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RESEARCH ARTICLE

Evaluating Helmet Use Among Motorcycle Drivers in Lebanon

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Abstract:

Background:

The impact of the use of helmet by motorcyclists on motorcycle injuries is enormous. The primary focus of this study was to asses the helmet use among motorcycle riders as well as the helmet quality.

Methods:

Both quantitative and qualitative studies had been done. Nine observational studies have been done over nine different years between 1997 and 2017 in the same spots. In addition to one qualitative study done in May 2017.

Results:

The results of the observational studies show a clear fluctuation in the use of helmets (6 - 42%). Whenever there is law enforcement, the percentage of users increases. Upon cessation of enforcement, the percentage of helmet use reduces. About 64% of the helmets inspected did not appear to have a certification, which indicates that the helmet did not meet international standards. Those who had spent less than US$15 on buying their helmets were found wearing a non-certified helmet.

Conclusion:

Lebanon has failed to pursue a successful and sustainable implementation of the enforcement of helmet use. Although strict enforcement measures are vital, it is almost as important to ban the import of poor quality helmets to the Lebanese market and to make sure that taxation is lower on helmets to enable consumers to buy good quality helmets at a lower price.

Keywords: Helmet, Injury Prevention, Legislation, Lebanon, Observations, Road Traffic Injuries (RTI), Low-income country, Law enforcement.

1. INTRODUCTION

Every year, road traffic crashes result in 1.25 million deaths worldwide and between 30-50 million non-fatal injuries [1]. Motorcyclists comprise between 5% and 18% of road traffic injury deaths in high-income countries [2]. However, this percentage is higher in most low and middle-income countries. The World Report on road traffic injury prevention recommends all countries, to follow many good practices, including "setting and enforcing laws requiring riders of bicycles and motorized two-wheelers to wear helmets" [3].

Head injuries account for around 75% of deaths among motorized two-wheelers in Europe, while it is estimated to be 88% in low and middle countries [4]. Wearing a motorcycle helmet has been shown to decrease the risk and severity of injuries by about 72%, the likelihood of death by up to 39% resulting in a significant reduction in the healthcare costs

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associated with a crash [5]. The social costs of head injuries for survivors, their families and communities are high, in part because they frequently require specialized or long-term care. Head injuries also result in much higher medical costs than any other type of injury [6]. Therefore, these road traffic head injuries place a higher burden on a country's health care costs and its economy.

In low and middle-income countries, motorcycles and bicycles are a major means of transport. Motorcyclists constitute a large proportion of those injured or killed on the roads. Compared with other vehicles, motorcycles and bicycles have a higher risk of being involved in a crash. This is because they often share the traffic space with fast-moving cars, buses and trucks, and because they are less visible. In addition, their lack of physical protection makes the riders particularly vulnerable to being injured if they are involved in a collision. The technical expertise behind the design of high-quality helmets is based on an understanding of what happens during the event of a motorcycle crash. Therefore, it is essential to produce or import high-quality helmets manufactured per international standards.

When involved in a crash while not using a helmet, the risk of injury increases along with the increased severity of the injury and increased risk of death. Helmets are designed to reduce the occurrence of head, brain, and facial injuries. They are not designed to prevent injuries to other parts of the body. A motorcyclist not wearing a helmet is 31 times as likely to be killed as a car occupant for the same distance of travel [7].

The rapid growth in the use of two-wheeled vehicles in most low and middle-income countries has been accompanied by a significant increase in road injuries and fatalities. In the last two decades, the use of motorcycles and mopeds has grown rapidly in Lebanon. As a result, there are increasing fatalities and injuries among users of two-wheelers, with head injuries being a major concern. Motorcycle helmets are effective both in preventing head injuries and in reducing the severity of injuries sustained by riders and passengers of motorcycles.

Combining information and public awareness campaigns with the sustainable enforcement of helmet use had been proven to be efficient worldwide [1, 3]. However, the increase in voluntary use of helmets is crucial in raising the acceptability of people about helmet use.

Many studies have evaluated the impact of enforcing helmet laws on helmet-wearing rates, head injuries or death [8 - 10]. Laws that mandate helmet use are effective in increasing usage rates as well as reducing fatalities and injuries among two-wheeler users. In Malaysia, the introduction of a helmet law led to a 30% reduction in motorcycle deaths. In Italy, the introduction and implementation of a law on helmet use resulted in helmet use increasing from 20% in 1999, to more than 96% in 2001 [11]. According to the Global status report on road safety 2013, by the World Health Organization, progress has been made in the number of countries whose helmet laws apply both to motorcycle drivers and passengers, on all road types and regardless of engine type.

