

MOTORCYCLIST SAFETY RISK AND ATTITUDE TO USING HELMET

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ABSTRACT

The quantity of motor-bikers has dramatically expanded in Bangladesh, with the presentation of the ride-sharing business. Consequently, crashes involving a motorcycle with fatalities and injuries are also increasing. One of the proven most effective safety measures for a biker is the use of a helmet. But there is no study on the use of helmets and the attitude of users to use the helmet. This research conducts an in-depth analysis of motorcycle safety risk using reported crash records as well as a comprehensive questionnaire survey among the bikers. The study also explores helmet usage attitude and evaluates the standard of the helmet being used. Overall, around 72% self-proclaimed they do not do wrong practice while riding a motorcycle. However, more than one-fourth of motorcycle drivers/riders misbehave or ill practice at different levels either often or always. Concern authorities could gainfully use the findings to develop motorcycle risk management strategies.

Keywords: *Motorcycle; Helmet; Safety risk; Attitude; Behaviour.*

1. INTRODUCTION

A motorcycle crash is a concerning issue for developing countries, especially in Bangladesh. Therefore, ensuring motorcyclist safety is a crying need to control the fatality and injury from crashes in Bangladesh. Motorcycle injuries establish a significant however disregarded rising general medical issue in developing countries and contribute fundamentally to the general street traffic injuries. Bike injuries are among the main sources of handicaps and deaths (Chalya et al., 2010). Over the recent couple of years, the quantity of motor-bikers has dramatically expanded in Bangladesh, with the presentation of the ride-sharing business. Consequently, crashes involving a motorcycle with fatalities and injuries are also increasing, where the most vulnerable group is the young generation known as the most productive group in the nation. In 2017, 53 individuals died and 19 were harmed in 48 bikes reported crashes in Dhaka city and it is argued that this problem will increase unless effective target-oriented measures are taken. Therefore, there is a need to do comprehensive research to understand the different aspects of motorcycle safety risk.

On the other hand, one of the proven most effective safety measures for bikers is the use of a helmet. Apparently, helmet clients have risen in recent times particularly in Dhaka city due to several initiatives. But there is no study on the use of a helmet and the attitude and behaviour of users to use the helmet. This study's focus area is to identify motorcycle safety issues and to find out the attitude and behaviour toward using helmets. This report presents the findings on motorcycle safety risk using reported crash records as well as a comprehensive questionnaire survey among the bikers. The study also explored helmet usage attitude and behaviour. An attempt is also made to evaluate the perceived standard of the helmet being used. The results obtained could be used to better understand the motorcycle safety risk and attitude toward the use of helmets of bikers in Bangladesh. Law-enforcement agencies, traffic operation, and maintenance officials, as well as helmet producers and importers, could gainfully use the finding of this study to develop motorcycle risk management strategies.

In Bangladesh, Rahman and Farah (2012) conduct a study to estimate the predominance of protective helmet use and to decide the components that impact the rebelliousness in head protector use among motorcyclists in Bangladesh. But they don't mention behaviour and attitude toward using a helmet. Pervaz et al., (2019) conduct

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their study to find the overall causes of motorcycle crashes and causes of injury and death rate. Hence, a big reason for bike crashes is not using a helmet is showed but the attitude and behaviour to using a helmet are not clear. Another research in America by Ross *et al.* (2011) conduct research to determine undergraduate students' helmet use attitudes and practices as a head protector as per the Theory of Planned Behaviour (TPB). Here, Helmet use attitude and behaviour are reviewed but motorcyclist safety risk is not clear.

The essential focal point of the study of Akl *et al.* (2018) was to assess helmet use among motorcycle riders just as the Helmet quality in Lebanon. Yu (2011) identifies the causes of not using a helmet and the consequences of not using a helmet. According to Houston and Richardson (2007), enforcement of strict regulations and laws is important to ensure the use of helmets as protective equipment. Kraus (1994) stated that there are many contrasting conclusions with respect to what standard is the best and whether to wear a helmet or not.

To merge those solutions of previous studies and evaluate the overall scenario of motorcycle safety risk and attitude to using the helmet in Bangladesh this research is conducted.

