in Figure 2, both the reported and estimated RTFs per 100,000 registered vehicles clearly illustrated reasonable correlations with the number of registered vehicles per 100,000 people. The greater the vehicle ownership (motorization), the lower the reported and estimated RTFs were per 100,000 vehicles. This was because the number of registered vehicles increased much quicker than the number of RTFs [5]. Additionally, as the number of registered vehicles per 100,000 people increased, the differences between the reported and estimated RTFs per 100,000 vehicles of these Asian countries gradually approached zero. Similar findings were have been reported [2, 5-6]. This condition explicitly indicates that there have been serious problems in terms of the reliability and accuracy of the RTF database systems in many Asian countries.

Table 1 Road safety status of 40 Asian countries based on a 2018 WHO report [3]

NO.	Country/Area	Population Number for 2016	GNI per Capita for 2016 (US$)	Number of Registered vehicles	Reported Number of road traffic fatalities	Estimated Number of road traffic fatalities	Reported Number of road traffic fatalities per 100,000 People	Estimated Number of road traffic fatalities per 100,000 People	Reported Number of road traffic fatalities per 100,000 Vehicles	Estimated Number of road traffic fatalities per 100,000 Vehicles
1	**Afghanistan**	34,656,032	580	655,357	1,565	5,230	4.52	15.1	798.04	238.80
2	**Nepal**	29,892,772	730	2,339,169	2,006	4,622	6.71	15.9	197.59	85.76
3	**Kyrgyzstan**	5,955,734	1,100	993,000	812	916	13.63	15.4	92.25	81.77
4	**Tajikistan**	8,734,951	1,110	439,972	427	1,577	4.89	18.1	358.43	97.05
5	**Cambodia**	15,762,370	1,140	3,751,715	1,852	2,803	11.75	17.8	74.71	49.36
6	**Bangladesh**	162,951,552	1,330	2,879,708	2,376	24,954	1.46	15.3	866.55	82.51
7	**Pakistan**	193,203,472	1,510	18,352,500	4,448	27,582	2.30	14.3	150.29	24.24
8	**India**	1,324,171,392	1,680	210,023,289	150,785	299,091	11.39	22.6	142.41	71.79
9	**Viet Nam**	94,569,072	2,050	50,666,855	8,417	24,970	8.90	26.4	49.28	16.61
10	**Lao PDR**	6,758,353	2,150	1,850,020	1,086	1,120	16.07	16.6	60.54	58.70
11	**Papua New Guinea**	8,084,991	2,160	100,993	158	1,145	1.95	14.2	1,133.74	156.45
12	**Timor-Leste**	1,268,671	2,180	146,596	71	161	5.60	12.7	109.83	48.43
13	**Bhutan**	797,765	2,510	86,981	125	137	15.67	17.4	157.51	143.71
14	**Indonesia**	261,115,456	3,400	128,398,594	31,282	31,726	11.98	12.2	24.71	24.36
15	**Mongolia**	3,027,398	3,550	841,537	484	499	15.99	16.5	59.30	57.51
16	**Philippines**	103,320,224	3,580	9,251,565	10,012	12,690	9.69	12.3	137.17	108.22
17	**Sri Lanka**	20,798,492	3,780	6,795,469	3,003	3,096	14.44	14.9	45.56	44.19
18	**Georgia**	3,925,405	3,810	1,126,470	581	599	14.80	15.3	53.17	51.58
19	**Jordan**	9,455,802	3,920	1,502,420	750	2,306	7.93	24.4	153.49	49.92
20	**Azerbaijan**	9,725,376	4,760	1,314,551	759	845	7.80	8.7	64.28	57.74
21	**Iraq**	37,202,572	5,430	5,775,777	4,134	7,686	11.11	20.7	133.07	71.57
22	**Thailand**	68,863,512	5,640	37,338,136	21,745	22,491	31.58	32.7	60.24	58.24
23	**Iran**	80,277,424	6,530	30,377,065	15,932	16,426	19.85	20.5	54.07	52.45
24	**Maldives**	427,756	7,430	92,983	4	4	0.94	0.9	4.30	4.30
25	**Lebanon**	6,006,668	7,680	1,866,407	576	1,090	9.59	18.1	58.40	30.86
26	**China**	1,411,415,375	8,260	94,694,457	58,022	256,180	4.11	18.2	86.93	19.69
27	**Kazakhstan**	17,987,736	8,710	4,383,120	2,625	3,158	14.59	17.6	72.05	59.89
28	**Russian Federation**	143,964,512	9,720	54,014,259	20,308	25,969	14.11	18	48.08	37.60
29	**Malaysia**	31,187,264	9,850	27,613,120	7,152	7,374	22.93	23.6	26.70	25.90
30	**Oman**	4,424,762	18,080	1,370,913	692	713	15.64	16.1	52.01	50.48
31	**Saudi Arabia**	32,275,688	21,750	6,895,799	9,031	9,311	27.98	28.8	135.02	130.96
32	**Cyprus**	1,170,125	23,680	650,805	46	60	3.93	5.1	9.22	7.07
33	**Republic of Korea**	50,791,920	27,600	25,680,967	4,292	4,990	8.45	9.8	19.43	16.71
34	**Israel**	8,191,828	36,190	3,239,405	335	345	4.09	4.2	10.65	10.34
35	**Japan**	127,748,512	38,000	81,602,046	4,682	5,224	3.67	4.1	6.40	5.74
36	**United Arab Emirates**	9,269,612	40,480	3,391,125	725	1,678	7.82	18.1	49.48	21.38
37	**Kuwait**	4,052,584	41,680	2,001,940	424	715	10.46	17.6	35.72	21.18
38	**Singapore**	5,622,455	51,880	933,534	141	155	2.51	2.8	16.60	15.10
39	**Qatar**	2,569,804	75,660	1,330,487	178	239	6.93	9.3	17.96	13.38

