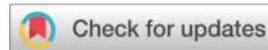


Assessment of Knowledge, Attitudes, and Practices Toward Road Safety Education Among Teenagers

in Nakhon Si Thammarat, Thailand: A Cross-Sectional Study



Francis Walugembe^{1,2}, Cua Ngoc Le^{1&2}, Patthanasak Kammaneechan^{1,2}, Hien Thi Nguyen³, Shamarina Shohaimi⁴, Sang-Arun Isaramalai⁶, Charuai Suawanbumrung^{1,2}, Sanhawat Chaiwong^{5*}

1Doctor of Philosophy program in Public Health Research, School of Public Health Walailak University

2Excellent Center for Public Health Research: EC-PHR, Walailak University

3Faculty of Public Health, Can Tho University of Medicine and Pharmacy, Vietnam

4Faculty of Science, Department of Biology, Universiti Putra Malaysia, Serdang, Malaysia

5Community Public Health Major Faculty of Science Nakhon Phanom University, Thailand

6Faculty of Nursing, Prince of Songkla University

Corresponding Author- Assoc. Prof. Dr. Sanhawat Chaiwong.

Submitting author : Francis Walugembe

Target journal : Technical Communication Journal (STC)

ABSTRACT

Objectives: The main objective of this study was to determine the level of knowledge, the attitudes and the practices of adolescents in Nakhon Si Thammarat, Thailand, towards road safety.

Methods: This study utilized a cross sectional study design among adolescents aged 13 to 18 years recruiting a total of 500 students across 23 districts and 71 secondary schools through stratified random sampling. Data were collected using a structured questionnaire that assessed knowledge on traffic laws, attitudes towards compliance with road safety regulations and self-reported road safety practices. The Data were analyzed and reported using descriptive statistics. The study adhered to ethical guidelines and had the approval from relevant authorities.

Results: The mean age of participants was 16 years, 61.4% were female, 80.8% resided in rural areas and the household income was predominantly (42.8%) less than 12,000 baht. 50.8% of respondents had a low

level of knowledge, 60.6% had negative attitudes towards compliance with road safety and 78.8% engaged in unsafe road practices.

Conclusions: Adolescents with a low level of knowledge on road safety practices and a predominantly negative attitude towards compliance with road safety regulations are at an increased risk of engaging in unsafe road practices. This highlights a need for a tailored training on road safety practices which directly addresses the gaps that are particular to this age group.

Keywords. Adolescents, Thailand, Road safety, KAP framework.

INTRODUCTION

Road traffic injuries rank as one of the leading causes of death among adolescents globally [1]. This risk is further heightened in countries such as Thailand where motorcycle usage is prevalent especially when these adolescents engage in risky behaviors such as riding motorcycles while distracted or without helmets [2]. Additionally, teenagers are at an increased risk from road traffic injuries since they often under-estimate the dangers of speeding, texting while driving and neglecting helmets or seatbelts [3]. Road safety practices are also heavily influenced by cultural practices. For example, helmet compliance rates are significantly lower in rural areas compared to urban areas in Thailand.

Nakhon Si Thammarat province provides a unique case study that is rural, has a high number of adolescents and the primary mode of transportation is motorcycles. According to provincial statistics, road traffic injuries are among the leading causes of morbidity and mortality for teenagers aged 13 to 19 years [4]. Therefore, a study in this area was able to result in data that would tell the real picture of the knowledge, attitudes and practices of teenagers with regards to road safety.

Thailand notably lacks targeted data on the knowledge attitudes and practices of teenagers regarding road safety. This gap hampers the development of targeted interventions. There is an urgent need for targeted interventions aimed at this demographic since the consequences of these injuries not only include fatalities but also lifelong disabilities and psychological trauma [5]. In order to implement these interventions, it would be crucial to first understand the knowledge, attitudes and practices of teenagers with regards to road safety.

To address road safety issues, several countries, including Germany and Australia, have successfully implemented educational programs that have been shown to reduce road traffic fatalities by changing user behaviors [6]. A crucial part of the development of these interventions is the KAP framework (Knowledge, Attitudes and Practices). This framework is beneficial in designing interventions that will improve road safety outcomes by first assessing the knowledge, attitudes and practices of teenagers with regards to road safety then developing interventions based on those results.