2. MATERIALS AND METHODS

2.1 Questionnaire Development

After an inclusive literature review (e.g., Suwanprateeb, *et al.*, 2018 and Hadiuzzamann *et al.*, 2019) on the design and formation of a questionnaire, a preliminary questionnaire was drafted. The preliminary questionnaire was tested to see whether the questions are correctly understood, and meaning are properly interpreted by the responders to avoid possible bias due to misinterpretation or misunderstanding. Reliability and level of acceptability of the questions are also assessed to see whether the questionnaire is adequate enough to evaluate the target objective. Moreover, the questionnaire is shared with several experts to get their opinions and suggestions for further improvement. Finally, after necessary modification with the incorporation of test feedback, experts' comments, and suggestions, the final questionnaire is fixed for the online survey. The questionnaire comprises in total of 46 questions. The entire questionnaire has been divided into five different groups including demography of the participants, general understanding and behaviour, attitude related to helmet use, attitudes related to driving behaviour, and motorcyclists' behaviour (what they practice as a motorcyclist).

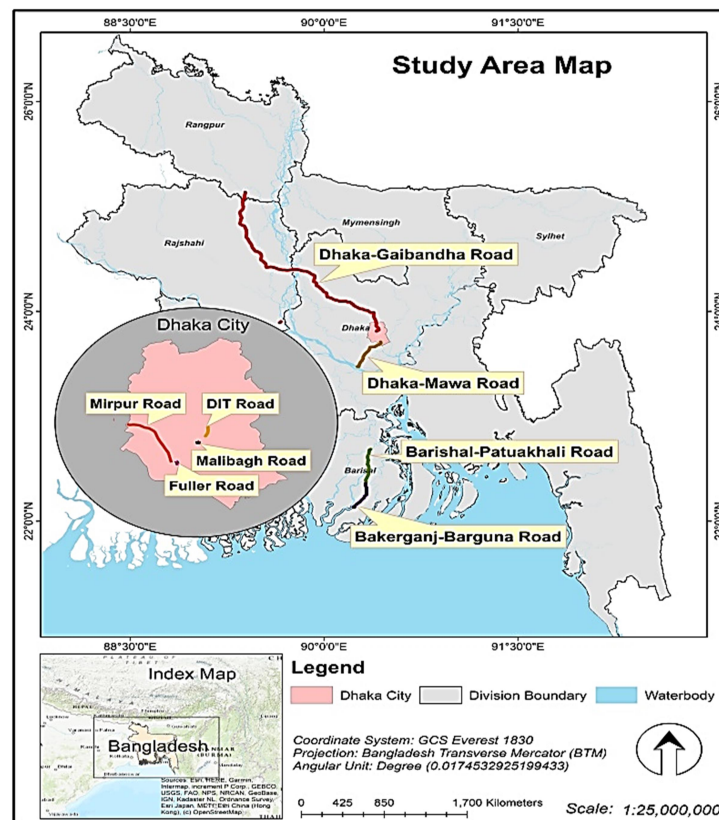


Figure 1: Study area indicating face-to-face interview zone.

2.2 Survey Design

Due to the COVID-19 pandemic, the questionnaire survey was conducted by using both face-to-face in-person interviews and an online platform form via a Google Form. The ratio was almost fifty-fifty i.e. around 50% of responses were taken from face-to-face contact surveys and the other 50% from an online survey. The Google Form was circulated by E-mail and using social media e.g. Facebook. Crash data of Bangladesh are collected from the Bangladesh Police record file as secondary data of our research. A total number of road crashes, motorcycle crashes, fatalities, injuries (both grievous and simple), and casualties in a total road crash as well as in motorcycle crash from 1998 to 2015. The purpose of this data is to describe the crash rate and trend, fatalities rate and trend, as well as casualties and injuries rate and trend of Bangladesh for the last Seventeen (1998-2015) consecutive years. Overall crashes, injuries, casualties, and fatalities are analyzed and the contribution or share of motorcycle crashes with those also analyzed. Some other data were from the Bangladesh Police record file, ARI record file, and BBS. These data are mainly statistical data like the total number of registered bikes, the total number of accidents in Dhaka and outside Dhaka city, the total death rate, and injury rate.