2.2 Vehicle types and proportion of RTFs by road user groups

As illustrated in Figure 3, the percentage of vehicle types was arranged from left to right with ascending values of per capita GNI. In Figure 4, as the GNI per capita increased, the proportion of 2/3-wheeled vehicles declined and that of 4-wheeled vehicles increased. As presented in Figure 5, as the fleet composition of both 2/3- and 4-wheeled vehicles increased, the proportion of RTFs involved both 2/3- and 4-wheeled vehicles increased. For low- and medium-income Asian countries, 2/3 wheeled vehicles are the dominant mode of the total road fleet. Based on the RTFs by road user types, 2/3-wheeled vehicles were a primary contributor to RTFs. Most (low and medium income) Asian countries consequently need strong commitments on education, campaigning, public relations and the adoption and enforcement of national road safety legislation related to the utilization of 2/3- wheeled vehicles [3]. It should be noted that Kyrgyzstan, Indonesia, Armenia, Jordan, China, Saudi Arabia, Qatar and Japan were not determined, because these Asian countries did not have information on vehicle types.

2.3 The performances of road safety laws enforcement

Based on a WHO report [3], scoring and rating systems (ranging from 1 (inefficient) to 10 (highest efficiency)) were applied to assess the enforcement of national road safety laws. It is complicated to directly compare the road safety law enforcement among the Asian countries. Each road safety law has its owned relative importance (weight). To make direct comparisons of road safety law enforcement of Asian countries possible, one may employ the most rigorous and widely used Multiple Criteria Decision Making (MCDM) method, namely the Analytic Hierarchy Process (AHP) [7]. It was applied to determine the relative weights on the enforcement of each of five road safety law using direct interviews of 13 selected road safety experts. AHP is a mathematical method primarily applied to consider the

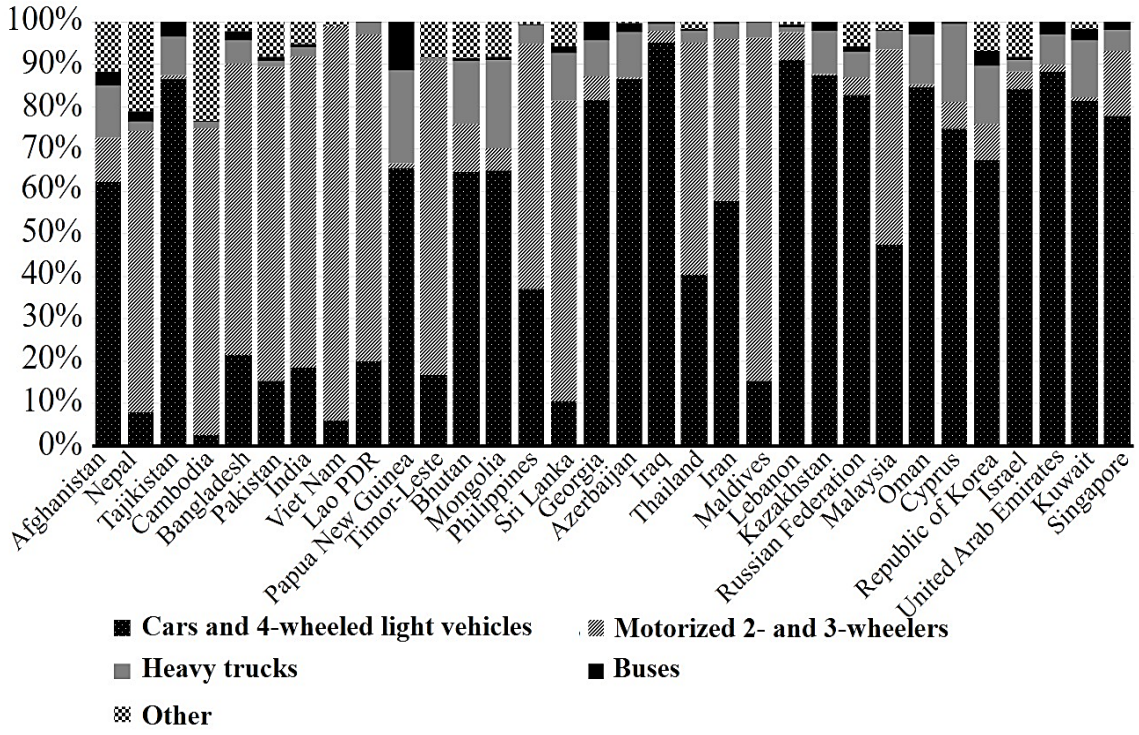


Figure 3 Vehicle types by road user groups among Asian countries [3]

