

MOTORCYCLIST SAFETY RISK AND ATTITUDE TO USING HELMET

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ABSTRACT

Over the recent couple of years, the quantity of motor-bikers has dramatically expanded in Bangladesh, with the presentation of ride-sharing business. Consequently, crashes involving motorcycle with fatalities and injuries are also increasing, where the most vulnerable group is young generation known as the most productive group of the nation. In 2017, 53 individuals were died and 19 harmed in 48 bike 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. Motorcycle safety risk indicate that motorcycling itself can be dangerous. The vehicle miles travelled data of FHWA shows that motorcyclists are about 28 times as likely as passenger car occupants to die in a motor vehicle traffic crash. Safe motorcycling takes balance, coordination, and good judgment. On the other hand, one of the proven most effect safety measures of bikers are the use of helmet. Apparently, helmet clients have risen in recent time particularly in Dhaka city due to several initiatives. But there is no study on the use of helmet and the attitude of user to use the helmet. This research report conducts in-depth analysis on motorcycle safety risk using reported crash record as well as a comprehensive questionnaire survey among the bikers. The study also explores helmet usage attitude and evaluates the standard of helmet being used as well. In response to the question, 33.91% respondents claimed that they always wear helmet. Around 52.87% response that most of the time they were helmet followed by 9.77% who sometimes wear helmet. In field observation, in Dhaka city around 99% users wear helmet (driver 99.8% and passenger 91.8%). Barisal-Patuakhali Highway and Bakhergonj-Barguna Regional road helmet wearing rates is very low, representing only 45.7% and 17.5% respectively. Overall, around 72% self-proclaimed they that do not do wrong practice while riding motorcycle. However, other 28% do wrong practice to some extent, 13.59% often, 9.48% most of the time and 4.72% always. The overall mean value 2.03 lies just above rarely level, which implies that more than one-fourth motorcycle drivers/rider doing misbehaviour or ill practice at different levels either often or always. If you consider rarely value, then it will be more than 50%. The results obtained could be used to better understand the motorcycle safety risk and attitude to use helmet of bikers in Bangladesh. Law-enforcement agencies, traffic operation and maintenance officials, as well as helmet producer and importer could gainfully use the finding of this study to develop motorcycle risk management strategies.

Keywords: Motorcycle, Safety risk, Attitude, Helmet.

1. INTRODUCTION

Motorcycle crash is a concerning issue for the developing countries especially for Bangladesh. Therefore, ensuring motorcyclist safety is crying need to control the fatality and injury from crashes for 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 handicap 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 ride-sharing business. Consequently, crashes involving motorcycle with fatalities and injuries are also increasing, where the most vulnerable group is young generation known as the most productive group of the nation. In 2017, 53 individuals were died and 19 harmed in 48 bike 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 effect safety measures of bikers are the use of helmet. Apparently, helmet clients have risen in recent time particularly in Dhaka city due to several initiatives. But there is no study on the use of helmet and the attitude and behaviour of user to use the helmet. This study focus area is to identify the motorcycle safety issues and to find out the attitude and behaviour towards using helmet. This report presents the findings of motorcycle safety risk using reported crash record as well as a comprehensive questionnaire survey among the bikers. The study also explored helmet usage attitude and behaviour. Attempt is also made to evaluate the perceived standard of helmet being used. The results obtained could be used to better understand the motorcycle safety risk and attitude to use helmet of bikers in Bangladesh. Law-enforcement agencies, traffic operation and maintenance officials, as well as helmet producer and importer 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 the motorcyclist in Bangladesh. But they don't mention about behavior and attitude to using helmet. Pervaz et al., (2019) conduct their study to find the overall causes of motorcycle crashes and cause of injury and death rate. Hence, a big reason of bike crashes is not using helmet is showed but the attitude and behavior to using helmet is not clear. In another research in America by Ross et al, (2011) conduct research determine undergraduate student's helmet use attitudes and practices as head protector as per the Theory of Planned Behavior (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 the Helmet use among Motorcycle riders just as the Helmet quality in Lebanon. Yu (2011) identify causes of not using helmet and the consequences of not using helmet. According to Houston and Richardson (2007), enforcement of strict regulations and law is important to ensure the use of helmet 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 helmet in Bangladesh this research is conducted.