3. RESULTS AND DISCUSSIONS

3.1 Respondent Profile

A total of 174 responders completed the online and face-to-face surveys. According to gender perception, males and females contribute 93.1% and 6.9% of total respondents respectively. Of those 105 (60.34%) respondents drive inside Dhaka city and else 69 (39.66%) respondent drive outside Dhaka city. In age analysis, below 18 years is 2 (1.15%) persons, from 18 to 24 years are 44 (25.29%), from 24 to 30 years are 69 (39.66%), from 30 to 36 years are 24 (13.79%), from 36-42 years are 14 (8.05%), from 42 to 48 years are 11 (6.32%), from 48 to 54 years are 6 (3.45%), and above 54 years are 4 (2.3%) in number. In an analysis of education status, we can see who have no formal education are 1.72 in percentage. Up to primary 4.6%, up to secondary school 5.75%, and up to higher secondary 18.97%, Graduate respondents are 39.66% and 29.31% have a degree of post-graduation. Around 45.98% of respondents have a monthly income of less than 20 thousand, 28.74% have twenty to forty thousand monthly income, 17.24% have forty to sixty thousands monthly income, 6.32% have sixty to eighty thousands monthly income, 0.57% have eighty thousand to one lakh monthly income and 2 persons (1.15%) have more than one lakh monthly income in BDT. In an analysis of the current profession of respondents Govt. employee, Private employee, Self-employed (Business), Student, Other are 13.79%, 19.54%, 24.14%, 31.03%, and 11.49% respectively. Of the total respondents, 33 (19.97%) persons are professional motorcycle drivers and others (74.14%) are non-professional. Non-professionals, 25.86%, 4.02%, 16.09%, 2.3%, and 35.06% drive their bike mainly for jobs, shopping, education, drop-off and pickup, and other purposes respectively. In terms of average time spent on motorcycle riding daily, it is found that 12.64%, 51.15%, 22.41%, 5.75%, 4.6%, and 3.45% of motorcycle drivers spent less than one hour, one to three hours, three to five hours, five to seven hours, seven to nine hours and more than nine hours in motorcycle riding respectively. Around 24.71% of respondents have experience of 1-2 years of driving, 31.03% of respondents have experience of 3-4 years of driving, 17.82% respondents have experience of 5-6 years of driving, 14.94% respondents have experience of 7-8 years of driving, 4.6% respondents have experience of 9-10 years of driving and 6.9% respondents have experience of more than 10 years of the driving motorcycle. It is also seen that 35.06%, 25.86%, 15.52%, 11.49%, 0.57%, 4.6% of respondents got their license 1-2 years, 3-4 years, 5-6 years, 7-8 years, 9-10 years, more than 10 years ago respectively. Whereas 6.9% (12 in number) of respondents have no license at all. Regarding the crash experience, more than one-third of respondents, 67 (39.51%) respondents experienced at least one crash in the last year (1 -2 crashes 32.76%, 3-5 crashes 5.17%, and more than 5 crashes 0.57%).

3.2 Uses of Motorcycle and Safety Risk in Bangladesh

3.2.1 Motorcycle Trends and Uses

In 1971, during the year of independence, the total number of registered motorized vehicles was 0.88 million (BBS, 2018) and in 2019, it becomes 4.3 million excluding informal non-registered motorized vehicles, increased by 48 times within these 49 years. Among them, the increase in motorcycle ridership is quite significant, from 0.24 million in 1971 to 2.9 million in 2019 (BRTA, 2020). Therefore, motorcycles alone increased by around 115 times. On the contrary, other vehicles excluding motorcycles increase by only 23 times. Last five years it has increased in an exponential manner, around 205% from 2015 to 2019. In the case of Dhaka city, this figure goes to 187%. Increase affordability, gradual improvement of road network particularly rural roadway section, the added benefit of navigation particularly in the congested road of city area, development of

local motorcycle industry (around 80% are now either manufactured or assembled within the country) are attributed to the major cause of the dramatic increase of motorcycle. Moreover, the recent app-based bike sharing facility is also considered one of the reasons for increasing ownership of the motorcycle, primarily in the city areas (Wadud, 2020). It is seen that more than two-thirds of motorized vehicles are motorcycles alone in Bangladesh (67%). In the case of Dhaka city, this figure is 48% as motor cars or private cars constitute a significant share in Dhaka city (19%) (BRTA, 2020). Though motorcycles contributed more than 65% of all registered vehicles in Bangladesh, the percentage of motorcycles according to the number of households is comparatively lower than in many other countries⁵. Thailand has the highest number of households that own motorcycles (87%), followed by Vietnam (86%), Indonesia (85%), Malaysia (83%), and China (60%). Whereas in Bangladesh, motorcycle ownership per 100 households is around 8, which is around 5.5 times lower than our neighboring countries India (45%) and Pakistan (43%) (Yau, 2004).