Over 90% of motorcyclists' wear helmets in the United States of America where they are required by laws; fewer than 50 percent do so when laws are weakened or repealed. In New Delhi, it is mandatory for drivers of motorcycles to wear helmets but not for passengers. An observational study in that city found over 90 percent of drivers, but only 3 percent of passengers, wore helmets [12].

Use of quality and standardized helmets is essential to reduce the actual impact [11]. In Lebanon, several campaigns were organized during the last two decades to promote the appropriate use of helmets. Attempts to encourage motorcyclists' use of helmets through public awareness campaigns, publicity or persuasion have had minor success. Another major problem in Lebanon is the widespread use of non-standard motorcycle helmets. The use of these helmets has the potential to undermine efforts aimed towards reducing the burden of road traffic injuries associated with motorcycle crashes. However, despite all these efforts, we have no scientific information of helmet use and standard for helmets in Lebanon

The aim of this study was to evaluate the use of helmets from 1997 to 2017 in Lebanon. Also, assessment of the use of standard helmet was performed. This study will assist efforts to increase the use of helmets in Lebanon to reduce the burden of motorcycle related Road Traffic Injuries (RTI). It will also encourage decision–makers to enforce all traffic rules and regulations and the mandatory use of helmets in specific. The added value of the qualitative study is the exploration of the different reasons that led to no use of the helmet based on the interviews with motorcycles users that are not using helmets.

2. METHODS

The research used observational studies in different years between 1997 and 2017 in same points of observations in

five major regions of Lebanon. Observations were done in a variety of regions: Rural and urban regions. The choice of these locations was to guarantee safety for researchers. These studies did not cover the Bekaa and the South region for several administrative and security reasons prior to 2002.

Data was collected based on a pre-tested observation protocol designed and managed by the researchers. To simplify the observation procedure, two trained research assistants completed the protocol at each site. The study sample comprised all motorcyclists observed during the observation period. Due to the high volume of motorcycles, use of the helmet was considered for the motorcycle drivers. Gender was not a major factor as almost all motorcyclists were men due to cultural issues. Therefore, during observation, the observers did not consider gender.

The selection process of the observation points was based on black spots where frequent motorcycles crashed and severe injuries occurred. In each study, three to four days of observations were spent to observe traffic on each point. Each day consisted of three hours of observation. The sample was based on the observation of all motorcycle users passing through the observed point during the observation period. Bicycles and ATV were not included. The observations disregarded other traffic violations.

Observation points were in the five major Lebanese regions (known as Mouhafaza): Mount Lebanon, Metropolitan area of Beirut, North, South and Bekaa.

We also observed the quality of the helmets of 300 motorcyclists. At each observation point, motorcycle drivers stopping at the nearest petrol stations were observed for the standard of helmets. Verbal consents from the petrol station owners/managers were sought and if not provided, the next closest petrol station was used. Motorcycle drivers stopping to purchase petrol were informed about the study objective. After obtaining verbal consent, the research assistants recorded whether the helmets were certified by a standard or not (Certification on the helmet).

The study had considered standard Motorcycle helmets: AS 1698 (Australia); CSA CAN3-D230-M85 (Canada); UN/ECE Regulation No. 22 (Europe); JIS T8133 (Japan); NZ 5430 (New Zealand); BS 6658 (United Kingdom); DOT FMVSS 218 (USA); TCVN 5756:2001 (Vietnam). Research assistants were trained to differentiate between standard and non-standard helmets and to differentiate between authentic and non-authentic stickers. Specifically, they examined many examples of standard and non-standard motorcycle helmets.

The last study in 2017 is a qualitative study which consisted of interviewing 10 motorcycle drivers that were not using the helmets. Our aim was to identify the reasons why they don't wear a helmet. Before taking their opinion, interviewers were asked whether they will accept or not to be interviewed and we assured that the name or any identification of the participants will not be disclosed. In each interview, the targets of the study were described to the expected participants and the informed verbal consent was received. They were given freedom to be interviewed or not. And if they accepted, they were free to stop the meeting at any point without any insistence on them to continue. These interviews were audio-recorded after receiving the approval of the participant. All information will remain anonymous, and all collected data will be used for this study only. We informed the respondents about the study objective and the respondents' rights of withdrawal prior to interviews or even during the interviews.

3. RESULTS

There was a huge fluctuation of using motorcycle helmets in Lebanon among motorcycle drivers.