Thailand's National Master Plan on Road Safety aims to decrease road traffic fatalities by 2027, with a particular focus on motorcycle safety and the enforcement of stricter regulations[7]. However, progress is hindered by factors such as weak enforcement, cultural attitudes, and inadequate infrastructure [8]. The government's Road Safety Master Plan, which includes measures such as speed restrictions, mandatory alcohol testing, and stricter licensing for young motorbike riders, specifically targets high-risk behaviors among teenagers [9]. In order to improve outcomes, it is necessary to design road safety interventions that cater specifically to adolescents such as driving simulations, interactive and experimental learning methods and peer led campaigns. This will result in reduction of the overall burden of road traffic injuries in Thailand.

In summary, the assessment of the level of knowledge attitudes and practices of teenagers from Nakhon Thammarat in relation to road safety is crucial in coming up with successful interventions. By

understanding the gaps after assessment, policymakers will be able to design more effective road safety solutions. This study therefore seeks to add to the growing body of literature on adolescent road safety both globally and in Thailand by providing insights that will inform policy decisions and educational interventions aimed at reducing road traffic injuries among teenagers.

METHODS

Study Design

This study employed a cross sectional study design which allowed for a comprehensive assessment of the current levels of knowledge, attitudes, and practices related to road safety education among teenagers in Nakhon Si Thammarat.

Study Setting

This study was conducted in selected schools in Nakhon Si Thammarat province, Thailand. The focus was on secondary schools both from urban and rural settings, and this ensured a diverse range of participants with varying exposure to road safety education and experiences.

Sampling Strategy and Procedure.

A stratified random sampling technique was used to ensure representation across 23 districts and 71 secondary schools. A sample size of 500 students was determined using a standard formula that accounted for the expected prevalence of the outcome, the desired confidence level, and the margin of error, and incorporated a non-response rate adjustment to ensure representativeness. The sample size was calculated based on previous studies in similar populations, considering a confidence level of 95% and a margin of error.

Study Population

The target population comprised secondary school students aged 13-18 years in Nakhon Si Thammarat. This age group was selected due to their increased exposure to road risks as pedestrians, cyclists, and motorcycle passengers.

Inclusion and Exclusion Criteria.

Students aged 13-18 years enrolled in selected secondary schools and those willing to participate and provide informed consent were included in the study. While students with cognitive impairments that hindered questionnaire completion and students who were absent on the day of the study were excluded from the study.

Variables

The independent Variables in this study were knowledge of traffic laws, awareness of road safety measures, attitudes towards compliance with road safety regulations, and self-reported practices. While the dependent variables were observed road safety behavior and risk factors contributing to noncompliance with safety measures.

Data Collection and Management

Data were collected using a structured questionnaire that assessed knowledge of traffic rules, attitudes toward road safety, and self-reported road safety behaviors. The questionnaire was validated through a pilot study involving 30 students from a different school to ensure clarity and reliability. Content Validity Index (CVI) was determined and the calculated Cronbach's Alpha value of 0.886 was very reliable and an indication of high internal consistency across the items of the scale. Kuder Richardson 20 was used to retain 9 Knowledge items that satisfied the criteria for KR-20 reliability. Data collection was conducted in a classroom setting under the supervision of trained research assistants to ensure uniform administration and minimize response bias. Collected Data were checked for completeness and accuracy before entry.

Data cleaning was performed and then the dataset was stored securely with restricted access to ensure confidentiality.

Statistical Analysis

Descriptive statistics was used to summarize knowledge, attitudes, and practices related to road safety education. Chi-square tests and logistic regression were employed to identify associations between knowledge levels, attitudes, and self-reported practices.

Ethical consideration

Ethical approval was obtained from Walailak University Human Research Ethics Committee (WUEC). Approval Number WUEC-24-335-01. Informed consent was obtained from a parent and or guardian of all participants prior to data collection, in addition to assent from the adolescent participants themselves. This study was performed in accordance with relevant guidelines and regulations of declaration of Helsinki.