3.2.2 Safety Risk

Though the number of motorcycles is low in comparison to many countries and mega cities as represented in the previous section, the safety risk is very high in terms of crash and casualty statistics. According to some published literature, Bangladesh has the highest death rate with 28.4 per Ten Thousand. Where the second highest for Cambodia is 11.9 and then Lao is 11.5. Bhutan has the lowest death rate for motorcyclists (Figure 2). With the rising number of motorcyclists, the number of crashes with fatal and injury rates are also increasing where the most vulnerable group is the young generation known as the most productive group of the nation. Motorcyclists are 26 times more likely to die in crashes. In 2017, 53 individuals died and 19 were harmed in 48 bike crashes in Dhaka city. In Bangladesh total number of registered motorcycles increased from 42% to 55% of total registered motor vehicles from 1998 to 2015. The share of motorcycle crashes and fatalities were only 5 and 3 percent in 1998 and it climbed to 15 and 9 percent respectively in 2015, almost 3 times increased within this 17 years period.

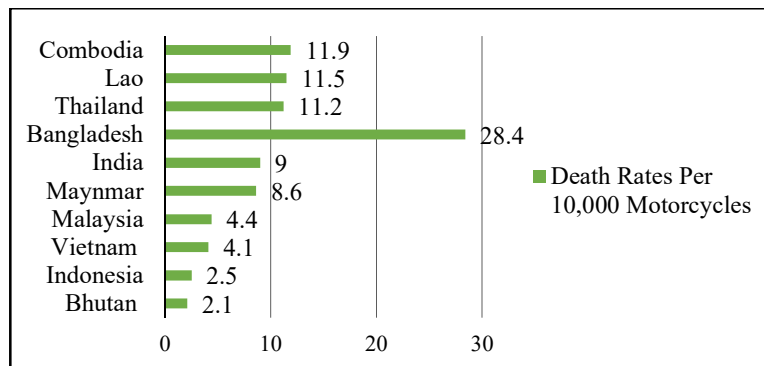


Figure 2: Motorcyclist death rates in some Asian countries (Pervaz et al., 2019; Wadud, 2020; WHO, 2013).

3.3 Attitude and Behavior to Using Helmet

3.3.1 Use of Helmet

According to the response, 33.91% of respondents claimed that they always wear helmets. Around 52.87% responded that most of the time they were helmets followed by 9.77% who sometimes wear helmets. Only 1.72% admitted that they never wear a helmet and the same percentage of responders very rarely wear a helmet while they ride on a motorcycle. During the field observation, different rates of helmet wearing have found in different cities and highways or regional roads. In the observational survey, it is found that Dhaka city represents the highest percentage of helmet-wearing rate, accounting for on average 98.6% (driver 99.8% and passenger 91.8%). Recent initiatives including improving the level of enforcement could be attributed to the high helmet-wearing rate in Dhaka city. On Mawa Road, more than 96% of drivers were found with helmets, for passengers this figure is 75%. On the other hand, in Gaibandha, only 61% of drivers were observed with a helmet. In the case of passengers, it is only 20% i.e., around 80% of passengers were found without helmets. In Barisal city, helmet wearing rate has found 56.5% (drivers 78.6% and passengers only 8.1%). Barisal-Patuakhali Highway and Bakhergonj-Barguna regional road helmet-wearing rates are poor, representing only 45.7% and 17.5% respectively. In regard to gender difference, 87.2% of female passengers were found with helmets in Dhaka city. On Mawa Road and Gaibandha road, the female motorcyclist helmet rate is higher than the male. Almost 100% of female drivers have been found with helmets in both areas. On contrary, no female passenger has found with a helmet, whereas there was a significant number of female passengers or pillion

riders on the motorcycle. Regarding the type of helmet use, more than 50% stated that they use full-face closed helmets (53%) followed by open-face helmets (39%) and half-face closed (9%). According to field observation, in Dhaka city, around 65% of motorcycle drivers use half-face helmets. In the case of passengers, this share is 47%. Around 50% of passengers use open-face/hat-type helmets in Dhaka city, for drivers it is 24%. On average, around 30% of motorcycle drivers and pillion passengers use open-face/hat helmets. In Mawa expressway, 45% are found with full-face helmets, which is followed by full-face (37%) and open-face/hat 17%. In the case of passengers, only 18% are found with a full-face helmet. Outside Dhaka city i.e., Gaibandha, there was no passenger with a full-face helmet. Of the driver, only 4% wearied a full-face helmet. Around 71% were with half-face helmets (69% driver, 86% passenger). More than 25% have found with Open face or hat-type helmet or cap. From this observation, it is found that a significant number of riders have found with open faces or hats which could be considered non-standard in terms of safety point of view.