As shown in the Fig. (**1**), in the first three studies, we were not able to cover two Lebanese border districts due to military operations in those areas. In 1997, the first study showed 5.83% use of helmets (498 were using helmets out of 8540 observed). The results on the second study in 1999 showed that 11.77% were using helmets (999 were using helmets from 8487 observed). The third study showed that 17.97% were using helmets (1513 were using helmets from 8418 observed). The fourth study including Bekaa and South, showed that only 9.4% using helmets (1098 from 11686 observed). The fifth study showed another fall in helmet use. The percentage of people using helmets was 9% (1056 were using helmets from, 11705 observed). The sixth study showed the increase in helmet use, 18.88% (2266 used the helmet from 12000 observed). The seventh study showed another increase in helmet uses, 24% (2880 used the helmet from 12000 observed). The eighth study was in December 2014. It showed another fall of helmet use,16.19% (1943 were using helmets from 12000 observed). The last study in May 2017 showed a great increase in wearing a motorcycle helmet with a percentage of 42% of motorcycle drivers who were wearing a helmet. This increase is due to the application of the Lebanese traffic law since 22 April 2015 that imposed fines on people not wearing helmets.

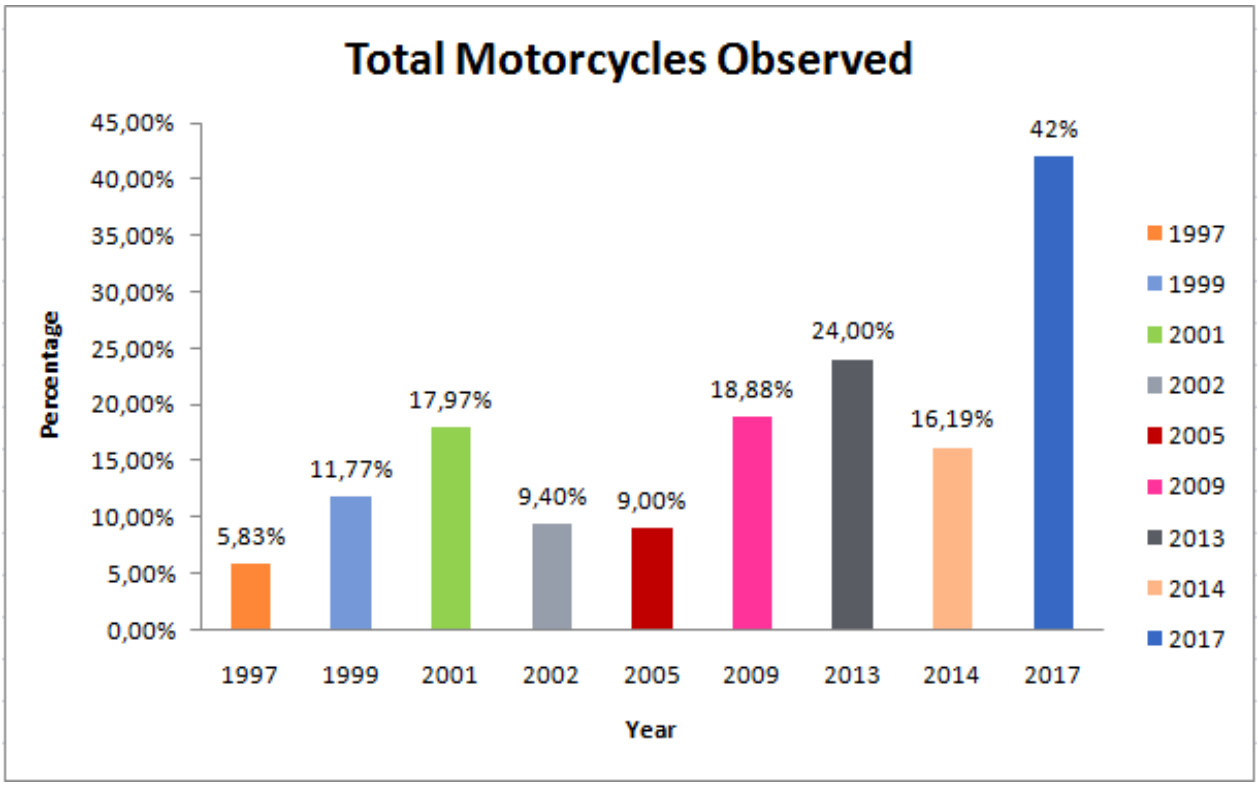

Fig. (1). Fluctuation of using motorcycle helmets in Lebanon among motorcycle drivers.

Sixty-four percent of the helmets did not appear to have a marker/sticker indicating that the helmet met required standards and therefore had poor quality. Those who had spent less than US$ 15 on their helmet were found to be more likely to be wearing a non-standard helmet.

