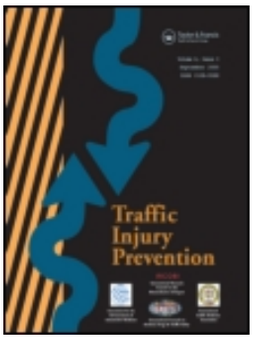

Traffic Injury Prevention

ISSN: 1538-9588 (Print) 1538-957X (Online) Journal homepage: www.tandfonline.com/journals/gcpi20

Helmet Use Among Motorcyclists in Cambodia: A Survey of Use, Knowledge, Attitudes, and Practices

Abdulgafoor M. Bachani, Nhan T. Tran, Socheata Sann, Michael F. Ballesteros, Chandara Gnim, Amra Ou, Panhavuth Sem, Xiaoyu Nie & Adnan A. Hyder

To cite this article: Abdulgafoor M. Bachani, Nhan T. Tran, Socheata Sann, Michael F. Ballesteros, Chandara Gnim, Amra Ou, Panhavuth Sem, Xiaoyu Nie & Adnan A. Hyder (2012) Helmet Use Among Motorcyclists in Cambodia: A Survey of Use, Knowledge, Attitudes, and Practices, Traffic Injury Prevention, 13:sup1, 31-36, DOI: 10.1080/15389588.2011.630763

To link to this article: https://doi.org/10.1080/15389588.2011.630763

Published online: 13 Mar 2012.

Traffic Injury Prevention, 13(S1):31–36, 2012

ISSN: 1538-9588 print / 1538-957X online
DOI: 10.1080/15389588.2011.630763

Taylor & Francis
Taylor & Francis Group

Helmet Use Among Motorcyclists in Cambodia: A Survey of Use, Knowledge, Attitudes, and Practices

ABDULGAFOOR M. BACHANI,[1] NHAN T. TRAN,[1] SOCHEATA SANN,[2] MICHAEL F. BALLESTEROS,[3] CHANDARA GNIM,[2] AMRA OU,[2] PANHAVUTH SEM,[2] XIAOYU NIE,[1] and ADNAN A. HYDER[1]

[1]Johns Hopkins International Injury Research Unit, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland
[2]Handicap International Belgium, Phnom Penh, Cambodia
[3]Centers for Disease Control and Prevention, Atlanta, Georgia

Objective: *Road traffic injuries (RTIs) are a leading cause of disability and fatality globally. Motorcycle-related injuries, mainly head injuries, and related deaths and disabilities are a significant contributor to the burden of disease in low- and middle-income countries (LMICs). Helmets have been proven to be an effective way to reduce the risk of head injury. As motorcycle use continually increases in Cambodia, head injuries and related deaths and disabilities are expected to rise. This article aims to assess the current status of helmet use in Cambodia, as well as the knowledge, attitudes, and practices among motorcyclists, in order to assist with better planning and implementation of injury prevention strategies.*

Methods: *Two separate methodologies were employed for this study. Helmet observations were conducted in Phnom Penh, Kandal, Kampong Speu, Siem Reap, and Kampong Cham to assess the current status of helmet use during the day and at night. Roadside knowledge, attitudes, and practice (KAP) interviews were also conducted in Phnom Penh, Kandal, and Kampong Speu to determine the prevailing beliefs around helmet use in Cambodia.*

Results: *Based on observations, the proportion of helmet wearing across all study sites was 25 percent at night and 43 percent during the day among all motorcyclists. The observed proportion was up to 10 times higher among drivers compared to passengers. The top 3 reasons for always wearing a helmet were lifesaving potential, legal duty, and police fines. Almost 60 percent of respondents said that their use or nonuse of a helmet depended on where they were driving. Helmet quality, price, style, and color were important factors influencing the decision to purchase a helmet.*

Conclusions: *A paradox appears to exist in Cambodia; though awareness of the benefits of wearing a helmet is high, actual helmet use remains low in the country. Daytime usage is higher than nighttime, and these proportions are significantly higher among drivers compared to passengers. There is a continuing need to improve the proportion of all-day helmet wearing, especially at night and among motorcycle passengers in Cambodia.*