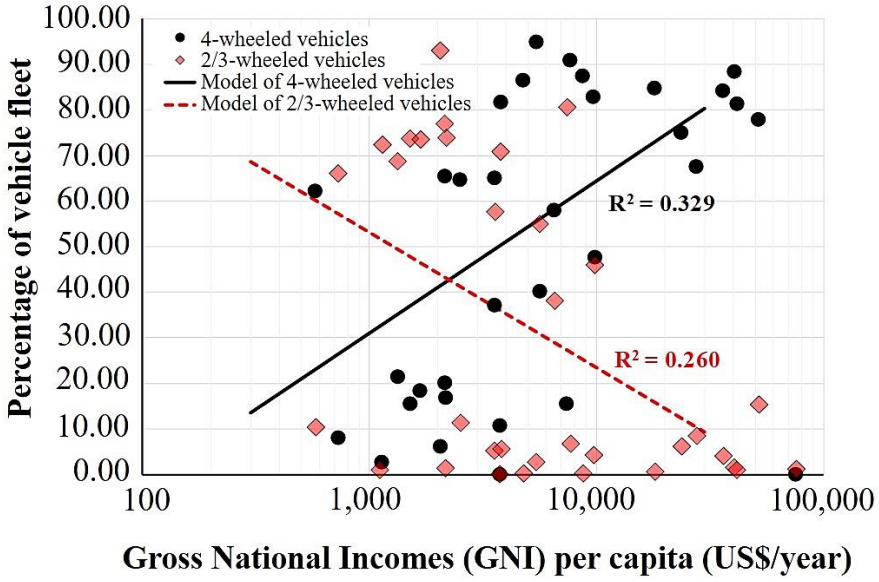


Figure 4 Proportion of vehicles composition vs. GNIs per capita in Asian Countries

priority of different alternatives using a pairwise comparison approach. The pairwise comparison method associated with a ratio scale has played an important role in calculating the relative weights of the determined decision elements [8-9]. AHP has become a most promising and popular method because of its simplicity, theoretical robustness, its ability to assess the judgements' consistency and has the capability to determine group judgements [8-9]. In this research, it is assumed that the group relative weights of five national road safety laws in all Asian countries are identical. The Normalization of the Geometric Mean (NGM) of the rows [7] was applied to estimate the relative weights of each road safety law. The Geometric Mean Method (GMM) [6] was adopted to calculate the group relative weights of the road safety laws. Subsequently, a Simple Additive Weight (SAW) method was adopted to compute the Composite Law Enforcement Scores (CLES) of each Asian country. Based on the SAW method: $CLES_i = \sum_{j=1}^{n} w_j \times LES_{ij}$, where w_j = group relative weight of national law enforcement criterion j and LES_{ij} = law enforcement score (ranging from 1 to 10) for criterion j of an Asian country i, The AHP methodological procedures, hierarchy structure of some road safety laws and a sample of a square matrix containing pairwise comparisons