2. METHODOLOGY

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 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 the 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, final questionnaire is fixed for online survey. The questionnaire comprises in total 46 questions. 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).

2.2 Survey Design

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

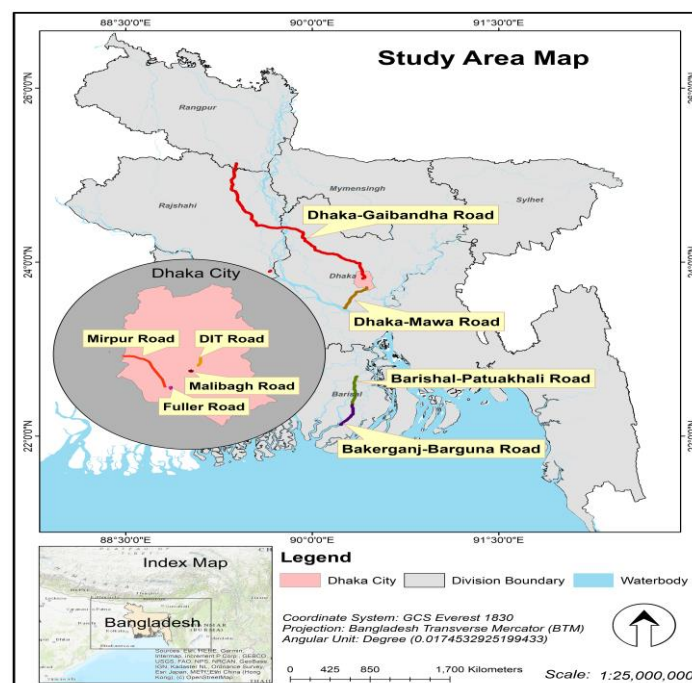


Figure 1: Study area indicating face to face interview's zone.

3. ANALYSIS AND RESULTS

3.1 Respondent Profile

A total of 174 responders completed the online and face to face survey. According to gender perception male and female contribute for 93.1% and 6.9% of total respondents respectively. From 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 analysis of education status, we can see which 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 the degree of post-graduation. Around 45.98% of respondents have monthly income 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 analysis of 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 total respondents, 33 (19.97%) persons are professional motorcycle drivers and others (74.14%) are non-professional. From non-professional, 25.86%, 4.02%, 16.09%, 2.3% and 35.06% drive their bike mainly for job, shopping, education, drop-off and pickup and others purpose 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% respondents have experience of 1-2 years of driving, 31.03% 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 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 respondents, 67 (39.51%) respondents experienced at least one crashes in last one 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 vehicle, increased by 48 times within these 49 years. Among them, increase of motorcycle ridership is quite significant, 0.24 million in 1971 to 2.9 million in 2019 (BRTA, 2020). Therefore, motorcycle alone increased by around 115 times. In contrary, other vehicles excluding motorcycle increase by only 23 times. Last five years it has increased in an exponential manner, around 205% from 2015 to 2019. In case of Dhaka city, this figure goes to 187%. Increase affordability, gradual improvement of road network particularly rural roadway section, added benefit of navigation particularly in congested road of city area, development local motorcycle industry (around 80% are now either manufactured or assemble within the country) are attributed to the major cause of dramatic increase of motorcycle. Moreover, recent app-based bike sharing facility is also considered as one of the reasons for increasing ownership of motorcycle, primarily in city area (Wadud, 2020). It is seen that more than two-third of motorized vehicle are motorcycle alone in Bangladesh (67%). In case of Dhaka city, this figure is 48% as motor car or private car constitute a significant share in Dhaka city (19%) (BRTA, 2020). Though, motorcycle contributed more than 65% of all registered vehicle in Bangladesh, the percent of motorcycle according to the number of household is comparatively lower than many other countries. Thailand has the highest number of households that own motorcycle (87%), followed by Vietnam (86%), Indonesia (85%), Malaysia (83%), China (60%). Whereas in Bangladesh, motorcycle ownership per 100 households is around 8, that is around 5.5 times lower than our neighbor country India (45%) and Pakistan (43%) (Yau, K.K.W., 2004).