Data availability

The dataset generated and or analyzed during the current study are not publicly available due to the need to protect participants confidentiality and privacy, as the data contain potentially identifiable information of minors. However, de-identified data are available from the corresponding author on reasonable request.

RESULTS.

Socio-demographic characteristics of respondents

The study included 500 participants with a mean age of 16 years (± 1.6). The majority (53.6%) were aged 16-18 years, while 46.4% were 13-15 years. Females constituted the majority at 61.4% of respondents. Nearly half (49.2%) had attended lower secondary school, and 80.8% resided in rural areas. Motorcycles

were the primary transportation mode (53.6%), followed by public transport (25.0%) and cars (19.2%). Fathers' education levels exceeded mothers', with 54.6% attaining secondary education versus 49.0% of mothers. Household income was predominantly ≤12,000 baht (42.8%), while 21.4% earned above 24,000 baht. Rural-urban disparities were evident, with rural participants forming the majority.

Table 1: Socio-demographic characteristics of respondents

Variable	Category	Frequency (n=500)	Percentage (%)
Age(years)	<i>Mean (std)</i>	<i>16 (1.6)</i>	
	13-15	232	46.40
	16-18	268	53.60
Gender	Male	193	38.60
	Female	307	61.40
Highest school attended	Lower Secondary	246	49.20
	Upper Secondary	254	50.80
Residence	Urban	96	19.20
	Rural	404	80.80
Transport means used	Motorcycle	268	53.60
	Car	96	19.20
	Public Transport	125	25.00
	Bicycle	7	1.40
	Walking	4	0.80

Mothers level	Education	No formal education	15	3.00
		Primary	51	10.20
		Secondary	245	49.00
		University	189	37.80
Fathers level	Education	No formal education	27	5.40
		Primary	66	13.20
		Secondary	273	54.60
		University	134	26.80
Family Economic Status	Socio	12,000 baht and below	214	42.80
		12,001 – 24,000 baht	179	35.80
		24,000 baht and above	107	21.40

Knowledge of Road Safety Among Teenagers

Overall, 50.8% had low knowledge of road safety. The highest correct response rate was observed for practicing safe road crossing habits (83.6%). 56.4% could identify a no-parking sign. Knowledge of necessary safety gear for biking was 65.2% correct. Understanding of proper biking behavior was demonstrated by 58.0%, while knowledge of vehicle speed effects on vision and stopping distance was 41.4%. Recognition of road accident consequences was 46.2% correct, while understanding safe driver behaviors was the lowest at 8.2%. Awareness of seat belt importance was 51.4% correct, while knowledge of proper seat belt use was 32.0%. (Table 2)

Table 2: Knowledge of Road Safety among respondents

Attributes	Knowledge of respondents on road safety			
	Response	High n=246 (49.2 %)	Low n=254 (50.8 %)	Total N=500 (%)
Practices safe road crossing habits	Correct	233 (94.7)	185 (72.8)	418 (83.6)
	Wrong	13 (5.3)	69 (27.2)	82 (16.4)
Identifies a no-parking sign correctly	Correct	169 (68.7)	113 (44.5)	282 (56.4)
	Wrong	77 (31.3)	141 (55.5)	218 (43.6)
Knows necessary safety gear for biking	Correct	205 (83.3)	121 (47.6)	326 (65.2)
	Wrong	41 (16.7)	133 (52.4)	174 (34.8)
Understand proper biking behavior	Correct	57 (23.2)	101 (39.8)	290 (58.0)
	Wrong	189 (76.8)	153 (60.2)	210 (42.0)
Understands effects of vehicle speed on vision and stopping distance	Correct	146 (59.4)	61 (24.0)	207 (41.4)
	Wrong	100 (40.6)	193 (76.0)	293 (58.6)
Recognize consequences of road accidents	Correct	163 (66.3)	68 (26.8)	231 (46.2)
	Wrong	83 (33.7)	186 (73.2)	269 (53.8)
Understand safe driver behaviors	Correct	25 (10.2)	16 (6.3)	41 (8.2)
	Wrong	221 (89.8)	238 (93.7)	459 (91.8)
Know the importance of wearing seat belts	Correct	172 (69.9)	85 (33.5)	257 (51.4)
	Wrong	74 (30.1)	169 (66.5)	243 (48.6)
Understand the proper way to wear a seat belt	Correct	140 (56.9)	54 (21.3)	160 (32.0)
	Wrong	106 (43.1)	200 (78.7)	340 (68.0)