When do people normally not wear a helmet?

The usual practice of wearing a helmet is not the same at all times for all users. Different circumstances including road and traffic environment, trip length, time of the trip, type of road, area, time of day, and weather conditions have a great influence on this usual practice or normal choice. It is worth mentioning that more than one factor could be equally true for a rider. To get an idea about these influencing conditions, respondents were asked when they normally do not wear helmets. Figure 3 presents the summary of responses in number and percentage.

When do you not wear helmet?	Number	Percent
When riding for a short trip	109	62.6
During the hot weather	34	19.5
When I don't anticipate meeting a policeman	26	14.9
During the day time	5	2.9
During the night	4	2.3
During weekdays	4	2.3
During weekend	5	2.9
When I ride on a local road	21	12.1
When I ride on highways	0	0.0
When share helmet with another pillion rider	0	0.0
Others (please specify)	11	6.3
Not applicable	31	17.8

Figure 3: Time for while riders don't wear a helmet.

According to the statement, the majority of people usually do not wear helmets when they ride for a short trip, this is followed during hot weather, when they don't anticipate meeting police, when ride on a local road. Among the 174 responders, 109 (63%) responders stated that they normally avoid or don't wear helmets when they are riding for a short trip. Hot weather is also a major influencing condition for not wearing a helmet. About 20% of responders pointed out this issue. Not presence of police personnel i.e. low enforcement level is also a triggering issue for not wearing a helmet. Around 15 % of responders admitted this issue as a factor to avoid helmets, this is followed by riding on local roads and others, accounting for 12.1 % and 6.3% respectively. Trip time or day factor also influences few responders for not wearing a helmet, which varies between 2.9 to 2.3 percent.

Reason for not wearing a helmet

Reasons or causes for not wearing or avoiding helmets might be different for different users. In spite of having huge benefits, people are not wearing helmets for different factors or reasons. To get an idea about this aspect, the survey asked this direct question about the main reasons for not wearing a helmet to the participants with some predefined reasons/factors. The responses are summarized in Figure 4.

What are the main reasons for not wearing helmet?	Number	Percent
Uncomfortable	79	45.40
Causes vision restriction	31	17.82
Head or hair damage	0	0.00
Costly	7	4.02
Cause neck pain	15	8.62
Feel hot	36	20.69
Cause suffocation	37	21.26
Over confidence	8	4.60
Long experience	2	1.15
Riding in low speed local road	38	21.84
Others	49	28.16

Figure 4: Reasons for not wearing a helmet.

According to the stated reasons, the leading cause for not wearing a helmet is related to the comfortability of wearing a helmet. Among 174 responders 79 (45.40%) stated that they don't feel comfortable wearing helmets. Around 22% claim that they do not wear a helmet because they ride on the low-speed local road and that is considered the second leading cause for not wearing helmets. The third leading cause is suffocation i.e. users feel asphyxiated when they wear helmets, stated 37 (21.26%) of the respondents. This is followed by feeling hot, vision restriction, causing neck pain, and overconfidence, accounting for 20.69%, 17.82%, 8.62%, and 4.60% respectively. A notable number of respondents said that they cannot use the helmet as it is too costly (4.02%). Around 28.16% indicated other factors that were not specified.

3.3.2 Attitude Related to Helmet Use

In motorcycle rider attitude (i.e., their thinking/belief) to use helmet section, a total of ten parameters are analyzed with the Likert scale. Table 1 presents an overview of responses on attitudes related to the use of helmets. The mean value of responses to all the questions varies from 3.55 to 4.16 (average 3.88) which implies that respondents disagree with the possible views that relate to attitude related to helmet use. Respondents were asked about their thinking on 'riding a motorcycle without a helmet and 84% of responders replied that it is unacceptable (48.85% disagree and 35.63% strongly disagree). However, the other 16% were still positive about that i.e., it is acceptable to them to ride on a motorcycle without a helmet. In the case of helmet use for passengers, this percentage is much higher, accounting for 25% i.e., one-fourth of motorcycle riders' understand that helmet use is not necessary for passengers. Around 84% believe that wearing a helmet does reduce the severity of head injury in a crash, whereas other 14% do not. Around 34% of responders opined that helmet use is not necessary during riding on the low-speed road (mean=3.59). In the case of a short trip, the almost same proportion of riders believes helmet wearing is not necessary (mean=3.55). When they were asked if it is not acceptable to wear a helmet during hot weather, 78% disagreed (52.87% disagree and 25.86% strongly disagree). Around 73% believe that helmet use is more necessary during the daytime than at night. Attitude is also judged regarding the importance of imposing police fines. They were asked if wearing a helmet is important just to avoid police fines and though the mean response value (3.74) lies in disagree position, around 30% agreed with that statement. The driving experience is an important aspect of good driving but sometimes it creates overconfidence and causes problems to the rider and others as well. Regarding attitude towards helmet wear for an experienced driver, the mean values fall under strongly disagree (4.16). However, around 18% to some extent believe that there is no need for the experienced driver to wear a helmet. On average, around 75% disagree (mean = 3.88) with the asking questions which implies that three-fourth motorcycle riders rightly understand the issues. However, one-fourth of users', which is not a negligible number in any way, understand or believe can't be considered as right as should have to ensure safety and program need to be taken to change this wrong attitude.