3.2.2 Safety Risk

Though number of motorcycles is low in compare to many countries and mage cities as represented in the previous section, 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 11.5. Bhutan has the lowest death rate of motorcyclists (Figure 2). With rising number of motorcyclists, the number of crashes with fatal and injury rates are also increasing where the most vulnerable group is young generation known as most productive group of nation. Motorcyclists are 26 times more likely to die in crashes. In 2017, 53 individuals were died and 19 harmed in 48 bike crashes in Dhaka city. In Bangladesh total number of registered motorcycles is increased from 42% to 55% of total registered motor vehicle 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.

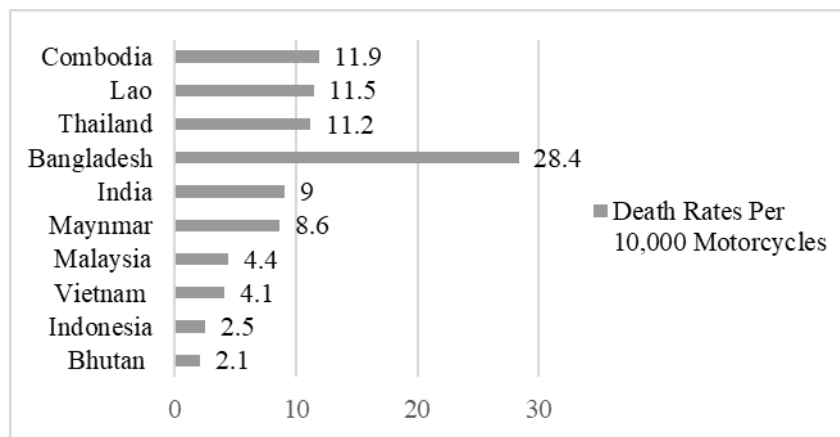


Figure 2: Motorcyclist's death rates of some Asian countries (Pervaz et al., 2019; Wadud, 2020; WHO, 2013)

3.3 Attitude and Behaviour to Using Helmet

3.3.1 Use of Helmet

According to the response, 33.91% respondents claimed that they always wear helmet. Around 52.87% response that most of the time they were helmet followed by 9.77% who sometimes wear helmet. Only 1.72% admitted that they never wear helmet and same percentage of responder very rarely wear helmet while they ride on the motorcycle. During the field observation, different rates of helmet wearing have found in different cities and highways or regional roads. In observational survey, it is found that Dhaka city represents the highest percent of helmet wearing rate, accounting for on average 98.6% (driver 99.8% and passenger 91.8%). Recent initiatives including improving level of enforcement could be attributed with high helmet wearing rate in Dhaka city. In Mawa road, more than 96% drivers were found with helmet, for passenger this figure is 75%. On the other hand, in Gaibandha, only 61% driver were observed with helmet. In case of passenger, it is only 20% i.e. around 80% passengers were found without helmet. In Barisal city, helmet wearing rate has found 56.5% (driver 78.6% and passenger only 8.1%). Barisal- Patuakhali Highway and Bakhergonj-Barguna Regional road helmet wearing rates is poor, representing only 45.7% and 17.5% respectively. In regard to gender difference, 87.2% female passengers found with helmet in Dhaka city. In Mawa road and Gaibandha road, female motorcyclist helmet rate is higher than male. Almost 100% female drivers have found with helmet in both areas. In contrary, no female passenger has found with helmet, whereas there were significant number of female passengers or pillion riders in the motorcycle. Regarding the type of helmet use, more than 50% stated that they use full face closed helmet (53%) followed by open face helmet (39%) and half face closed (9%). According to field observation, in Dhaka city, around 65% motorcycle driver use half face helmet. In case of passenger this share is 47%. Around 50% passengers use open face/hat type helmet in Dhaka city, for driver it is 24%. On

average, around 30% motorcycle driver and pillion passenger use open face/hat helmet. In Mawa expressway, 45% are found with full face helmet, which is followed by full face (37%) and open face/hat 17%. In case of passenger, only 18% are found with full face helmet. In outside Dhaka city i.e. Gaibandha, there were no passenger with full face helmet. For driver, only 4% wearied full-face helmet. Around 71% were with half face helmet (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 face or hat which could be considered as non-standard in terms of safety point of view.