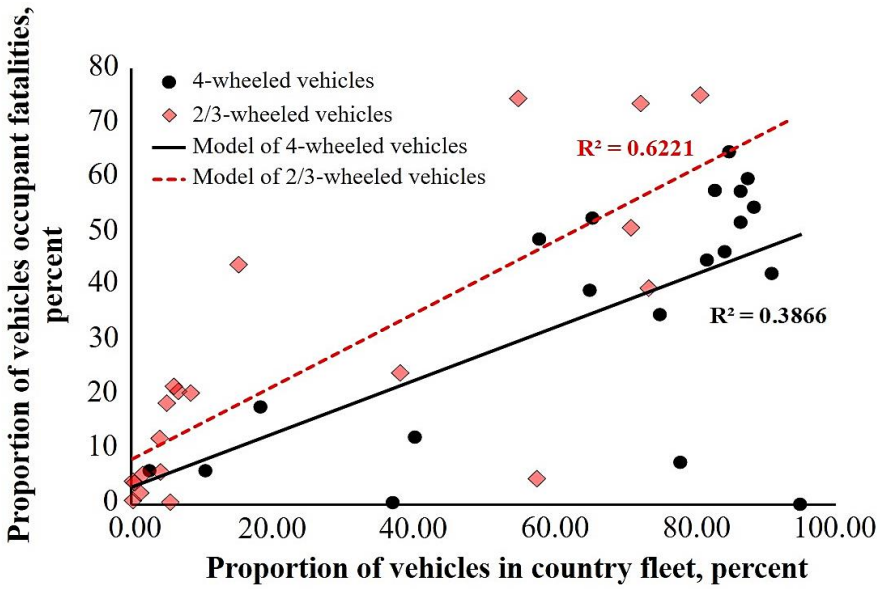
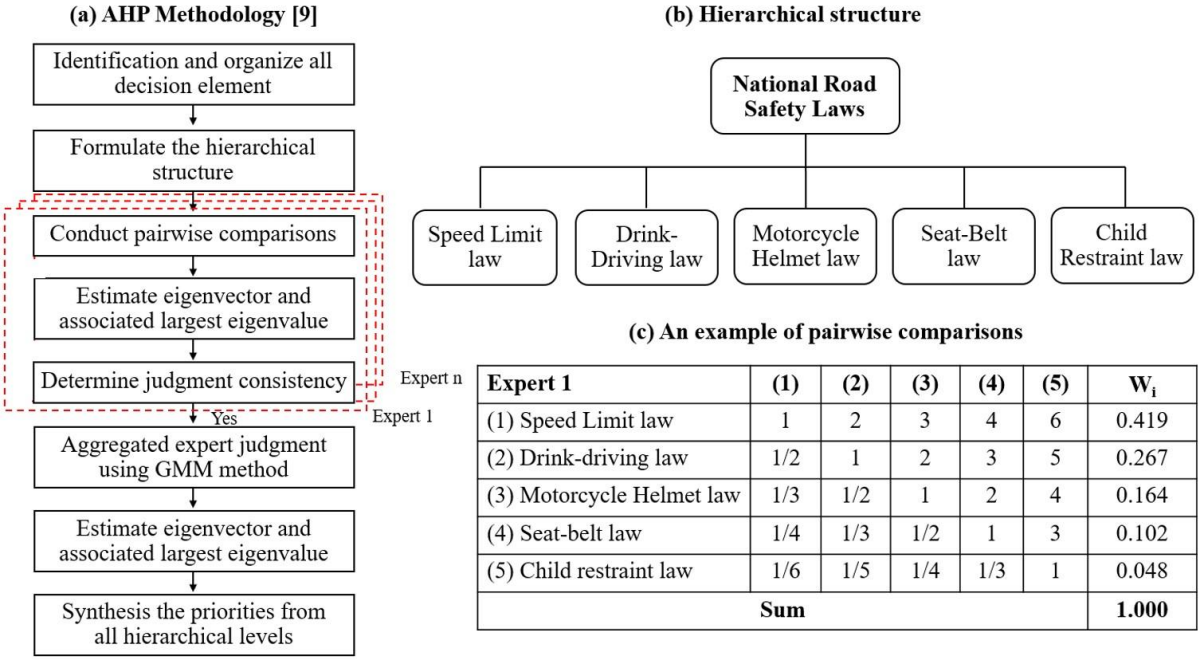


Figure 5 Proportion of RTFs by vehicle types vs. proportion of vehicles compositions



(c) An example of pairwise comparisons

Expert 1	(1)	(2)	(3)	(4)	(5)	W_i
(1) Speed Limit law	1	2	3	4	6	0.419
(2) Drink-driving law	1/2	1	2	3	5	0.267
(3) Motorcycle Helmet law	1/3	1/2	1	2	4	0.164
(4) Seat-belt law	1/4	1/3	1/2	1	3	0.102
(5) Child restraint law	1/6	1/5	1/4	1/3	1	0.048
Sum						**1.000**

Figure 6 The AHP methodological procedures (a), the hierarchy structure of all road safety laws (b) and one example of a square matrix containing all pairwise comparisons of all road safety laws of one experts (c)

of the road safety laws of experts are presented in Figure 6. The derived group relative weights of each road safety law criterion are also illustrated in Figure 7. Based on the SAW method, the estimated $CLES_i$ values of all determined Asian countries are shown in Figure 8. It was found that as the GNI per capita of each Asian country increased, their corresponding $CLES_i$ values also increased and the integrated enforcement performance of all road safety laws was relatively improved.

3. Road safety status and analysis of Thailand

3.1 Trend of RTFs per 100,000 people and RTFs per 100,000 vehicles

The Ministry of Public Health (MPH) recently released a vital research report that relied on a systematic and scientific integration of the National Police Bureau (NPB), MPH, and the Road Accident Victim Protection Company of Thailand (RAVPCT) database resources [10]. The main purpose of the study was to calculate RTFs values (from 2011 to 2017) from these three RTF database systems. The individual identification numbers (13 digits) of the fatalities of road accidents each year and other screening methods were applied to remove duplicate data [11]. As illustrated in Figure 9, the trend of the RTFs per 100,000 people was computed using these three RTF database systems. As shown in Table 2 and Figure 9, the estimated values of the RTFs per 100,000 people derived in this way slowly declined (12.2 percent) from 32.8