Table 1: Attitude Related to Using Helmet.

Possible Views	Strongly Agree (%)	Agree (%)	Neither (%)	Disagree (%)	Strongly Disagree (%)	Mean (%)	Mean ² (%)	Standard Deviation
It is acceptable to ride on a motorbike without a helmet	6.32	6.32	2.87	48.85	35.63	4.01	17.30	3.65
Helmet use is not necessary for passengers	4.02	12.07	9.20	43.10	31.61	3.86	16.15	3.51

Possible Views	Strongly Agree (%)	Agree (%)	Neither (%)	Disagree (%)	Strongly Disagree (%)	Mean (%)	Mean ² (%)	Standard Deviation
Wearing a helmet does not reduce the severity of head injury in a crash	6.32	4.02	5.17	43.68	40.80	4.09	17.88	3.71
Helmet use is not necessary during riding on the low-speed road	5.75	15.52	13.22	44.83	20.69	3.59	14.21	3.26
Helmet use is not necessary for children	2.87	5.17	9.20	43.68	39.08	4.11	17.82	3.70
Wearing a helmet is not necessary when riding a short trip	4.60	18.39	14.37	43.10	19.54	3.55	13.86	3.21
It is not acceptable to wear a helmet during hot weather	2.30	6.32	12.64	52.87	25.86	3.94	16.34	3.52
Helmet use is more necessary during the daytime than at night	6.32	7.47	13.22	46.55	26.44	3.79	15.61	3.44
Wearing a helmet is important just to avoid police fines	5.17	14.37	11.49	39.66	29.31	3.74	15.33	3.40
There is no need for the experienced driver to wear a helmet	1.72	2.30	13.79	43.10	39.08	4.16	18.02	3.72

Note: Mean calculated considering Strongly Agree=1, Agree=2, Neither=3, Disagree=4, and Strongly Disagree=5

3.3.3 Attitude Related to Driving Behaviour

The responses related to attitude on driving behavior of motorcycle riders are presented in Table 2. The table shows that the mean response from all questions about driving behavior varies from 3.18 to 3.99 (average 3.66) which lies in between neither and disagree. This implies that most of the respondents disagree with the possible views that relate to attitude related to driving behavior. Around 79% of responders disagreed (50.57% disagree and 18.39% strongly disagree) with the statement that it is acceptable to drive a little faster if you are a good driver, in contrary remaining 31% still have this belief or attitude that driving a little faster, in other word exceeding the speed limit to a minimum extent is acceptable for a good driver. In the case of speed at an intersection, around 36% attitude that there is no need to reduce at the intersection if it seems clear. Driving on the wrong side or violating traffic rules in case of group movement or following other users- here motorcyclists-around 79% disagreed (mean 3.99) but the other 21% has this understating or attribute that it is acceptable. Around 65% of respondents disagreed with the statement that it is acceptable to receive any important phone call during riding/driving a motorcycle. This implies that around 35% of users believe that there is nothing wrong to receive an important phone call while driving a motorcycle. More fatalistic beliefs have been found in response to the question of reducing speed or yielding at the crossing of a pedestrian. More than 83% attitude that it is not necessary always to reduce speed or yield at pedestrians when they are crossing the road. In regard to the punishment for speeding or rule violation, there is no general consensus among the responders, almost fifty-fifty, with some inclination towards increasing severe punishment. Around 53% are in favor of increasing severe punishment for violations.

Table 2: Attitude Related to Driving Behavior.