This qualitative study consists on determining the reasons behind not using the helmet as a safety device to protect users' life.

We found out in our short interviews the following reflections that helped us to describe “what is going on:’ the respondents answered our question “Why you don’t wear a helmet?”

I have classified the answers into two main categories:

3.1. Negligence:

Over Confidence in myself (for example, I don’t use a helmet every day for many years, it is not risky…)

Importance of physical appearance (when I wear a helmet, it ruins my hairstyle; I spend a good time fixing my hairstyle and am not ready to ruin it by wearing a helmet.)

Willingness to imitate their friends who don’t wear a helmet (to avoid the feeling to be alone wearing a helmet while friends or partner are not).

Weather factor (I prefer not to wear a helmet because the weather is too hot and the helmet annoys me.)

3.2. Unaware Behavior:

No perception of risk (is it dangerous to not wear a helmet? I don’t see the difference between wearing or not, a helmet). The Table **1** below resumes the method adopted in this study.

Table 1. Method adopted in study.

Observational Studies	
Year of the study	First study: September 1997 Second study: August 1999 Third study: June 2001 Forth study: April 2002 Fifth study: December 2005 Sixth study: September 2009 Seventh study: November 2013 Eighth study: December 2014 Last study: May 2017
Data collection	Based on Pre-tested protocol.
Observation points	Based on black spots in 5 regions in Lebanon: Mount Lebanon, Metropolitan area of Beirut, The North, The south and Bekaa.
Observation procedure	2 trained research assistants completed the protocol at each site.

4. DISCUSSION

The first study in 1997, with no recorded public awareness campaign or even law enforcement efforts, showed a very low percentage of drivers using the helmet. A national conference for road safety was organized in October 1998. The study had advocated NGOs like YASA to initiate public awareness campaigns in educational institutions and in media about helmet use. The results of the second study in December 2000 showed an increase in helmet use. The observations showed that 11.77% were using helmets. In 2001, the Minister of Interior and Municipalities in Lebanon took the decision to enforce traffic rules and regulations in general, and the helmet use was enforced for the first time in Lebanon. Meanwhile, public awareness campaigns were jointly undertaken by the ministry and YASA which made many people aware of the need for using helmets. The result has showed an increase in helmet use. In April 2002, 17.97% of motorcycle drivers were using helmets. The fourth study which was in April 2002 included Bekaa and South Lebanon. These two regions affected by continuous military problems for decades and the enforcement of traffic law was almost absent. The inclusion of these two regions might have decreased the overall helmet use (9.4%). This was also due to the weak law enforcement.

The fifth study was in December 2005 when Lebanon passed through great political and social upheaval following the assassination of the then Prime Minister. This meant that the implementations of traffic laws were not prioritized. This explains the fall in the percentage of people using helmets to 9% in 2005. Another Minister of Interior took the decision to enforce traffic rules and regulations in general, and helmet use was well enforced for few months. Public awareness campaigns were undertaken by the ministry and by YASA. In the sixth study, results showed a significant increase in helmet use nationwide (18.88%) and this provided evidence that enforcement has a central role in helmet use. This finding is in the line with WHO guidelines [1, 11]. The seventh study was in November 2013 during a campaign by the Ministry of Interior. Helmet use increased to 24%.

The final study was in December 2014. This study showed the fall in the percentage of people using helmets to 16.19%, reflecting the lack of enforcement of traffic laws in general and of helmet use. It could be due to the difficult security and political situation in the country.

In brief, the results of these eight observational studies show a clear fluctuation in the use of helmets. When enforcement campaigns are efficient, the use of helmets increases, but as soon as these campaigns stop, helmet use decreases again. Even if we compare helmet use for motorcycle drivers from 2014 in Lebanon (16.19%), it is very low compared to other low and middle income countries such as Tanzania (82.1%), Vietnam (34.7%), Ghana (34.2%), Indonesia (89%) and China (63%), Brazil (63%) [13 - 16].

As in most countries, the onset of helmet law enforcement appears to be the critical factor for a substantial increase in helmet use. The effect on the behaviour was immediate and remarkable. In the first period of law enforcement, the results of the observations were very positive. Then, with less enforcement, we see a decrease in the helmet use. This decrease is significant and has a negative impact on road safety in Lebanon. However, in Lebanon, the current study demonstrates a major problem in the confidence of road users in the sustainability of traffic law enforcement. Most people consider that law enforcement is seasonal and will not last for long. A similar scenario is present in Argentina where motorcycle drivers wear helmets for weather protection [17].