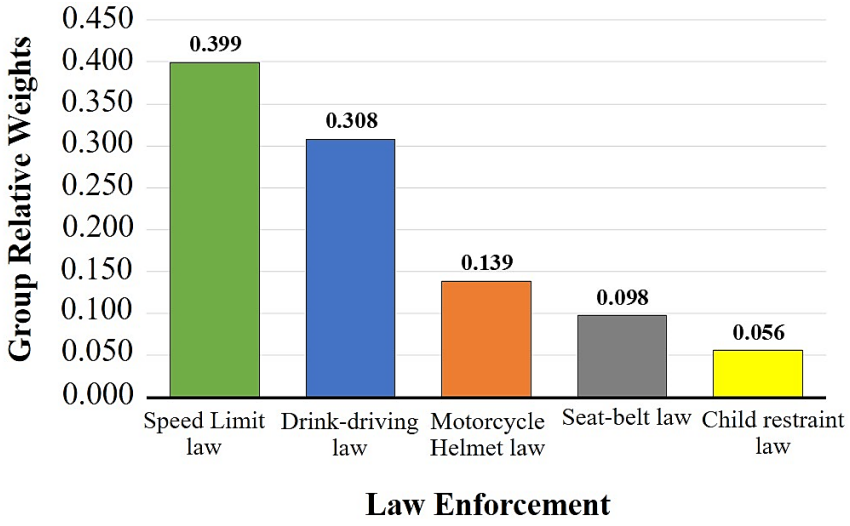


Figure 7 Group relative weight of law enforcement criterion

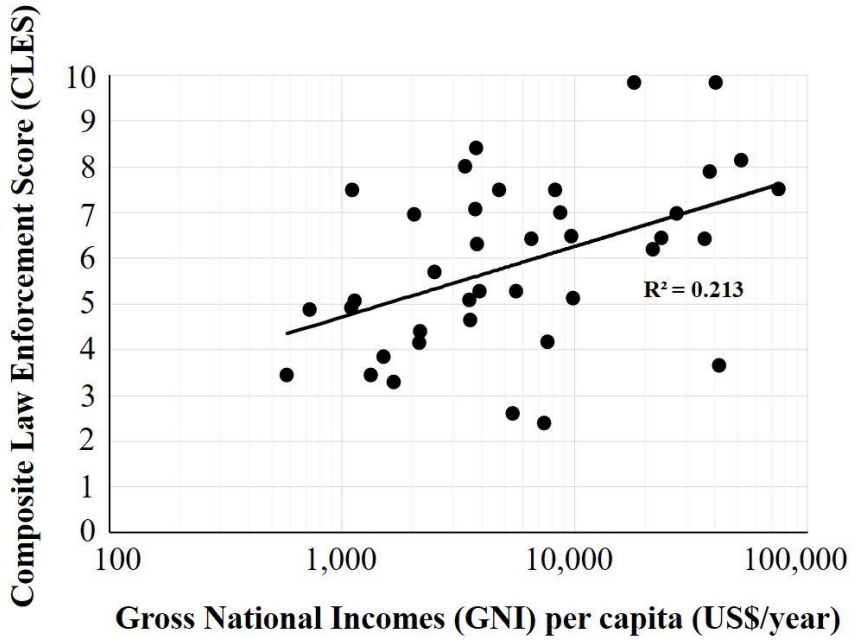


Figure 8 The CLES vs. GNIs per capita among Asian countries

Table 2 Thailand estimated RTFs and RTFs per 100,000 people from three sources and the WHO

Years	Number of people (millions) **	Number of registered vehicles (millions) **	3 RTFs Database source [10]			Estimated WHO Reports [3, 4, 12]		
			3 RTFs Database source *	RTFs per 100,000 people	RTFs per 100,000 vehicles	RTFs	RTFs per 100,000 people	RTFs per 100,000 vehicles
2010	66.6	29.79	-	-	-	26,312	38.1	88.3
2011	67.0	31.13	21,996	32.8	70.66	-	-	-
2012	67.4	32.47	21,603	32.0	66.54	-	-	-
2013	67.8	33.80	21,221	31.3	62.78	24,237	36.2	71.7
2014	68.3	35.14	20,790	30.5	59.16	-	-	-
2015	68.7	36.48	19,960	29.1	54.71	-	-	-
2016	69.1	37.82	21,745	31.5	57.49	22,491	32.7	59.5
2017	69.6	39.16	22,864	32.9	58.39	-	-	-
2018	70.0	40.50	20,169	28.8	49.80	-	-	-

*The 3- Road Accident Fatalities Database sources including Road Accident Victim Protection Company of Thailand (RAVPCT), National Police Bureau (NPB) and Ministry of Public Health (MPH) [10]