Attitudes Towards Road Safety

Negative attitudes towards road safety were prevalent (60.6%). A significant proportion (53.6%) disagreed with the need to wear helmets. 65.8% did not believe road signs helped reduce speed. Concern about accidents from speeding vehicles was reported by 58.8%, yet 60.4% did not see using a mobile phone while riding as a hazard. 57.6% reported concern when failing to adhere to road signs. 56.6% felt uneasy when not wearing a seatbelt in a car. 41.4% believed drivers would try not to hit them when crossing the road. (Table 3)

Table 3: Attitudes of respondents towards road safety

Attitudes of respondents towards road safety				
N=500 (%)				
Variable	Response	Positive 197 (39.4%)	Negative 303 (60.6%)	Total (N=500)
I don't have to acquire a license before driving a car or riding a motorcycle.	Agree	75 (38.1)	10 (3.3)	85 (17.0)
	Neutral	39 (19.8)	82 (27.1)	121 (24.2)
	Disagree	83 (42.1)	211 (69.6)	294 (58.8)
I get nervous when I see my friends playing near a stopped car.	Agree	19 (9.6)	65 (21.5)	84 (16.8)
	Neutral	72 (36.6)	138 (45.5)	210 (42.0)
	Disagree	106 (53.8)	100 (33.0)	206 (41.2)
I get nervous when I don't adhere to road signs.	Agree	155 (78.7)	133 (43.9)	288 (57.6)
	Neutral	32 (16.2)	99 (32.7)	131 (26.2)

	Disagree	10 (5.1)	71 (23.4)	81 (16.2)
It doesn't bother me to see others ignore road signs.	Agree	111 (56.4)	23 (7.6)	134 (26.8)
	Neutral	38 (19.3)	103 (34.0)	141 (28.2)
	Disagree	48 (24.4)	177 (58.4)	225 (45.0)
If I ride a bike, road signs help me stay safe by reducing speed and accident risk.	Agree	6 (3.1)	46 (15.2)	52 (10.4)
	Neutral	29 (14.7)	90 (29.7)	119 (23.8)
	Disagree	162 (82.2)	167 (55.1)	329 (65.8)
I don't like to wear a helmet when riding a motorcycle.	Agree	86 (43.7)	9 (3.0)	95 (19.0)
	Neutral	40 (20.3)	97 (32.0)	137 (27.4)
	Disagree	71 (36.0)	197 (65.0)	268 (53.6)
If I ride a motorcycle, it will be safe to use my mobile phone because the risk of having an accident is low.	Agree	87 (44.2)	13 (4.3)	100 (20.0)
	Neutral	25 (12.7)	73 (24.1)	98 (19.6)
	Disagree	85 (43.2)	217 (71.6)	302 (60.4)
I worry about accidents when I see a car driving fast.	Agree	162 (82.2)	132 (43.6)	294 (58.8)
	Neutral	31 (15.7)	114 (37.6)	145 (29.0)
	Disagree	4 (2.0)	57 (18.8)	61 (12.2)
It feels safe to see a friend cross the street in bright clothes.	Agree	138 (70.0)	75 (24.8)	213 (42.6)
	Neutral	51 (25.9)	152 (50.2)	203 (40.6)
	Disagree	8 (4.1)	76 (25.0)	84 (16.8)
Drivers will try not to hit me.	Agree	146 (74.1)	61 (20.1)	207 (41.4)
	Neutral	45 (22.8)	147 (48.5)	192 (38.4)
	Disagree			

