Participation in Community-Based Road Safety Program Associated with Motorcycle Helmet Use in Udon Thani Province, Thailand

Surachai Phimha[1], Attapong Rittitit[2], Nakarin Prasit[3], Nathakon Nilnate[4], Prachak Bouphan[5]

[1]Lecturer, Department of Public Health Administration, Health Promotion, and Nutrition, Faculty of Public Health, Khon Kaen University, Thailand, [2]Research Scholar, ASEAN Cancer Epidemiology and Prevention Research Group, Faculty of Public Health, Khon Kaen University, Thailand, [3]Doctoral Student, Faculty of Public Health, Khon Kaen University, Thailand, [4]Lecturer, Department of Public Health, Faculty of Nursing Science, Phetchaburi Rajabhat University, Thailand, [5]Associate Professor, Department of Public Health Administration, Health Promotion, and Nutrition, Faculty of Public Health, Khon Kaen University, Thailand.

Abstract

Background: Road traffic fatalities remain a significant cause of premature death in Thailand, with motorcycle riders comprising the largest proportion of deaths. Helmet use improves road safety outcomes; therefore, it is important to understand how to improve helmet use. The purpose of this study was to determine whether community participation in road safety meetings was associated with helmet use and to identify other factors associated with self-reported helmet use.

Objective: To determine the participation in community-based road safety program associated with motorcycle helmet use in Udon Thani Province, Thailand

Method: Multivariable logistic regression was used to analyze the association between self-reported participation in community meetings about road safety and other factors with self-reported helmet use behaviors among 2,474 motorcycle riders (55.4% female, aged 53.4 ± 12.3 years) in Prachaksinlapakhom District, Udon Thani province, Thailand.

Results: Regular participation in community road safety meetings (ORadj.=1.61; 95% CI=1.24 to 2.08, p-value <0.001) was associated with increased self-reported helmet usage. Risk factors for non-compliance included being female (ORadj.=0.64; 95%CI=0.53 to 0.77, p-value <0.001), elderly (i.e., ≥60 years old) (ORadj.=0.65; 95%CI=0.54 to 0.79, p-value <0.001), and smoking (ORadj.=0.79; 95%CI=0.62 to 0.97, p-value = 0.029).

Conclusions: Regular community participation was associated with increased self-reported helmet usage after adjusting for other factors. Further research should assess whether helmet use outcomes improved following participation in community road safety activities.

Keywords: *Community participation, motorcycle helmet use, road safety program.*

Corresponding Author:
Surachai Phimha
Lecturer, Department of Public Health Administration, Health Promotion, and Nutrition, Faculty of Public Health, KhonKaen University, Thailand.
e-mail: suraphi@kku.ac.th

Introduction

Globally, over 1.3 million people die from road traffic injuries, or 18.2 per 100,000 population, per year. Rates vary substantially across regions. South-East Asia has one of the highest road traffic death rates, at 20.7 deaths per 100,000 population, with 43% occurring among users of two- and three-wheeled motorized

vehicles—the highest such proportion among World health Organization regions.[1]

Traffic injuries are a major public health problem in Thailand.[2] Thailand is frequently ranked as having one of the top five highest per capita death rates from road traffic accidents, with a mortality rate of 32.7 per 100,00.[1] Accidents have increased 1.65 percent every year, while related deaths have increased by 4.01 percent every year.[3] Nearly three out of every four road traffic deaths occur among riders of motorized two- and three-wheeled vehicles in Thailand. [1]

Helmets are one of the most effects method to reduce the severity of injuries in motorcycle accidents and reduce the loss of life.[4] Nationwide helmet use in Thailand, however, is estimated around 44%. Moreover, pillion riders were 2.5 times less likely to wear a helmet than drivers (19.3%).[5] Higher compliance with helmet laws would substantially improve Thailand's outcomes in road safety. It is estimated that increasing the nationwide helmet compliance to 90% would reduce total road traffic deaths by 23%.[6]

Several factors influence helmet usage among motorcyclists. For example, accident experience can predict helmets use.[7] Additionally, personal factors such as gender and family income correlate with helmets use.[8] Helmet laws and law enforcement also have been shown to affect vehicle driving behavior[9] and decrease the morbidity of head injuries.[10] To improve helmet usage, several programs, including community participation projects, have been proposed. In one such program an increase of 13.2% in the rates of helmet usage was found.[4] This study aimed to measure the relationship between participation in community-based road safety programs and helmet, as well as identify other factors associated with helmet use.