3.3.1.1 When people normally do not wear helmet?

The usual practice of wearing helmet is not same at all time for all users. Different circumstances including road and traffic environment, trip length, time of trip, type of road, area, time of day, weather condition have great influence on this usual practice or normal choice. It is worth mentioning that more than one factors could be equally true for a rider. To get an idea about these influencing conditions, respondents were asked when they normally do not wear helmet. 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: When riders don't wear helmet

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

3.3.1.2 Reason for not wearing helmet

Reasons or causes for not wearing or avoiding helmet might be different for different users. In spite of having huge benefit, people are not wearing helmet 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 helmet to the participants with some predefined reasons/factors. The responses are summaries 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: Reason for not wearing helmet

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

3.3.2 Attitude Related to Helmet Use

In motorcycle rider attitude (i.e., their thinking/believe) to use helmet section, a total of ten parameters are analyzed with Likert scale. Table 1 presents overview of response on attitude related to use helmet. The mean value of responses of all the questions vary from 3.55 to 4.16 (average 3.88) which implies that respondents are disagree with the possible views that relates to attitude related to helmet use. Respondents were asked about their thinking on 'riding motorcycle without helmet' and 84% responders replied that it is unacceptable (48.85% disagree and 35.63% strongly disagree). However, other 16% still positive about that i.e., it is acceptable to them to ride on motorcycle without helmet. In case of helmet use for passenger, this percentage is much higher, accounting for 25% i.e., one-fourth motorcycle riders' understanding 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% responders opined that helmet use is not necessary during riding in low-speed road (mean=3.59). In case of short trip, almost same proportion of riders believe helmet wearing is not necessary (mean=3.55). When they were asked it is not acceptable to wear 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 night. Attitude also judged regarding the importance of imposing police fine. They were asked wearing 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. Driving experience is an important aspect for good driving but sometimes it creates overconfidence and causes problems to the rider and others as well. Regarding attitude towards helmet wear for 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 helmet. On average, around 75% disagrees (mean = 3.88) with the asking questions which implies that three-fourth motorcycle riders rightly understand the issues. However, one-fourth users', which is not a negligible number in any way, understanding or believe can't be consider 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	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	3.65
Helmet use is not necessary for passengers	4.02	12.07	9.20	43.10	31.61	3.86	3.51
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	3.71
Helmet use is not necessary during riding in low-speed road	5.75	15.52	13.22	44.83	20.69	3.59	3.26
Helmet use is not necessary for children	2.87	5.17	9.20	43.68	39.08	4.11	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	3.21
It is not acceptable to wear helmet during hot weather	2.30	6.32	12.64	52.87	25.86	3.94	3.52
Helmet use is more necessary during the daytime than night	6.32	7.47	13.22	46.55	26.44	3.79	3.44
Wearing helmet is important just to avoid police fines	5.17	14.37	11.49	39.66	29.31	3.74	3.40
There is no need for the experienced driver to wear helmet	1.72	2.30	13.79	43.10	39.08	4.16	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 Behavior

The responses related to attitude on driving behavior of motorcycle rider are presented in Table 2. In the table, it shows that the mean response from all question about driving behavior is vary from 3.18 to 3.99 (average 3.66) which lies in between neither and disagree. This implies that most of the respondents are disagree with the possible views that relates to attitude related to driving behavior. Around 79% 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 has this believe or attitude that driving little faster, in other word exceeding speed limit to a minimum extent is acceptable for good driver. In case of speed at intersection, around 36% attitude that there is no need to reduce at intersection if it seems clear. Driving in wrong side or violating traffic rules in case of group movement or following other users- here motorcyclists- around 79% disagreed (mean 3.99) but other 21% has this understating or attribute that it is acceptable. Around 65% responder disagreed with the statement that it is acceptable to receive any important phone call during riding/driving motorcycle. This implies that around 35% users have this believe that there is nothing wrong to receive important phone call while driving motorcycle. More fatalistic believe has been found in response to the question on reducing speed or yielding at crossing of pedestrian. More than 83% attitude that it is not necessary always to reduce speed or yield at pedestrian 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 of severe punishment. Around 53% in favour of increasing severe punishing for violation.