The research has shown that, on average, factory workers in low-income countries have to work 11 times longer to earn enough money to buy a motorcycle helmet as their counterparts in high-income countries. One way to overcome this is to reduce the cost of helmets to the consumer [18]. So high helmet price could lead to less helmet use in Lebanon. All Helmet importers, in Lebanon, had to pay a 20% customs tax on the billing invoice (covering initial bill and the cost of transport). After that, they must pay an additional 10% of Value Added Tax on all costs. Reviewing the current taxation system on the helmet will lead to lower prices in the market which is needed for more helmet use on Lebanese roads. The study recommends the prohibition of the import of poor quality helmets and the use of non-standard helmets.

While there are several internationally recognized standards, it is important that helmet standard be suitable for the traffic and weather conditions of the country, and is both affordable and available to users. The effectiveness of motorcycle helmets in reducing head injuries is in part a result of the quality of the helmets. Requiring helmets to meet a recognized safety standard is important to ensure that helmets can effectively reduce the impact of a collision in the event of a crash [19]. Currently, the Lebanese market suffers from hundreds of thousands of cheap helmets that do not meet the minimum safety requirements. Based on that, it is highly recommended to organize a well-targeted public awareness campaign about this new measure to promote the importance of having quality helmets. This will be crucial to have a new law well accepted by the public. Standard helmets were generally 3-4 times more expensive than non-standards helmets in the Lebanese markets. It happened many times that when the law about helmet use was enforced, there was a sudden demand for helmets. Stocks of standard helmets were quickly sold out. Thus, more non-standard helmets were sold at higher prices leading to popular criticism of the government failing to control helmet prices. This challenge of supply of standard helmets without the increase of helmet prices in the market was found in other markets [5, 8, 9].

These observations were not able to assess and evaluate the culture of the observed people, although culture can provide an explanation for why some people do not understand the reasons behind taking preventive measures. However, these observations were important to media and road safety advocates to work more on raising awareness about helmet use and for law enforcement.

The qualitative study was used to understand the reasons behind the unsafe behaviour of not using the helmet. This made us understand in a better way the factors behind why they don't wear a helmet each time they ride a motorcycle even for a short distance. Once these factors were explored, interventions will be implemented to encourage the Lebanese users to wear the helmet.

Demographics such as age of drivers and socioeconomic status were not considered. Many motorcyclists could be underaged. Future studies are warranted considering demographics and socioeconomic issues in relation to helmet use. Also, studies warranted whether helmet users properly using their helmets and properly buckling or not.

Lebanon needs to put significant efforts to implement the resolution of the World Health Assembly WHA 57. 10, that recommended member states "especially developing countries, to legislate and strictly enforce wearing of crash helmets by motorcyclists and pillion riders" [20]. To be effective, helmet legislation needs to be supported by strong enforcement and public awareness campaigns [21]. When motorcycle helmet laws are enforced effectively, helmet-wearing rates can increase to over 90% [22]. But we should emphasize on enhanced and sustainable enforcement of helmet use involving the increasing number of traffic police on patrol, use of mobile safety checkpoints, or a combination of both these efforts. In Lebanon, as in other low and middle- income countries, there is a major challenge to convince people for using a helmet, especially who are at a high risk of being involved in a motorcycle crash. Researchers have identified that there is a common belief among the majority of motorcyclists that they are skilled, above-average drivers and can avoid being involved in crash.

CONCLUSION

During the period 1997- 2017, the use of helmet has increased and decreased many times over the past two decades according to enforcement and awareness campaign but is still relatively low. This also proves that most riders are not well convinced about the importance of a helmet, particularly standard quality helmet use on reducing injuries in case of a crash and hence saving lives. The qualitative study has helped us to understand the reasons behind not using the helmets and the need for sustainable enforcement combined with public awareness campaigns.

During these interventions, users who don't use proper helmet would highly be convinced with its necessity and its benefits. Consequently, motorcycles road collisions would decrease and would be non-fatal crashes.

In addition, this study highlighted the quality of the helmet which is the most important factor that should be taken

into consideration when riding a motorcycle. With a non-standard helmet, the injury would be dangerous or even could lead to death.

AUTHORS CONTRIBUTION

ZA & KD planned the study. ZA & MA conducted data collection. All authors contributed to writing the manuscript.

ETHICAL APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

HUMAN AND ANIMAL RIGHTS

No animals/humans were used for the studies that are bases of this research.

CONSENT FOR PUBLICATION

Informed verbal consent was received.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest, financial or otherwise.

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