Possible Views	Strongly Agree (%)	Agree (%)	Neither (%)	Disagree (%)	Strongly Disagree (%)	Mean (%)	Mean ² (%)	Standard Deviation
If you are a good driver it is acceptable to drive a little faster	1.72	21.26	8.05	50.57	18.39	3.63	14.28	3.26
When the road is clear, there is no need to reduce the	5.17	19.54	10.92	44.83	19.54	3.54	13.87	3.21

Possible Views	Strongly Agree (%)	Agree (%)	Neither (%)	Disagree (%)	Strongly Disagree (%)	Mean (%)	Mean ² (%)	Standard Deviation
speed at an intersection								
If there are many motorcyclists who are driving on the wrong side or violating traffic rules, it is acceptable to follow them	0.57	10.92	9.20	47.70	31.61	3.99	16.81	3.58
It is acceptable to receive any important phone call during riding/driving a motorcycle	2.30	20.69	11.49	44.25	21.26	3.61	14.28	3.27
It is not necessary always to reduce speed or yield to a pedestrian when they are crossing the road	4.02	6.32	5.75	55.17	28.74	3.98	16.82	3.58
Punishments for speeding or rule violations should be more severe	14.94	23.56	14.37	22.41	24.71	3.18	12.15	2.99

Note: Mean calculated considering Strongly Agree=1, Agree=2, Neither=3, Disagree=4 and Strongly Disagree=5.

4. CONCLUSIONS

The motorcycle itself poses a high safety risk due to two-wheelers instability and high maneuvering capacity. Statistics show that motorcycle is the main contributor to road traffic crashes and injuries in many developing countries including Malaysia, Vietnam, Cambodia, etc. Bangladesh also is in great danger due to the rapid rise of motorcycles and their users in recent years. Though in terms of ownership or population, the share of motorcycles in Bangladesh is still very low compared to some other developing countries (around 8 per 100 households and 7 per 1000 population), the registered motorcycle has increased in an exponential manner in the last five years, around 205% from 2015 to 2019 and currently, it contributes around 67% of all registered motorized vehicle in Bangladesh. On the other hand, according to some published literature, Bangladesh has the highest death rate with 28.4 per Ten Thousand. Where the second highest for Cambodia is 11.9 and then Lao is 11.5. In 2017, 53 individuals died and 19 were harmed in 48 bike crashes in Dhaka city. According to official statistics, motorcycles have almost a 20% share in total vehicle crashes. Therefore, it is imperative to conduct an in-depth analysis of motorcycle crash statistics to identify motorcycle safety issues.

The use of a helmet is one of the proven and most effective safety measures for bikers. Therefore, it is mandatory in many countries including Bangladesh. However, the use of helmets is a neglected issue for many motorcycle users. Therefore, there was a need to do an in-depth study on the use of a helmet and the attitude and behaviour of users using the helmet. This study evaluates the motorcyclist stated attitudes and behaviour in urban areas of Bangladesh using a questionnaire survey. Altogether 46 questions were asked including demography of the participants, reasons, and situations for not wearing helmets, attitudes related to Helmet use, attitudes related to driving behavior, and Motorcyclists' behavior while riding on a motorcycle. Attitude and behaviour are measured using five scale points Likert scale. Due to the current COVID-19 pandemic, an online survey was made.

A total of 174 responses were analyzed under different ages ranging from 18 to 54+. However, the majority of this is young people aged ranging from 18 to 30 years, accounting for 25.29% from 18 to 24 and 39.66% from 24 to 30 age group. Among them 93.1% are male and the remaining are female with different levels of education, income, and profession. Around 20% of responders are professional drivers. Among non-professionals, the major trip purpose of the responders is the job, accounting for 25.86% followed by education, 16.9%. Responders are with different driving experiences ranging from 1 to more than 10 years, 31% responders 3 to 4 years, followed by 24.71% 1 to 2 years, 17.82% 5 to 6 years. Around 27% of responders have more than 7 years of experience, whereas 17% have received a driving license more than 7 years before. Even around 7% have no driving license yet. This implies that a significant number of motorcyclists ride motorcycles without a

license. In the case of safety experience, more than one-third (39.51%) of respondents experienced at least one crash in the last year (1-2 crashes 32.76%, 3-5 crashes 5.17%, and more than 5 crashes 0.57%). From a safety point of view, this rate is very alarming and worrying as well.