Keywords Motorcycles; Head injuries; Helmets; Cambodia; Road safety; Asia

INTRODUCTION

The World Health Organization (WHO) estimated that road traffic injuries (RTIs) were the ninth leading cause of death in 2004, accounting for 2.2 percent of all deaths or 1.3 million deaths (WHO 2008, 2009). In the Western Pacific Region (WPR), 93 percent of road traffic fatalities occurred in low- and middle-income countries (LMICs). RTIs were the leading cause of death among individuals in the economically productive age range of 15 to 44 years and the second leading cause of death among 5- to 14-year-olds in the WPR. In 2004, there were 264,772 disability-adjusted life years (DALYs) lost due to RTIs, with nearly 92 percent of these DALYs lost in LMICs of the WPR (WHO 2008). Cambodia is a low-income country in the WPR with a population of almost 15 million (WHO 2009). According to the data from the Road Crash and Victim Information System (RCVIS), there were 18,287 road crash casualties in 2010, among which 1816 (10%) were fatalities (Road Safety Cambodia). In the past 5 years, there was a 40 percent increase in road crash fatalities (Road Safety Cambodia).

Motorcycles are a significant cause of RTIs and fatalities, especially in LMICs where they are an increasingly frequent means of transport. In most high-income countries, motorcycle fatalities usually account for 5 to 18 percent of overall traffic mortality (WHO 2006). The proportion is much higher in LMICs, ranging from 27 percent in countries like India to 42 and 57 percent in Indonesia and Malaysia, respectively (Mohan

Received 8 August 2011; accepted 6 October 2011.

Address correspondence to Abdulgafoor M. Bachani, PhD MHS, Johns Hopkins International Injury Research Unit, Johns Hopkins Bloomberg School of Public Health, 615 N. Wolfe St., Suite E-8132, Baltimore, MD 21205. E-mail: abachani@jhsph.edu

2002). According to the WHO, globally the use of motorcycles has increased in recent years, for both transport and recreational purposes (WHO 2006). Asian countries, in particular, are expected to experience rapid growth in the number of motorcycles, which is predicted to be accompanied by a significant increase in the number of motorcycle-related injuries and deaths (WHO 2006). Cambodia currently has an estimated RTI death rate of 12.1 per 100,000 people, and 63 percent of the fatalities were drivers and passengers of motorized 2- or 3-wheelers. This rate is expected to rise significantly (WHO 2009).

Motorcycles play an important role in the Cambodian transportation system. They are a common form of mobility for both humans and goods, particularly in poorer communities. Since 1990, the number of motorcycles on the roads has continuously increased at an annual rate of 20 percent (Ministry of Public Works and Transport 2010b). In 2007, the total number of registered vehicles was 154,389, among which 84 percent were motorized 2- and 3-wheelers (WHO 2009). Ten percent of the population own motorcycles, but only 4 percent have proper driving licenses to legally ride a motorbike (Ministry of Public Works and Transport 2010a).

Head injuries are a major concern in road traffic crashes involving motorcycles and are a main cause of disability and deaths (Liu et al. 2008). According to the WHO, head injuries contribute to about 75 percent of deaths among motorized 2-wheeler users in European countries and up to 88 percent in some LMICs (WHO 2006). For survivors of head injuries, there is a significant social and economic cost associated with specialized or long-term care (WHO 2006). A 2008 Cochrane review indicated that helmets reduced the risk of head injury by 69 percent and death by 42 percent (Liu et al. 2008). Another study conducted in Taiwan concluded that, compared with helmeted motorcyclists, nonhelmeted motorcyclists were more than 4 times as likely to have head injuries and 10 times as likely to have brain injuries (Yu et al. 2011). Helmet use has also shown to reduce the mean cost of hospitalization by more than $6000 per patient, according to a study conducted in a trauma center in Michigan (Brandt et al. 2002). But this figure would not necessarily be transferable to low- and middle-income countries.

There is a need to understand the current status of helmet use among motorcyclists, as well as the prevailing knowledge, attitudes, and practices (KAPs) around helmet use, in Cambodia. Such information is important so that appropriate interventions can be developed and implemented to address the problem. This is especially the case in light of the renewed interest in injuries to motorcyclists in Cambodia through initiatives by groups such as Bloomberg Philanthropies and the Global Helmet Vaccine Initiative that are seeking to enhance safety on Cambodian roads (Cambodia Global Helmet Vaccine Initiative 2011; Peden 2010). In this article, we aim to assess the current status of helmet use in 5 districts in Cambodia, as well as the KAP related to helmet use. These empirical data will add new information on the need for motorcycle injury prevention in the country.