Tabel 2: Attitude Related to Driving Behavior

Possible Views	Strongly Agree (%)	Agree (%)	Neither (%)	Disagree (%)	Strongly Disagree (%)	Mean	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	3.26
When the road is clear, there is no need to reduce speed at intersection	5.17	19.54	10.92	44.83	19.54	3.54	3.21
If there are many motorcyclists who are driving in wrong side or violating traffic rules, it is acceptable to follow them	0.57	10.92	9.20	47.70	31.61	3.99	3.58
It is acceptable to receive any important phone call during riding/driving motorcycle	2.30	20.69	11.49	44.25	21.26	3.61	3.27
It is not necessary always to reduce speed or yield at pedestrian when they are crossing the road	4.02	6.32	5.75	55.17	28.74	3.98	3.58
Punishments for speeding or rule violation should be more severe	14.94	23.56	14.37	22.41	24.71	3.18	2.99

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

4. CONCLUSIONS

Motorcycle itself poses high safety risk due to two wheelers instability and high manoeuvring capacity. Statistics shows that motorcycle is the main contributor of road traffic crashes and injuries in many developing countries including Malaysia, Vietnam, Cambodia etc. Bangladesh also is in a great danger due to rapid rise of motorcycle and its users in recent years. Though, in terms of ownership or population, share of motorcycle in Bangladesh still very low compared to some other developing countries (around 8 per 100 households and 7 per 1000 population), registered motorcycle has increased in an exponential manner in 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 11.5. In 2017, 53 individuals were died and 19 harmed in 48 bike crashes in Dhaka city. According to official statistics motorcycle have almost 20% share in total vehicle crashes. Therefore, it is imperative to conduct in-depth analysis on motorcycle crash statistics to identify the motorcycle safety issues.

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

A total of 174 responses were analysed under different age ranging from 18 to 54+. However, majority of this is young people age ranged 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 remaining are female with different level of education, income, and profession. Around 20% responders are professional driver. Among non-professional, the major trip purpose of the responders is job, accounting for 25.86%

followed by education, 16.9%. Responders are with different driving experience 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% responders have more than 7 years' experience, whereas 17% has received driving licence more than 7 years before. Even, around 7% have no driving licence yet. This implies that a significant number of motorcyclists riding motorcycle without license. In case of safety experience, more than one third (39.51%) respondents experienced at least one crashes in last one year (1 -2 crashes 32.76%, 3-5 crashes 5.17% and more than 5 crashes 0.57%). From safety point of view, this rate is very alarming and concerning as well.

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

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

Regarding attitude to use helmet, the mean value of responses of all the questions vary from 3.55 to 4.16 (average 3.88) which implies that respondents are disagree with the possible views that relates to attitude related to helmet use. Around 84% opined that 'riding motorcycle without helmet' is unacceptable. However, other 16% is still positive about that. Around 84% believe that wearing a helmet does reduce the severity of head injury in a crash, whereas other 14% do not. Around 34% responders opined that helmet use is not necessary during riding in low-speed road (mean=3.59). In case of short trip, almost 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 night. Around 18% to some extent believe that there is no need for the experienced driver to wear helmet. On average, around 75% disagrees (mean = 3.88) with the asking questions which implies that three-fourth motorcycle riders rightly understand the issues. However, one-fourth users', which is not a

negligible number in any way, understanding or believe can't be consider 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 is vary from 1.48 to 2.26 which lie in between 'rarely' and 'often'. Regarding following road sign and marking, 25% responses implies that they violet road sign and marking to some extent. Around 25% responders also admitted that they often receive mobile calls while riding/driving the motorcycle, the mean value is around 2.06 just crosses the category rarely. On the other hand, more than 55% self-proclaimed that they carry pillion passenger without helmet.

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

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