		6 (3.1)	95 (31.4)	101 (20.2)
I think myself and my family can also be victims of road accidents.	Agree	165 (83.8)	79 (26.1)	244 (48.8)
	Neutral	25 (12.7)	139 (45.9)	164 (32.8)
	Disagree	7 (3.5)	85 (28.0)	92 (18.4)
I feel uneasy seeing a friend not wear a seatbelt.	Agree	166 (84.3)	115 (38.0)	281 (56.2)
	Neutral	29 (14.7)	126 (41.6)	155 (31.0)
	Disagree	2 (1.0)	62 (20.5)	64 (12.8)
I feel uneasy when I don't wear a seatbelt in a car.	Agree	168 (85.3)	115 (38.0)	283 (56.6)
	Neutral	25 (12.7)	124 (40.9)	149 (29.8)
	Disagree	4 (2.0)	64 (21.1)	68 (13.6)

Practices of respondents towards road safety

Safe road practices were observed in only 21.2% of respondents, while 78.8% engaged in unsafe practices. 38.2% crossed the road without checking for oncoming traffic. 73.0% reported crossing roads without waiting for a green light. 78.6% did not raise their hand when using pedestrian crossings. 65.2% did not adhere to road signs when traveling. 67.4% of respondents reported not wearing a helmet while riding a motorcycle. 85.6% rode bicycles in areas with heavy traffic rather than safer, open spaces. 61.8% of respondents admitted to crossing roads outside designated crosswalks regularly. 72.2% reported not checking road signs when traveling. 80.4% did not attempt to understand drivers' thoughts before crossing the road. 95.9% did not wear bright-colored clothing on cloudy days. 81.5% reported not wearing seat belts properly. 67.0% admitted to disregarding speed limits when riding motorcycles or driving. 84.6% played around cars in parking lots or near moving traffic. 90.4% did not walk on crosswalks with their hand

raised for visibility. 83.3% did not wear a helmet when riding motorcycles. 93.7% did not consider driver behaviors when deciding when to cross the road.

Table 4: Practices of respondents towards road safety

Attributes	Practices of respondents towards road safety			
	Category	Total <i>N=500 (%)</i>	Safe n=106 (21.2 %)	Unsafe n=394 (78.8 %)
I walk on crosswalks with my hand raised up after checking that all cars have stopped.	Agree	107 (21.4)	69 (65.1)	38 (9.6)
	Disagree	393 (78.6)	37 (34.9)	356 (90.4)
I sometimes play with my friends in front of or behind cars.	Agree	423 (84.6)	65 (61.3)	358 (90.9)
	Disagree	77 (15.4)	41 (38.7)	36 (9.1)
I check road signs when travelling	Agree	139 (27.8)	97 (91.5)	42 (10.7)
	Disagree	361 (72.2)	9 (8.5)	352 (89.3)
I adhere to road signs when riding or driving	Agree	165 (33.0)	98 (92.5)	67 (17.0)
	Disagree	335 (67.0)	8 (7.6)	327 (83.0)
I ride a bike in a wide place with little traffic.	Agree	72 (14.4)	55 (51.9)	17 (4.3)
	Disagree	428 (85.6)	51 (48.1)	377 (95.7)
I like to goof off or mess with friends while I ride my bike.	Agree	384 (76.8)	57 (53.8)	327 (83.0)
	Disagree	116 (23.2)	49 (46.2)	67 (17.0)

I wear a helmet when I ride a motorcycle.	Agree	163 (32.6)	97 (91.5)	66 (16.8)
	Disagree	337 (67.4)	9 (8.5)	328 (83.3)
I have sometimes seen My family ride a motorcycle three-up.	Agree	60 (12.0)	38 (35.9)	22 (5.6)
	Disagree	440 (88.0)	68 (64.2)	372 (94.4)
I wear bright-colored clothes on cloudy days.	Agree	75 (15.0)	59 (55.7)	16 (4.1)
	Disagree	425 (85.0)	47 (44.3)	378 (95.9)
I cross the road when I see no cars coming.	Agree	191 (38.2)	102 (96.2)	89 (22.6)
	Disagree	309 (61.8)	4 (3.8)	305 (77.4)
I try to understand drivers' thoughts when crossing the road.	Agree	98 (19.6)	73 (68.9)	25 (6.4)
	Disagree	402 (80.4)	33 (31.1)	369 (93.7)
I wait for the green light to cross the road.	Agree	135 (27.0)	82 (77.4)	53 (13.5)
	Disagree	365 (73.0)	24 (22.6)	341 (81.5)
I put on my seat belt when I get into a car.	Agree	326 (65.2)	101 (95.3)	73 (18.5)
	Disagree	174 (34.8)	5 (4.7)	321 (81.5)
I wear my seatbelt in the correct way.	Agree	190 (38.0)	104 (98.1)	86 (21.8)
	Disagree	310 (62.0)	2 (1.9)	308 (78.2)