Materials and Method

Study Population: Prachaksinlapakhom District is located in Udon Thani province, Thailand. The district has a population of 25,621.[11] The area is suburban with an agriculture (71.49 %) as the most common occupation. Udon Thani is one of the largest provinces in the northeastern region. Annually, between 6,596 and 6,980 people were injured in the province between 2017 and 2019.[12]

Data Collection: Data was collected by the District Health Coordinating Committee between 2017-2018 using a "Health Information Status" questionnaire. Questionnaires were collected by village health volunteers . The instrument requested participants to report helmet use behaviors, participation in community activities, demographics, smoking status, alcohol consumption, and chronic disease. The primary outcome was helmet use. The main factor of interest was community participation.

A total of 3134 records, representing most of the families in the district, existed within the governmental database. To be eligible, records were included in the study if the respondent was aged between 15 and 80 years and reported using a motorcycle in daily life (n=3035). After removing records without the primary outcome (helmet use) and primary factor (community participation), the final sample size was 2474.

Statistical Analysis: Prior to univariate analysis, any continuous variable (i.e., age) was recoded into categorical format. Univariate logistic regression was then used to analyze the association between each factor and helmet use and identify factors to be included in the initial model. Factors were included in the initial model if significant in the univariate analysis ($p<0.25$) and confounding factors.

Multivariable logistic regression analysis was utilized to fit models and assess the relationship between helmet use and community participation, while adjusting for potential confounding factors. Backwards stepwise elimination method was used to remove factors ($p > 0.05$). Model fit was assessed using AIC. Statistical analysis was performed with STATA software version 15.0.

Results

Sample Characteristics: A total of 2,474 participants were included (Table 1). Most of the subjects (55.4%) were female, and the average age was 53.4 ± 12.3 years old. Agriculture was a major occupation of participants (71.5%), and most of the education level was a primary school (68.7%). Almost all participants were married (73.0%). Most participants did not smoke, drink alcohol, or have chronic disease (74.2%, 64.5%, and 78.2%, respectively). Most participants reported participating in community activities of subjects was seldomly (46.1%) or usually (40.3%). (Table 1).

Table 1

Variable	Number (n = 2,474)	Percentage
Gender		
Male	1,104	44.62
Female	1,370	55.38
Age (Years)		
<25	23	0.93
25-45	548	22.15
45-65	1,463	59.14
>=65	440	17.78
Mean (SD)	53.43 (± 12.26)	
Median (Min:Max)	53 (15 : 80)	
Marital Status		
Single	215	8.69
Married	1,807	73.04
Widowed/divorce	452	18.27
Education Level		
Non education	83	3.35
Primary school	1,699	68.67
Secondary/High school	596	24.09
Higher under graduated	96	3.88
Occupation (n = 2,473)		
Agriculture	1,768	71.49
Employee	472	19.09
Merchant/self employed	162	6.55
Officer/state enterprise	71	2.87
Smoking Status (n = 2,473)		
No	1,834	74.16
Yes	639	25.40
Alcohol Consumption		
No	1,596	64.51
Yes	878	35.49
Chronic disease (n = 2,409)		
No	1,883	78.16
Yes	526	21.84

Univariate Analysis: Crude analysis identified three factors for inclusion in the initial model (Table 2). They were community participation (usually: OR=1.60; 95% CI=1.24 to 2.06, p-value <0.001), gender (female: OR=0.72; 95%CI=0.61-0.85, p-value <0.001), and age (≥60 years old: OR=0.68; 95%CI=0.57 to 0.81, p-value <0.001).