** Number of people and registered vehicles from forecasting data derived from World Health Organization [3, 4, 12, 13]

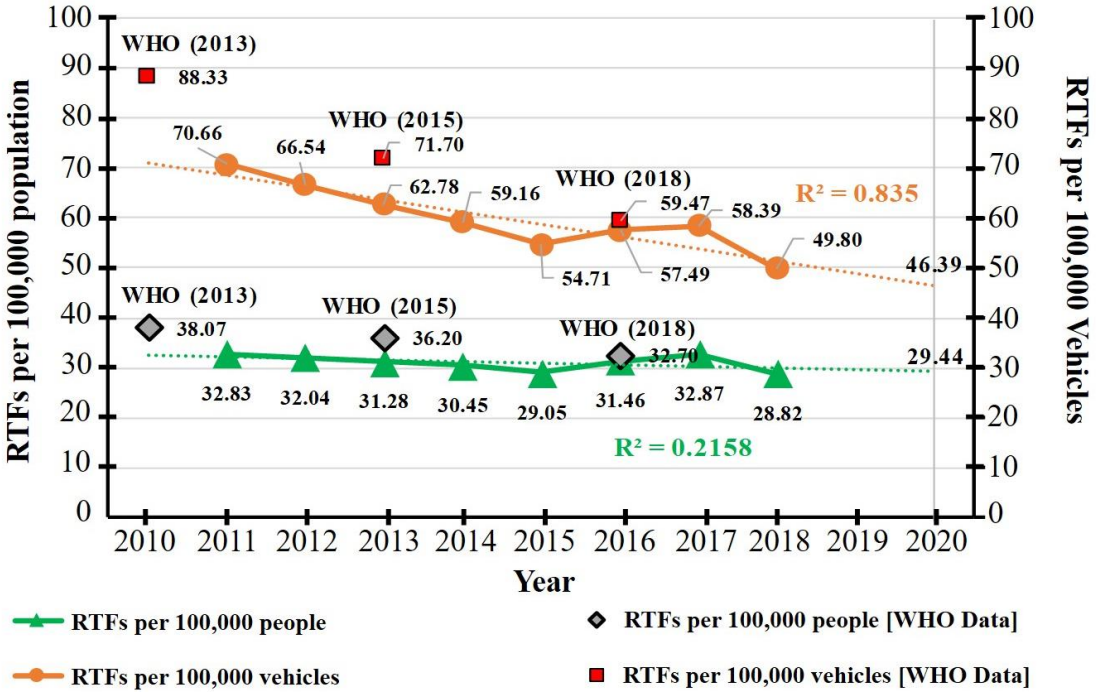


Figure 9 Road traffic deaths per 100,000 population and a rate of road traffic deaths per 100,000 vehicles: 2010-2020