Relationship between having High knowledge and positive attitudes with social demographic characteristics of respondents

Variables significantly associated with high knowledge included Residence of respondents ($\chi^2=4.922$, $p=0.027$) and Family Socioeconomic status ($\chi^2=5.120$, $p=0.077$). For positive attitudes, significant associations were found with education level ($\chi^2=4.887$, $p=0.027$) and perceptions of external factors

($\chi^2=9.458$, $p=0.002$). No significant associations were observed for gender ($p=0.467$), age ($p=0.078$), or father's education level ($p=0.468$).

Table 6: Relationship between High knowledge and Positive attitudes with respondents' characteristics

Variable	High Knowledge of road safety			Positive Attitudes on road safety		
	n (%)	(X^2)	p-value	n (%)	(X^2)	p-value
Age(years)		1.642	0.200		3.100	0.078
13-15	107 (43.5)			101 (51.3)		
16-18	139 (56.5)			96 (48.7)		
Gender		0.528	0.467		0.032	0.857
Male	91 (37.0)			77 (39.1)		
Female	155 (63.0)			120 (60.9)		
Highest school attended		1.583	0.208		4.887	0.027
Lower Secondary	114 (46.3)			109 (55.3)		
Upper Secondary	132 (53.7)			88 (44.7)		
Residence		4.922	0.027		2.514	0.113
Urban	57 (23.2)			31 (15.7)		
Rural	189 (76.8)			166 (84.3)		
Transport means used		2.669	0.615		7.272	0.122
Motorcycle	137 (55.7)			113 (57.4)		
Car	46 (18.7)			40 (20.3)		
Public Transport						

Bicycle	56 (22.8)			43 (21.8)		
Walking	4 (1.6)			0 (0.0)		
	3 (1.2)			1 (0.5)		
Mothers Education level		0.991	0.803		1.328	0.723
No formal education	9 (3.7)			4 (2.0)		
Primary	25 (10.2)			19 (9.6)		
Secondary	117 (47.7)			100 (50.8)		
University	95 (38.6)			74 (37.6)		
Fathers Education level		2.540	0.468		2.249	0.522
No formal education	12 (4.9)			9 (4.6)		
Primary	27 (11.0)			31 (15.7)		
Secondary	138 (56.1)			107 (54.3)		
University	69 (28.1)			50 (25.4)		
Family Socio Economic Status		5.120	0.077		3.356	0.187
12,000 bahts and below						
12,001 – 24,000 bahts	93 (37.8)			94 (47.7)		
24,000 baht and above	94 (38.2)			66 (33.5)		
	59 (24.0)			37 (18.8)		
External factors		0.019	0.891		9.458	0.002
Favorable	137 (55.7)			70 (35.5)		
Non-favorable	109 (44.3)			127 (64.5)		

DISCUSSION.

In this study, most of the participants were aged 16 to 18 years (53.6%), were female (61.4%) and from rural areas (80.8%) with their education level almost equally distributed between lower and upper secondary school. The combination of a high proportion of young rural residents who mostly use motorcycles for transport (53.6%) underscores the increased vulnerability of this demographic to road traffic accidents. In Thailand, the most accessible means of transport is motorcycles which is usually associated with a greater risk of injury especially to teenagers who lack licenses and are more prone to irrational behavior. A secondary school level of education among the parents with mothers at 49% and fathers at 54% and a modest socio-economic status with a larger proportion 42.8% earning 12,000 baht and below suggests that while formal education might be present, the ability to access safer transportation methods and afford good quality safety gear might be limited.