Multivariable Analysis: The final multiple logistic regression retained all confounding factors and showed that three factors strong associated with outcome were community participation (usually: OR adj. = 1.61; 95% CI = 1.24 to 2.08, p-value <0.001), gender (female: ORadj. = 0.64; 95% CI = 0.53 to 0.77, p-value <0.001), and age (> = 60 years old: ORadj. = 0.65; 95%CI = 0.54 to 0.79, p-value <0.001). In addition, smoking status who have smoking were associated with helmet using behavior (ORadj. = 0.79; 95%CI = 0.62 to 0.97, p-value = 0.029)

Discussion and Conclusion

Discussion: Our main finding indicates that community participation is associated with self-reported helmet use. Participation in community activities provides an opportunity to receive information and share ideas among many stakeholders. Previous studies have found that the community participation projects can increase the rates of helmet usage.[4] Increased knowledge and awareness are likely explanations for this relationship. Studies have found that knowledge and greater awareness of safe driving was related with safe driving,[13] and motorcyclists with low exposure to road safety awareness campaigns were more likely not to use helmets when compared to higher exposure groups .[14] Moreover, widespread awareness programs have been shown to increase motorcyclist's helmet use and improve road safety of motorized users.[15]

Females, elderly, and smokers were also associated with lower self-reported helmet use. Gender is a personal factor that is different from lifestyle and behaviour factors. Females have certain physical characteristics that may hinder the use of helmets. Previous studies have shown lower helmet usage among adult female motorcyclists in Thailand . [4] However, the relationship between helmet use and gender may differ depending on the population. Male adolescent motorcycle drivers and male bicycle riders were shown to have lower self-reported helmet compliance than females.[16,17] Among university students in Thailand, men engaged in motorcycle accident risk behavior more often than women.[13] When the younger and older demographics were mixed, the relationship was not significant, suggesting age and gender may be compounding.[14]

Another factor, age, is one of the factors involved in wearing a helmet, because it is representative of experience and daily living. This study found that the

elderly were less likely to report wearing a helmet. The injury and prevention program should focus on the older aged group because their injuries are more severe than younger adults.[18] Along with being female and not wearing a helmet, increasing age was associated with an increased risk of death among two-wheeled vehicle traffic accidents in Spain.[19] However, this study's sample primarily consisted of adults and did not include many young or adolescent people. Therefore, the elderly were less likely to report helmet use as compared to primarily middle-aged adults. If younger adults are studied, previous studies show low helmet use among teenagers and young adults.[4,14,18] On the other hand, older adults and elderly were shown to have lower rates of motorcycle injuries in a Thai cohort study.[20] Therefore, while helmet compliance may be lower, usage may differ to include only short-distance or low-risk driving situations relative to younger groups that are more dependent on motorcycles as the primary mode of transportation.

Smoking was also shown to be associated with lower helmet use. Smoking may hinder helmet use, because smoking makes it difficult to use a helmet. [16,21,22]. Smoking may also indicate high risk-taking behaviour or lower safety compliance, such as seatbelt use.[23]

Conclusions

This study found that regular community participation was associated with increased self-reported helmet usage after adjusting for other factors. Being female, older than 60, and smoking were also shown to be associated with lower reported helmet use. Further research should assess whether helmet use outcomes improved following participation in community road safety activities. Efforts should be made to expand community participation in road safety campaigns.

Ethical Considerations: This study was approved by the Khon Kaen University Ethics Committee for Human Research based on the Declaration of Helsinki and the ICH Good Clinical Practice Guidelines (reference number HE 622120).

Acknowledgement: We are grateful to Prachaksinlapakhom District Health Coordinating Committee Prachaksinlapakhom District, Udon Thani province, Thailand and Prachaksinlapakhom Hospital, Udon Thani province, Thailand for health status information. Finally, thanks are due to Anthony C. Kuster for his advice and assistance in writing this paper.

Conflict of Interest: No conflicts of interest to declare.