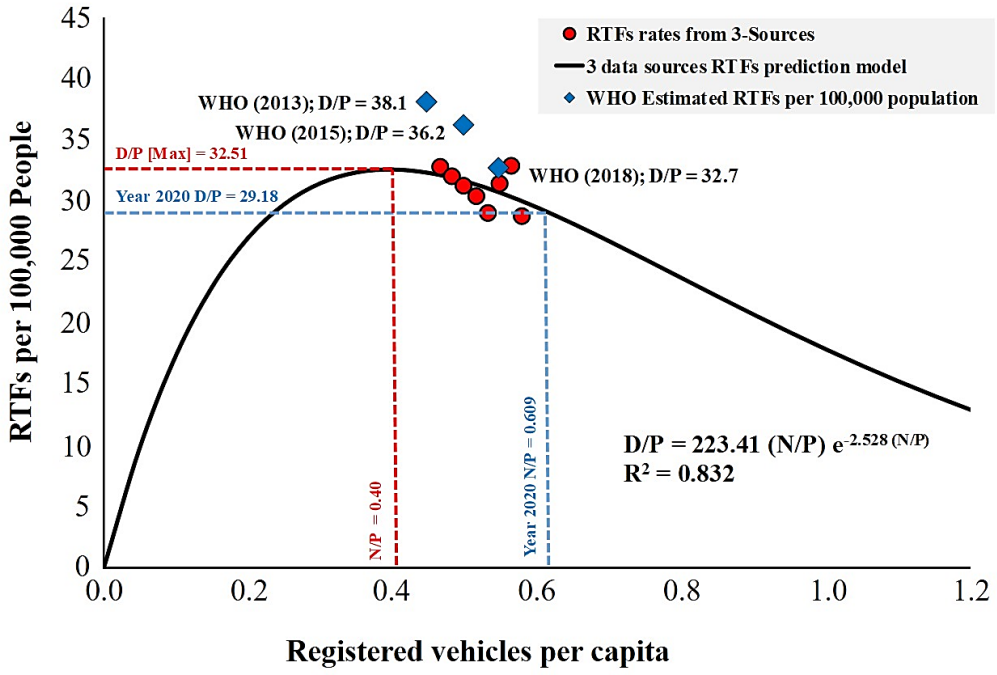


Figure 10 The Thailand RTFs prediction model as a function of motorization

(in 2011) to 28.8 (in 2018). If this declining trend remains constant, the predicted RTFs per 100,000 people will be 29.4 in 2020. The estimated values of RTFs per 100,000 people obtained from the three database sources were similar to values derived from WHO reports [3-4, 12]. In 2016, while the number of global RTFs (1.35 million) increased, the values of global RTFs per 100,000 people (18.2) remained stable [3]. In contrast, based on the WHO's reports [3, 12], the estimated RTFs per 100,000 people in Thailand gradually declined from 38.1 in 2010 [12] to 32.7 in 2016 [3]. These two values are much greater than the global average [3]. Similarly, as presented in Table 2 and Figure 9, the estimated values of the RTFs per 100,000 vehicles from the three database systems gradually decreased (29.6 percent) from 70.7 (in 2011) to 49.8 (in 2018). If this decreasing tendency remains stable, the anticipated RTFs per 100,000 vehicles will be 46.4 in 2020. The computed values of RTFs per 100,000 vehicles derived from the three database sources were close to the values from WHO reports [3-4, 12]. While the number of registered vehicles rapidly increased globally from 0.85 billion (in 2000) to 2.1 billion vehicles (in 2016), the global RTFs per 100,000 vehicles declined from rates

Table 3 Vehicle type and RTF proportion by road user group among Asian countries

Year	RTF Proportion by Road User Types [3, 4, 12, 13]						Vehicle Fleet Composition [3, 4, 12, 13]					
	Driver/ Passenger of 4-wheeled vehicles (1)	Driver/ Passenger of 2- or 3-wheelers (2)	Cyclist (3)	Pedestrians (4)	Other users (5)	Ratio (2)/(1)	Car and 4-wheeled light vehicles (6)	Motorized 2- and 3-wheelers (7)	Heavy trucks (8)	Buses (9)	Others (10)	Ratio (7)/(6)
2007	11.0	69.7	2.8	8.3	8.2	6.3	32.5	63.0	3.0	1.0	0.5	1.9
2010	13.3	73.5	3.0	7.7	2.5	5.5	34.7	60.8	2.9	0.5	1.1	1.8
2013	13.0	72.8	2.3	8.1	3.8	5.6	36.4	59.0	2.8	0.4	1.4	1.6
2016	12.3	74.4	3.5	7.6	2.3	6.1	40.2	54.9	2.8	0.4	1.7	1.4

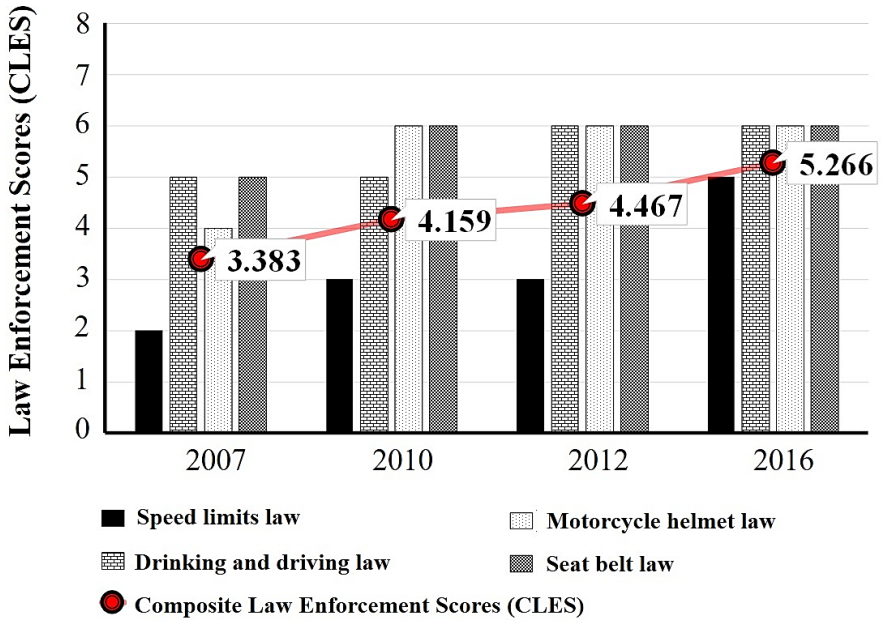


Figure 11 Enforcement scores of various road safety laws in Thailand [3, 4, 12, 13]

of 135 (in 2000) to approximately 64 (in 2016) [3]. Relying on the WHO's reports [3, 12], the estimated RTFs per 100,000 vehicles of Thailand rapidly decreased from 92.4 (in 2010) [12] to 58.2 (in 2016) [3]. These two values are lower than those global average.