METHODS

Data for this study was collected and analyzed using 2 methods: (1) helmet observational studies to assess the current status of helmet use and (2) roadside KAP surveys to illustrate the prevailing beliefs around helmet use in Cambodia. Details on each of these methods are described below. The sites for the first study were 5 provinces in Cambodia: Phnom Penh, Kandal, Kampong Speu, Siem Reap, and Kampong Cham; the KAP interviews were only conducted in Phnom Penh, Kandal, and Kampong Speu. These sites were selected as the sites of 2 separate efforts (starting in the future) to enhance motorcycle road safety.

Helmet Observational Studies

The goal of the observational studies was to determine the percentage of helmet usage among motorcycle drivers and passengers through systematically observing motorcyclists at randomly selected locations in the study districts. This study was carried out in 2 phases. First, in 2010, observations were carried out every other month beginning in July 2010 at night in 3 provinces (i.e., Phnom Penh, Kandal, and Kampong Speu). In the second phase, which began in January 2011, two more provinces (i.e., Siem Reap and Kampong Cham) were added, and the observations were extended to cover daytime helmet wearing as well.

To ensure representativeness, observation sites were selected following a systematic multistep procedure. First, all possible observation locations in the study sites were identified and divided into two categories (i.e., urban and rural). The 2 categories were further divided into 2 subcategories (i.e., intersections and motorcycle bays). These sites were selected from all available intersections along the national roads. Site eligibility criteria included that the site was deemed safe for observers; location at an elevation that of higher or equal height to a motorcycle; and a place where the local population rather than tourists were more likely to be observed. Six sites that covered all 4 categories described above were then selected from a pool of all eligible sites using a random selection process.

The observations were conducted during 90-min intervals every third week in July, September, and November 2010 and in January, March, and May 2011, during the day (i.e., 9 am, 12 pm, and 5 pm) and at night (i.e., 7 pm) to account for variations in traffic volume and composition at different times of the day. The study team recorded a brief description of each study location and systematically assessed the site's road traffic volume prior to beginning the study. Motorcycles that drove through a study location were observed for helmet use among drivers and passengers. To avoid double counting and ensure reliable data collection and documentation at locations with high traffic volume, the study team observed motorcycles traveling in only one direction. If more than one motor vehicle simultaneously passed by the observer, the motor vehicle closest to the curb or roadside was observed. If time permitted, the next closest motor vehicle was observed. This process continued until the motor vehicle

Table I Background information for study provinces in Cambodia

Province	Population[a]	RTIs per 100,000[b]			No. of sites selected for observational and KAP survey
		Motorcycle	Other vehicles	Overall RTI	
Phnom Penh	1,327,615	106.88	29.90	136.79	10
Kandal	1,265,280	98.87	37.46	136.33	5
Kampong Speu	716,944	43.80	29.29	60.54	4
Siem Reap	896,443	141.45	39.27	180.71	5
Kampong Cham	1,679,992	82.26	28.63	110.89	5

[a]Data from National Institute of Statistics (2008).
[b]Data from the Road Crash and Victim Information System (Road Safety Cambodia 2010). It includes all kinds of injury (fatal and injury).

furthest away from the roadside was observed. In settings where divided highways were present, the motorcycle "furthest away" was defined as the motorcycle closest to the highway median.

Roadside KAP Surveys

The roadside surveys aimed to assess the prevailing KAP around helmet use among motorcyclists in 3 of the study provinces (i.e., Phnom Penh, Kandal, and Kampong Speu). Interview locations, which comprised gas stations, were selected based on their proximity to the observation locations described above. Those gas stations closest to the observation sites were selected and included10 sites in Phnom Penh, 4 sites in Kampong Speu, and 5 sites in Kandal.