Source of Funding: Self-funding

References

1. World Health Organization. Global status report on road safety 2018: Summary. World Health Organization; 2018.
2. Chadbunchachai W, Suphanchaimaj W, Settasatien A, Jinwong T. Road traffic injuries in Thailand: current situation. J Med Assoc Thai. 2012 Jul 1;95(Suppl 7):S274-81.
3. Office of Transport and Traffic Policy and Planning, Ministry of Transport. Road accident situation analysis report; 2018.
4. Ratanavaraha V, Jomnonkwao S. Community participation and behavioral changes of helmet use in Thailand. Transport policy. 2013 Jan 1;25:111-8.
5. Suriyawongpaisa P, Thakkinstian A, Rangpueng A, Jiwattanakulpaisarn P, Techakamolsuk P. Disparity in motorcycle helmet use in Thailand. International journal for equity in health. 2013 Dec;12(1):74.
6. Nishi A, Singkham P, Takasaki Y, Ichikawa M, Chadbunchachai W, Shibuya K, Tanasugarn C. Motorcycle helmet use to reduce road traffic deaths in Thailand. Bulletin of the World Health Organization. 2018 Aug 1;96(8):514.
7. Cheawae, S. Selected Factors Affecting Helmet Use Behaviors for Accidental Prevention Following Health Belief Model of Students[A Thesis Master of Education]. Songkla: Prince of Songkla University; 2019.
8. Sreshthaputra, K. The Study of Factors of University Students in Wearing Helmet . Humanities and Social Science, Burapha University journal.2018; 26(52): 216-235.
9. Phetcharat, S., Buntan R., & Chintarat S. Influencing Factors on Driving Against Traffic Flow Behavior: A Case Study of Nakhonnayok Province. Srinakharinwirot Engineering Journal. 2017; 11(2): 141-152.
10. Chiu WT, Kuo CY, Hung CC, Chen M. The effect of the Taiwan motorcycle helmet use law on head injuries. American journal of public health. 2000 May; 90(5):793.
11. Official statistic registration systems, Department of Provincial Administration. Information about

accidents injuries and deaths [Internet]. 2019 [cited 20 December 2019]. Available from: http://stat.bora.dopa.go.th/stat/statnew/statTDD/views/showProvinceData.php

12. Thailand road safety observatory, Thai Roads Foundation. Information about accidents injuries and deaths [Internet]. 2019 [cited 20 March 2019]. Available from: http://www.thairsc.com/TH/statactivepolicy
13. Chumpawadee U, Homchampa P, Thongkrajai P, Suwanimitr A, Chadbunchachai W. Factors related to motorcycle accident risk behavior among university students in Northeastern Thailand. Southeast Asian J Trop Med Public Health. 2015 Jul 1;46(4):805-21.
14. Siviroj P, Peltzer K, Pengpid S, Morarit S. Helmet use and associated factors among Thai motorcyclists during Songkran festival. International journal of environmental research and public health. 2012 Sep;9(9):3286-97.
15. Karuppanagounder K, Vijayan AV. Motorcycle helmet use in Calicut, India: User behaviors, attitudes, and perceptions. Traffic injury prevention. 2016 Apr 2;17(3):292-6.
16. Irvine A, Rowe BH, Sahai V. Bicycle helmet-wearing variation and associated factors in Ontario teenagers and adults. Canadian journal of public health. 2002 Sep 1;93(5):368-73.
17. Sharma, R., Grover, V. L., & Chaturvedi, S. Health-risk behaviors related to road safety among adolescent students. Indian Journal of Medical Sciences. 2008; 61(12): 656-662.
18. Tantibundit, P., & Woranuch, A. Helmet use and severity of injury in motorcyclist patients in Khon Kaen Hospital, Thailand.Injury Prevention. 2016; 22(Suppl 2); 213.
19. Donate-López C, Espigares-Rodríguez E, Jiménez-Moleón JJ, de Dios Luna-del-Castillo J, Bueno-Cavanillas A, Lardelli-Claret P. The association of age, sex and helmet use with the risk of death for occupants of two-wheeled motor vehicles involved in traffic crashes in Spain. Accident Analysis & Prevention. 2010 Jan 1;42(1):297-306.
20. Berecki-Gisolf J, Yiengprugsawan V, Kelly M, McClure R, Seubsman SA, Sleigh A, Thai Cohort Study Team. The impact of the Thai motorcycle transition on road traffic injury: Thai Cohort Study results. PloS one. 2015;10(3).
21. Richard JB, Thélot B, Beck F. Evolution of bicycle helmet use and its determinants in France: 2000–2010. Accident Analysis & Prevention. 2013 Nov 1;60:113-20.
22. Salako A, Abiodun O, Sholeye O. Risk behaviors for road traffic accidents and severe crash injuries among commercial motorcyclists in Sagamu, South West, Nigeria. Online J Med Medical Sci Res. 2013 Feb;2(2):19-23.
23. Dadgarmoghaddam M, Khajedaluee M, Niroumand S, Rezaiyan MK, Abrishami M, Juya M, Khodaee G. Seatbelt and helmet use and associated factors in a metropolitan area. International Journal of High Risk Behaviors and Addiction. 2016;5(4).