3.2 Modelling RTFs per 100,000 people

Based on Borsos et al. [14] and Klungboonkrong et al. [5], the new Thailand RTF prediction model (RTFs per 100,000 people as a function of motorization (vehicles per capita)) utilizing three RTF database sources (in 2011 and 2018) was recently developed. The new Thailand RTF prediction model, $D/P = 223.41\ (N/P)\ e^{-2.528(N/P)}$ (with $R^2 = 0.83$) (shown in Figure 10) was derived, where D is the number of annual RTFs, N is number of registered vehicles and P is number of population. It clearly illustrates an inverted U-shaped trend. As presented in Figure 10, the country is beyond its maximum rate (at 32.5 RTFs per 100,000 people and 0.4 vehicles per capita) and is presently in a declining trend [5]. This model forecasts that the RTFs per 100,000 people will be 29.2 in 2020. It should be noted that the predicted values of RTFs per 100,000 people in 2020 derived from the declining trend in Figure 9 (29.4) and from the new model shown in Figure 10 (29.2) are almost identical. However, these values are greater than the targeted value (18.0). This clearly indicates that Thailand is unlikely to achieve its road safety SDGs target.

3.3 Vehicle Type and RTF Proportions by Road User Groups

The percentage of vehicle types and the RTF proportion by road user groups in Thailand is given in Table 3 [3-4, 12-13]. Based on the vehicle type, 2/3-wheeled vehicles were the dominant modes of road travel, followed by 4-wheeled vehicles. In Table 3, the ratios of the percentage of 2/3-wheeled vehicles to those of 4-wheeled vehicles ranged from 1.4 – 1.9 (in 2007 and 2016), while the ratios of the percentage of RTFs caused by 2/3-wheeled vehicles to those involved 4-wheeled vehicles ranged from 5.5 – 6.3 (in 2007 and 2016). The RTFs involving 2/3-wheeled vehicles ranged from 3.2 to 4.4 times greater than those of 4-wheeled vehicles. Hence, 2/3-wheeled vehicles (motorcycles) are the most hazardous on-road vehicles in Thailand and riders and passengers of such vehicles are consequently the most harmed road users in Thailand. Urgent road safety actions to deal with this crisis are crucially needed.

3.4 Performances of Road Safety Law Enforcement

In 2016, the ratings for speed limit, drinking and driving, motorcycle helmet and seat belt laws were 5, 6, 6 and 6, respectively [3]. A child restraint law has never been formally adopted in Thailand. As shown in Figure 11, The Composite Law Enforcement Scores (*CLES*$_i$) of various national road safety laws of Thailand in 2007, 2010, 2013 and 2016 were 3.38. 4.16, 4.47 and 5.27, respectively [3-4, 12-13]. It clearly showed a progressive improvement on road

safety law enforcement in Thailand between 2007 and 2016. The speed limit enforcement scores were the lowest, 2, 3, 3 and 6 in 2007, 2010, 2013 and 2016, respectively. However, in 2013 and 2016, the enforcement scores for the drinking and driving, motorcycle helmet, and seat belt laws in Thailand were rated to 6 [3-4]. Road safety law enforcement of Thailand is relatively moderate as the acceptable enforcement score for all road safety laws is 8 [4].

4. Conclusions

Based on the Global Status Report on Road Safety 2018 [3], the interrelationship of important road safety parameters (such as Road Traffic Fatalities (RTFs), population, income levels, registered vehicles, law enforcement and others) in Thailand and other Asian countries was achieved via a literature review and in-depth analysis. RTFs per 100,000 people had correlations with motorization (registered vehicles per capita), while RTFs per 100,000 vehicles demonstrated reasonable correlation with the number of registered vehicles per 100,000 people. When the number of registered vehicles per 100,000 people increased, the RTFs per 100,000 vehicles decreased accordingly. The primary contributing vehicles to the RTFs in Thailand and other Asian countries are 2/3-wheeled vehicles. As the number of 2/3- and 4-wheeled vehicles in Asian countries increased, the percentages of RTFs caused by these vehicles were enhanced. As the GNIs per capita of Asian countries were enhanced, road safety law enforcement commonly improved. Based on RTFs per 100,000 people, Thailand has one of the most dangerous road transport systems. A new RTF (per 100,000 people) prediction model was derived using a limited time series of three RTF database resources. Motorization can potentially be used to predict the RTFs per 100,000 population in Thailand. In 2020, the anticipated RTFs per 100,000 people will be three-fold greater than targeted. Consequently, Thailand is unlikely to reach its SDGs for road safety issues.

During 2011-2017, Thailand RTFs derived from these three database resources were much greater than the formally reported statistics of the WHO. This will lead to the misunderstanding and underestimation of the real impacts of the road safety crisis in terms of the road accident severity, its related costs and other adverse effects in Thailand. There have been serious problems regarding the accuracy and reliability of RTF database systems in Thailand. Consequently, development of a systematic and integrated road safety database system for Thailand is crucially needed. Two-thirds of all road accidents and RTFs on national highways in Thailand were caused by speeding. As the speed limit law enforcement scores were the worst, urgent actions on enforcement of speed limit laws are critically needed. Motorcycles are the most dangerous on-road vehicles in Thailand and riders and passengers of such vehicles are consequently the most harmed road users. Urgent road safety actions to deal with this crisis are indispensable.

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