The surveys were conducted in November 2010. Interviews were conducted during 1.5-h blocks at varying times of the day over 5 days by trained interviewers using structured questionnaires. For each survey, face-to-face interviews were conducted around gas stations where motorcyclists stopped to refuel. In order to capture their self-reported knowledge, attitudes, practices, and behaviors regarding helmet use, study participants were asked questions about frequency of wearing a helmet, reasons for always/not always wearing a helmet, factors influencing decisions to purchase a helmet, and police enforcement, among others. A closed-ended questionnaire, developed in collaboration with the Johns Hopkins International Injury Research Unit (JHIIRU), was used in this survey.

Data for both studies were managed and analyzed using STATA 11 (StataCorp 2009) and MS Excel. Descriptive statistics and hypothesis tests were used to understand the current status of helmet use as well as the prevailing KAP around their use and to identify potential solutions to the problem.

The study was approved by the Institutional Review Board at the Johns Hopkins Bloomberg School of Public Health, as well as the National Road Safety Committee in Cambodia.

RESULTS

Results of the data collection and analysis from both the helmet observational studies and the roadside KAP surveys are described below. A total of 29 observation locations were selected in the 5 study cities/provinces (10 sites in Phnom Penh, 5 in Kandal, 4 in Kampong Speu, 5 in Siem Reap, and 5 in Kampong Cham). Background information on the 5 provinces is provided in Table I.

Helmet Observational Studies

On average, the proportion of helmet wearing at night among all motorcyclists was 25 percent across all the study sites, with the highest percentages observed in Phnom Penh (41%), followed by Siem Reap (37%) and Kandal (31%; Figure 1a). Though there seems to be an increase in the proportions of nighttime helmet wearing over the study period, there were fluctuations in each region (Figure 1a). On the other hand, the usage proportion

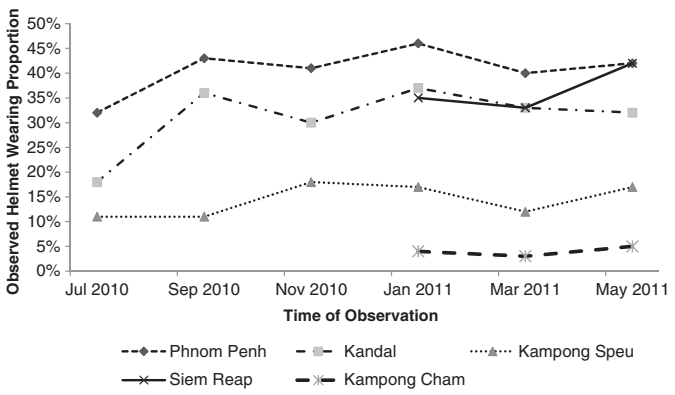

Figure 1a Trend of observed helmet wearing proportions at night by region, July 2010 to May 2011.

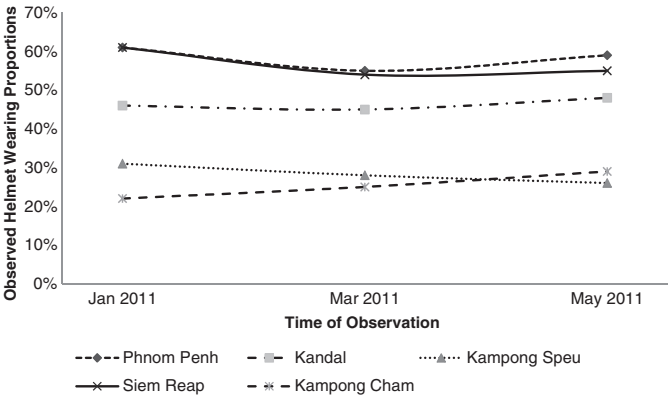

Figure 1b Trend of observed helmet wearing proportions during the daytime by region, January to May 2011.

during the daytime among all motorcyclists was generally higher, with an average proportion of helmet wearing of 43 percent. Daytime helmet wearing was highest in Phnom Penh (58%) and Siem Reap (57%), followed by Kandal (46%; Figure 1b).

There appears to be a marked and statistically significant difference between overall proportions of helmet wearing among drivers and passengers, with observed percentages of up to 10 times higher among drivers compared to passengers (Table II). Among both groups, the proportion of helmet wearing was significantly higher during the daytime compared to at night.