Half of the respondents had a low level of knowledge of road safety. This result is similar to the results of other studies conducted among adolescents like [10] but differs from studies done among slightly older individuals which show better levels of knowledge at 58.3% [11] and 75% [12]. However, at bivariate analysis, age did not show a statistically significant association with the level of knowledge of road safety thus indicating that the difference in level of knowledge in the studies might have been due to other factors like residence and socioeconomic status.

The knowledge on basic concepts such as safe crossing practices and knowledge on necessary safety gear for biking were high at 83.6% and 65.2% respectively while more detailed knowledge was unsatisfactory. For instance, only 8.2% of respondents understood safe driver behaviors and only 32% could identify the proper way to wear a safety belt. This gap suggests an incomplete understanding of road safety since it shows that while the students may have been exposed to basic road safety knowledge, they may not be able to fully comprehend more practical information especially when it comes to areas involving

judgement such as understanding the consequences of accidents and recognizing how the vehicle speed impacts stopping distance.

In terms of road signs, slightly more than half of the participants could identify a no parking sign correctly which is in contrast to a study done in India[13] which revealed that more than half the participants could not identify road signs correctly. These findings support the need for a more interactive and student-oriented road safety education to help improve retention and application of knowledge.

Overall, negative attitudes towards road safety were more prevalent at 60.6%. A significant proportion 53.6% disagreed with the necessity to wear a helmet while on the road. Several other studies have looked at the attitude towards wearing a helmet while on the road with most of them reporting that while road users agree with the necessity to wear a helmet and understand the dangers of not wearing one, most of them did not use helmets especially when they were the passengers [14], [15], [16]. The contradiction in attitudes reveals a critical barrier to change since even when they recognize the dangers, their attitudes may not compel them to act in a safer manner. This discrepancy might be due to peer influence, normalization of risky behavior and the perceived inconvenience to following road safety regulations.

More than half of the participants had a positive view on driver's licenses, the danger of fast cars and the use of seat belts. These results are consistent with the results of a study conducted in India which found the same results [17]. However, many still held permissive or indifferent attitudes towards noncompliance with road safety rules. Majority (65.8%) did not believe that road signs help them stay safe by reducing speed when riding a motorbike.

An alarming number of participants reported unsafe road practices (78.8%). More than half, 67.4% reported to be riding motorcycles without helmets. A study done in Northern Thailand showed that the highest proportion of non-helmet users was from 15 to 17 years age group [18], which is similar to the results in this study. 65.2% of the participants reported to wearing a seatbelt immediately they got into a

car, a number that is slightly higher from the results of [13] which found that only 55.8% reported to wearing a seatbelt. However, in this study a larger number (62%) reported that they did not wear the seatbelt the correct way. This trend shows a need for more training on proper seatbelt techniques and for regulators to go to a further step of checking whether seatbelts have been worn correctly to reduce the fatalities related to improper technique.

When it comes to road signs, most (67%) of the participants did not regularly adhere to them or check them when travelling (72.2%). Majority of respondents did not wait for the green light to cross the road and would sometimes cross the road when there were on coming vehicles. These findings are similar to the findings in [17]. The respondents also had risky behaviors such as playing near moving vehicles, hanging on vehicles and goofing off while riding bikes. This widespread engagement in unsafe practices could be due to the low knowledge and the negative attitudes reflecting a gap between knowledge, attitudes and practices.

CONCLUSION.

Adolescents are at an increased risk of road traffic accidents especially in rural areas where motorcycle use is prevalent. Their low level of knowledge on road safety and a free-spirited attitude towards the risks involved while on the road leads them to have practices that increases this risk. In Nakhon Si Thammarat, Thailand, the combination of a large population of adolescents from a low socioeconomic background with low level of knowledge, negative attitudes towards road safety and unsafe road practices is a lethal combination. Therefore, this needs to be addressed by developing a tailored training model for teenagers on road safety to help reduce the morbidity and mortality related to road traffic accidents.