In response to the question, 33.91% of respondents claimed that they always wear helmets. Around 52.87% responded that most of the time they wear helmets followed by 9.77% who sometimes wear helmets. In field observation, in Dhaka city around 99% of users wear a helmet (driver 99.8% and passenger 91.8%). Barisal-Patuakhali Highway and Bakhergonj-Barguna regional road helmet-wearing rates are very low, representing only 45.7% and 17.5% respectively. On Dhaka-Mawa Road, more than 96% of drivers were found with helmets, for passengers this figure is 75%. On the other hand, in Gaibandha, only 61% of drivers were observed with helmets. In the case of passengers, it is only 20% i.e., around 80% of passengers were found without a helmet. On Mawa Road and Gaibandha road, the female motorcyclist helmet rate is higher than males. Almost 100% of female drivers have found helmets in both areas. On contrary, no female passenger has found with a helmet, whereas there was a significant number of female passengers or pillion riders on the motorcycle. More than 50% stated that they use a full-face closed helmet (53%) followed by an open-face helmet (39%) and a half-face closed (9%). According to field observation, on Mawa Road 45% are found with full-face helmets, which is followed by full-face (37%) and open face/hat 17%. Outside Dhaka city i.e., Gaibandha, there was no passenger with a full-face helmet. More than 25% have found with Open face or hat-type helmet or cap. A significant number of riders have been found with open faces or hats (17% Mawa Road, 25% Gaibandha), which could be considered non-standard in terms of safety point of view.

According to the statement, the majority of people usually do not wear helmets when they ride for a short trip, this is followed during hot weather when they don't anticipate meeting police when riding on a local road. Almost 63% of responders stated that they normally avoid or don't wear helmets when they are riding for a short trip. Around 15% of responders admitted this issue as a factor to avoid helmets, this is followed by riding on local roads and others, accounting for 12.1% and 6.3% respectively. Trip time or day factor also influences few responders for not wearing a helmet, which varies between 2.9 to 2.3 percent. The leading reason for not wearing a helmet is related to the comfortability of wearing a helmet. Around 40% stated that they don't feel comfortable wearing a helmet. Around 22% claim that they do not wear a helmet because they ride on the low-speed local road and that is considered the second leading cause for not wearing a helmet. The third leading cause is suffocation i.e., users feel asphyxiated when they wear helmets, stated 37 (21.26%) of the respondents. This is followed by feeling hot, vision restriction, causing neck pain, and overconfidence, accounting for 20.69%, 17.82%, 8.62%, and 4.60% respectively. A notable number of respondents said that they cannot use the helmet as it is too costly (4.02%). Around 28.16% indicated other factors but that was not specified.

Regarding attitude toward the use of a helmet, the mean value of responses to all the questions varies from 3.55 to 4.16 (average of 3.88) which implies that respondents disagree with the possible views that relate to attitude related to helmet use. Around 84% opined that 'riding a motorcycle without a helmet is unacceptable. However, the other 16% are still positive about that. Around 84% believe that wearing a helmet does reduce the severity of head injury in a crash, whereas another 14% do not. Around 34% of responders opined that helmet use is not necessary during riding on the low-speed road (mean=3.59). In the case of a short trip, almost the same proportion of riders believe helmet wearing is not necessary (mean=3.55). Around 73% believe that helmet use is more necessary during the daytime than at night. Around 18% to some extent believe that there is no need for experienced drivers to wear a helmet. On average, around 75% disagree (mean = 3.88) with the asking questions which imply that three-fourths of motorcycle riders rightly understand the issues. However, one-fourth of users', which is not a negligible number in any way, understand or believe can't be considered as right as should have to ensure safety and program need to be taken to change this wrong attitude.

For behavior, the mean response from all questions varies from 1.48 to 2.26 which lies in between 'rarely' and 'often'. Regarding following road signs and marking, 25% of responses imply that they violate road signs and marking to some extent. Around 25% of responders also admitted that they often receive mobile calls while riding/driving the motorcycle, the mean value is around 2.06 just crossing the category rarely. On the other hand, more than 55% self-proclaimed that they carry pillion passengers without a helmet.

This study presents the findings of an analysis of motorcyclist safety and attitude and behaviour toward using helmets. Due to the COVID-19 pandemic fallout and time and resource constraints, the study could manage a limited number of samples. An increased sample size may provide better insight and would be useful to confirm the results presented here. The analysis could be extended by using different statistical tests to see the influence of different attributes on the perception, attitude, and behaviour of users. In addition, the application of advanced modeling techniques e.g., Structural Equation Model (SEM), and Principal Component Analysis (PCA) with more samples to analyze the motorcyclist's attitude and perception as well as behaviour could be future research options.

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