Roadside KAP Surveys

A total of 304 motorcycle drivers and passengers were interviewed (Table III). Most of the motorcyclists interviewed were males (86%) and were between 18 and 35 years. Nearly half of the respondents had a high school education or higher. Almost all (93%) of them were drivers and only 7 percent were passengers. In addition, 95 percent of those interviewed were driving motorcycles that they owned. The majority of respondents (75%) were the only occupants of the motorcycles (i.e., the drivers), with 23 percent of the motorcycles carrying 2 individuals. Most of the respondents described the purpose of their current trip as commercial activities (43%) and traveling to/from work/school (32%).

Almost 100 percent of respondents claimed that they wore a helmet at least sometimes. However, the proportion of respondents who reported always wearing a helmet was 71 percent, and 18 percent claimed to do so "most of the time." In addition, when asked about helmet use within the past 30 days, 64 percent of drivers reported wearing a helmet all the time, whereas only 33 percent of passengers indicated doing so. However, there appeared to be a remarkable difference when these percentages were compared to the observed helmet wearing percentages in the 3 provinces where both methodologies were implemented (Table IV).

The majority of respondents understood the lifesaving potential of a helmet and indicated that as the main reason for always wearing a helmet (86%). The other top reasons for helmet use were found to be the fact that it was their legal duty to wear a helmet (25.3%) and police fines (21.7%). The most common reason (72%) for not wearing a helmet was that their use or nonuse of a helmet depended on where they were driving. Additionally, 26 percent of respondents claimed that they forgot to wear a helmet, and 17 percent considered it to be inconvenient or uncomfortable. Police enforcement also seems to be a problem, with only 22 percent of the respondents indicating having been stopped by police in the 3 months preceding this study to check for helmet use.

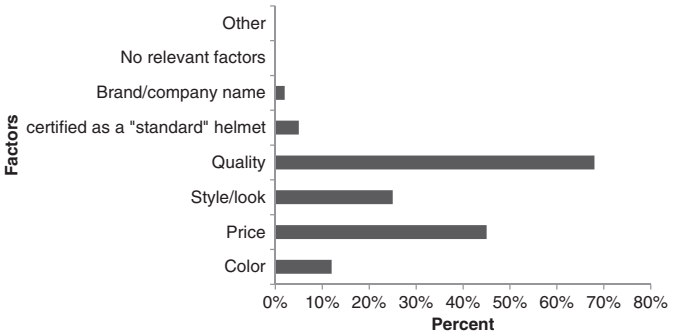

Figure 2 Factors influencing decision to purchase a helmet.

It appears that helmet ownership is not a factor prohibiting helmet use; 97 percent of the respondents indicated that they own a helmet (Table II). Helmet costs also do not seem prohibitive, with the majority of these individuals reporting that their helmets cost less than US$20, with only 4 percent of them costing more. In terms of other factors influencing the decision to purchase a helmet, helmet quality was the most popular factor considered (68%), followed by price (45%). The style/look (25%) and color (12%) of the helmet were also significant factors (Figure 2).

DISCUSSION

Though there has been a decline in the number of road traffic deaths in Cambodia in the last 5 years, Cambodia still leads the WPR in road traffic-related deaths and injuries (WHO 2009). Among the major risk factors responsible for road traffic crashes and fatalities, the use of helmets (particularly at night) is

Table II Observed proportions of helmet wearing among drivers and passengers by region in Cambodia in 2011

		Drivers		Passengers		
Region	Time	Total number of observations	% Wearing helmets	Total number of observations	% Wearing helmets	*P*-value[a]
Phnom Penh	Day	17994	82	8678	8	.001
	Night	5996	65	3532	6	.001
Kandal	Day	8944	66	5099	11	.001
	Night	2897	49	1786	10	.001
Kampong Speu	Day	7159	41	3896	5	.001
	Night	1966	22	1294	3	.001
Siem Reap	Day	8999	80	4194	8	.001
	Night	2975	55	1578	4	.001
Kampong Cham	Day	8996	36	4277	3	.001
	Night	2968	6	1823	1	.001

[a]Test for difference in proportions—drivers vs. passengers.