Declarations

Funding:

This research work has been supported by "Walailak University Graduate Scholarships", Contract

No.06/2023 College of Graduate School Walailak University and Excellency Centre Public Health Research School of Public Health Walailak University. This work was financially supported by Mitsui Sumitomo Insurance Welfare Foundation (MSIWF) Research Grant 2024.

REFERENCES.

- [1] Peden AE, Cullen P, Francis KL, et al. Adolescent transport and unintentional injuries: a systematic analysis using the Global Burden of Disease Study 2019. *The Lancet Public Health*. 2022;7(8):e657–e669.
- [2] Useche SA, Alonso F, Montoro L, et al. Explaining self-reported traffic crashes of cyclists: An empirical study based on age and road risky behaviors. *Safety Science*. 2019;113:105–114.
- [3] Chen Y, Wang K, Lu JJ. Feature selection for driving style and skill clustering using naturalistic driving data and driving behavior questionnaire. *Accident Analysis & Prevention*. 2023;185:107022.
- [4] Iamtrakul P, Chayphong S, Makó E, et al. Analysis of Road Users' Risk Behaviors in Different Travel Modes: The Bangkok Metropolitan Region, Thailand. *Infrastructures*. 2023;8(4):79.
- [5] Mesic A, Damsere-Derry J, Feldacker C, et al. Identifying emerging hot spots of road traffic injury severity using spatiotemporal methods: longitudinal analyses on major roads in Ghana from 2005 to 2020. *BMC Public Health*. 2024;24(1):1609.

- [6] Loo BP, Tsoi KH. Road safety strategies necessary in the second Decade of Road Safety. *J Glob Health*. 2022;12:03081.
- [7] Ismail HN, Khairani AZ, Abdullah SMS, et al. The Effect of Road Safety Education on Knowledge, Attitude and Perceived Behavioural Control Regarding Road Safety Among Malaysian School Students. *ujer*. 2019;7(12):2597–2603.
- [8] Yasanthi RGN, Mehran B, Alhajyaseen WKM. Modelling speed behaviour in rural highways: Safety analysis of driving under adverse road-weather conditions. Chen F, editor. *PLoS ONE*. 2021;16(8):e0256322.
- [9] Chanie M. Prevalence of Risky Driving and Associated Factors Among Debre Tabor Town Drivers, Northwest, Ethiopia.
- [10] Swami HM, Puri S, Bhatia V. Road Safety Awareness and Practices Among School Children of Chandigarh. 2006;31(3).
- [11] Jothula KY, Sreeharshika D. Knowledge, attitude, and practice toward road safety regulations among college students in Telangana state. *Journal of Education and Health Promotion*. 2021;10(1):25.
- [12] Al-Khalidi Y. Attitude and practice towards road traffic regulations among students of health sciences college in Aseer region. *J Fam Community Med*. 2006;13(3):109.
- [13] Sheila Doris EM. A cross sectional study to assess the knowledge, attitude and practice towards road safety rules and regulations among higher secondary school students in Chennai. *Indian Journal of Basic and Applied medical research*.; 2016.
- [14] Siviroj P, Peltzer K, Pengpid S, et al. Helmet Use and Associated Factors among Thai Motorcyclists during Songkran Festival. *IJERPH*. 2012;9(9):3286–3297.
- [15] Xuequn Y, Ke L, Ivers R, et al. Prevalence rates of helmet use among motorcycle riders in a developed region in China. *Accident Analysis & Prevention*. 2011;43(1):214–219.
- [16] Li Q, Adetunji O, Pham CV, et al. Helmet use among motorcycle riders in Ho Chi Minh City, Vietnam: results of a five-year repeated cross-sectional study. *Accident Analysis & Prevention*. 2020;144:105642.
- [17] Abbas S, Fatima S, Sharif A, et al. Drivers' Knowledge, Attitude and Practices Towards Traffic Rules and Regulations. *JRS*. 2024;35(3):24–31.
- [18] Siviroj P, Peltzer K, Pengpid S, et al. Helmet Use and Associated Factors among Thai Motorcyclists during Songkran Festival. *IJERPH*. 2012;9(9):3286–3297.