Table III Background information on respondents for the roadside KAP survey

	Male *N* (%)	Female *N* (%)	Total *N* (%)
Age Group			
18–25	80 (30.5)	25 (59.5)	105 (34.5)
26–35	112 (42.7)	12 (28.6)	124 (40.8)
36–45	45 (17.2)	3 (7.1)	48 (15.8)
46–55	20 (7.6)	1 (2.4)	21 (6.9)
56+	5 (1.9)	1 (2.4)	6 (2.0)
Total	262 (100.0)	42 (100.0)	304 (100.0)
Education			
Primary	63 (25.0)	8 (20.5)	71 (24.4)
Secondary	70 (27.8)	13 (33.3)	83 (28.5)
High school	83 (32.9)	11 (28.2)	94 (32.3)
University	36 (14.3)	7 (17.9)	43 (14.8)
Total	252 (100)	39 (100.0)	291 (100.0)
Status of motorcyclist			
Driver	244 (93.8)	37 (86.0)	281 (92.7)
Passenger	16 (6.2)	6 (14.0)	22 (7.3)
Own helmet			
Yes	245 (96.8)	40 (97.6)	285 (96.9)
No	8 (3.2)	1 (2.4)	9 (3.1)
Own motorcycle			
Yes	247 (95.7)	37 (90.2)	284 (95.0)
No	11 (4.3)	4 (9.8)	15 (5.0)
Purpose of the trip			
Traveling to/from work (or school)	78 (30.0)	19 (45.2)	97 (32.1)
Traveling to/from leisure activities	17 (6.5)	3 (7.1)	20 (6.6)
Riding for pleasure	40 (15.4)	13 (31.0)	53 (17.5)
Commercial activity	124 (47.7)	6 (14.3)	130 (43.0)
Others	1 (0.4)	1 (2.4)	2 (0.7)

especially important in Cambodia. Overall, helmet usage in Cambodia remains relatively low. We found that in Cambodia the use of helmets differs between nighttime and daytime hours. This may be because during the daytime, wearing or not wearing helmets is more visible, whereas during nighttime hours, it becomes more difficult to confirm helmet use among motorcycle riders and therefore more difficult to enforce. Our results showed that a very low proportion of motorcycle drivers—and even fewer passengers—wear helmets at night.

Though there has been a motorcycle helmet law in Cambodia since January 2009, inconsistent enforcement of this law may explain the patterns of helmet use observed in this study. As seen from our results, only 16 percent reported police fines as a reason to use a helmet; therefore, when motorcycle drivers do not wear a helmet, they may not perceive that they will be fined by the police. This is also suggested by our finding that helmet use was generally higher in Phnom Penh, where there are generally higher levels of enforcement compared to other locations.

Helmet use was also substantially lower among motorcycle passengers compared with drivers. This is consistent with reports from other Asian countries (Conrad et al. 1996; Hung et al. 2006; Li et al. 2008; Xuequn et al. 2011). The current helmet law in Cambodia does not include requirements for passengers. Though we have seen that a law for drivers alone does not result in universal usage, one would expect helmet use to increase among passengers if the law also included this high-risk group. Efforts are underway locally to change the helmet law so that it also covers passengers. Proper public education and enforcement will also be necessary to achieve large increases in passenger helmet use.

This study was subject to several limitations. First, we were not able to document the type or quality of helmet used or whether the helmet was being worn properly. Helmet type and proper use have been shown to be associated with head injury risk (Peek-Asa et al. 1999; Yu et al. 2011). Second, data collected during the roadside interviews may have been biased because individuals who agreed to be interviewed may have been more likely to be health conscious and report wearing helmets. This may explain differences seen between the proportions of self-reported helmet use from roadside interviews and helmet wearing obtained from observations. Lastly, we were only able to observe helmet use during specific times of the day and in a limited number of provinces in Cambodia. Though these data do provide some information about the issues and risks for motorcyclists, they are not nationally representative.

To address this issue of injuries to motorcyclists in Cambodia, 2 notable initiatives are underway in Cambodia, one by the Bloomberg Philanthropies (Peden 2010) and another by the Cambodia Helmet Vaccine Initiative (2011). Both of these initiatives are coalitions of national and international stakeholders and aim to improve helmet use in Cambodia through a multifaceted approach. They focus, among other things, on public awareness education; targeted programs such as school-based programs, helmet donations, and curriculum development; helmet provision, which includes the importation of high-quality affordable helmets and the development of local helmet assembly plants; technical assistance in the areas of legislative advocacy, capacity building, and helmet standards and testing labs; and monitoring and evaluation.

Table IV Observed vs. self-reported helmet use proportions in Cambodia

	Observed helmet wearing proportion		Self-reported helmet wearing proportion		*P*-value for test of difference in proportion of observed vs. self-reported helmet wearing	
Province	Driver (%)	Passenger (%)	Driver (%)	Passenger (%)	Driver	Passenger
Phnom Penh	78	7	87.5	46.0	.001	.001
Kandal	62	11	86.5	62.2	.001	.001
Kampong Speu	37	5	76.9	28.8	.001	.001

This renewed focus on improving helmet use among motorcyclists and passengers both during the day and at night has significant potential in reducing the number of motorcycle-related head injuries, as well as resulting fatalities and disabilities. Knowing the current status of helmet use as well as the prevailing KAP around their use will aid in the development and implementation of appropriate programs and policies to achieve this goal.

ACKNOWLEDGMENTS

This work was conducted as part of the Road Safety in 10 Countries project funded by the Bloomberg Philanthropies. Additional support for some of the data collection was provided by the International Union for Health Promotion and Education and the Centers for Disease Control and Prevention.

DISCLAIMER

The opinions in this article are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

REFERENCES

Brandt MM, Ahrns KS, Corpron CA, Franklin GA, Wahl WL. Hospital cost is reduced by motorcycle helmet use. *J Trauma.* 2002;53:469–471.

Cambodia Global Helmet Vaccine Initiative. Cambodia. 2011. Available at: http://www.helmetvaccine.org/target_countries/cambodia.html. Accessed August 3, 2011.

Conrad P, Bradshaw YS, Lamsudin R, Kasniyah N, Costello C. Helmets, injuries and cultural definitions: motorcycle injury in urban Indonesia. *Accid Anal Prev.* 1996;28:193–200.

Hung DV, Stevenson MR, Ivers RQ. Prevalence of helmet use among motorcycle riders in Vietnam. *Inj Prev.* 2006;12:409–413.

Li GL, Li LP, Cai QE. Motorcycle helmet use in Southern China: an observational study. *Traffic Inj Prev.* 2008;9:125–128.

Liu BC, Ivers R, Norton R, Boufous S, Blows S, Lo SK. Helmets for preventing injury in motorcycle riders. *Cochrane Database Syst Rev.* 2008;23:CD004333.

Ministry of Public Works and Transport. *Driving License Statistic.* Phrom Penh, Cambodia: Ministry of Public Works and Transport. 2010a.

Ministry of Public Works and Transport. *Vehicle Registration Statistics.* Phrom Penh, Cambodia: Ministry of Public Works and Transport. 2010b.

Mohan D. Traffic safety and health in Indian cities. *J Transport and Infrastructure.* 2002;9:79–92.

National Institute of Statistics. *Cambodia General Population Census 2008*. Available at: http://celade.cepal.org/khmnis/census/khm2008/. Accessed September 5, 2011.

Peden M. Road safety in 10 countries. *Inj Prev.* 2010;16:433.

Peek-Asa C, McArthur DL, Kraus JF. The prevalence of non-standard helmet use and head injuries among motorcycle riders. *Accid Anal Prev.* 1999;31:229–233.

Road Safety Cambodia. *Road Crash and Victim Information System*. Available at: http://www.roadsafetycambodia.info/action2. Accessed June 25, 2011.

StataCorp. *Stata Statistical Software* [computer program] Release 11. *College Station, Tex: StataCorp LP*; 2009.

World Health Organization. Helmets: a road safety manual for decision-makers and practitioners. 2006. Available at: http://www.who.int/roadsafety/projects/manuals/helmet_manual/en/. Accessed June 25, 2011.

World Health Organization. *The Global Burden of Disease: 2004 Update*. Geneva, Switzerland: World Health Organization; 2008.

World Health Organization. *Road Safety in the Western Pacific Region: Call for Action*. Geneva, Switzerland: World Health Organization; 2009.

Xuequn Y, Ke L, Ivers R, Du W, Senserrick T. Prevalence rates of helmet use among motorcycle riders in a developed region in China. *Accid Anal Prev.* 2011;43:214–219.

Yu WY, Chen CY, Chiu WT, Lin MR. Effectiveness of different types of motorcycle helmets and effects of their improper use on head injuries. *Int J Epidemiol.* 2011;40:794–803.