Original Article

Road traffic accidents in Bangladesh: Why people have poor knowledge and awareness about traffic rules?

Md. Rafiqul Islam, Md. Mostaured Ali Khan, Md. Mosharaf Hossain, Kulanthayan K. C. Mani, Ruhani Mat Min

ABSTRACT

Purpose: The study aimed to identify the characteristics of road traffic accident (RTA) and to determine the role of different socioeconomic and demographic factors on the knowledge and awareness about traffic rules among people in Bangladesh.

Study Design: This was a cross-sectional study.

Methods: To conduct this study, 700 primary data were collected from respondents who were involved in RTA by interviewing in medical college hospitals and several private clinics of Dhaka, Rajshahi, and Khulna division in Bangladesh. For the achievement of the objective, the Chi-square test, Cramer’s V correlation, and the logistic regression model have been applied in this study.

Results: Traffic rules violation was identified as the second-most important reason behind RTA. Respondent’s age, gender, residence, education, occupation, awareness about RTA, etc., were significantly associated with having knowledge and awareness about traffic rules. The result of multivariate analysis showed that respondent’s age (<30: odds ratio [OR] = 2.019, confidence interval [CI]: 1.377–2.960); residence (rural: OR = 0.288, CI: 0.193–0.431); education (literate: OR = 5.064, CI: 3.332–7.698); and categories of victims (driver: OR = 2.731, CI: 1.676–4.450 and passenger: 1.869, CI: 1.198–2.916) were the vital predictors of having knowledge and awareness about traffic rules.

Conclusions: By imposing strict traffic act, increasing public awareness through various types of education and awareness/outreach about traffic rules-related program, especially in rural areas, by strictly prohibiting the license giving to unskilled drivers or unfit vehicles, RTA can be minimized.

Key Words: Bangladesh, Chi-square test, injury, knowledge and awareness, logistic regression, road traffic accident, traffic rules

INTRODUCTION

Road traffic accident (RTA) is a global health, economic, and social crisis. It is the 9th major cause of death and around 1.25 million people die and 20–50 million people suffer from nonfatal injuries annually in RTA.[1] According to a statistics, in road accident, an average of 3287 people dies per day and 2.2% of all deaths worldwide and the main cause of death among adolescents aged 15–29 years and the 2nd for children from 5 to 14 years, cost $518 billion globally, especially in LMICs costing individually 1%–2% of their annual GDP.[2] Without taking action predicted to...
METHODS

Sources of data
To conduct this study, primary data were collected from Medical College Hospitals, Sadar Hospitals, and Dhaka, Khulna and Rajshahi Division using purposive sampling technique by interviewing using questionnaire and duration January to May 2017. The information related to injury, treatment, and awareness was collected from 700 respondents who have recently experienced RTA in the selected study area.

Statistical techniques
Setting at $P < 0.05$ level of significance, the association between knowledge and awareness about traffic rules and various background characteristics were assessed by Chi-square test. Further, Cramer’s V correlation formula was used to measure the association. The response variable of this study was knowledge and awareness about traffic laws, which is binary in nature. Hence, the binary logistic regression model was fitted to assess the net effect of background characteristics. Here, the dependent variable knowledge and awareness about traffic laws are addressed as follows:

$$Y = \begin{cases} 1, & \text{Yes} \\ 0, & \text{No} \end{cases}$$

On the other hand, respondent’s age, gender, residence, education, occupation, economic status, categories of victims, aware of RTA was treated as explanatory variables. Data were analyzed using SPSS 23.0 (SPSS Inc., Chicago, IL, USA) in the window’s version.

RESULTS

Knowledge and awareness about traffic rules
Traffic laws are the laws governing traffic and control of vehicles, and the rules of the road are the informal laws and rules that may be developed over time to facilitate timely and orderly traffic flow. Table 1 illustrates the bivariate distribution of respondents who were involved in RTA and their knowledge and awareness about traffic rules according to different explanatory variables. This demonstration pursued the factors that might be related to having knowledge and awareness about traffic rules using the Chi-square-test and Cramer’s V correlation test where a significant association and correlation between knowledge and awareness about traffic rules and some selected explanatory variables such as respondent’s age, gender, residence, education, occupation, economic status, categories of victims, and aware of RTA were found. However, in this observation, there were 62% of respondents had knowledge and awareness about traffic rules. There were 58.1% of the respondents was aged 30 or less, whereas 43.2% of these respondents had no knowledge and awareness about traffic rules which is proportionately higher than the respondents aged >30 years (30.7%). This study observed a higher percentage of victims were male (81.9%), but unfortunately, 34.4% of males had no knowledge and awareness about traffic rules. In this observation, most of the respondents were rural people (55.1%), but miserably, 52.8% of them had no knowledge and awareness about traffic rules as compared to the urban people (80.3%). Although 79% of the respondents in this study area were literate, a respectable amount of them (29.7%) had no knowledge and awareness about traffic rules. According to our demonstration, 69.9% of the respondents were occupied in a profession such as...
Islam, et al.: Road traffic accidents in Bangladesh

Table 1: Bivariate distribution of knowledge and awareness about road traffic laws according to some background characteristics of the respondents

| Variables           | Frequency, n  | Knowledge and awareness about road traffic laws | Calculated chi-square value ($\chi^2$) | Level of significance (P value) | Cramer's V value |
|---------------------|---------------|-----------------------------------------------|--------------------------------------|---------------------------------|------------------|
|                     | No (n = 266), n (%) | Yes (n = 434), n (%) |                                           |                                 |                  |
| Age                 |               |                                               |                                      |                                 |                  |
| ≤ 30                | 407 (58.1)    | 176 (43.2)                                    | 231 (56.8)                           | 11.346                          | 0.001            | 0.127           |
| > 30                | 293 (41.9)    | 90 (30.7)                                     | 203 (69.3)                           |                                 |                  |
| Gender              |               |                                               |                                      |                                 |                  |
| Male                | 573 (81.9)    | 197 (34.4)                                    | 376 (65.6)                           | 17.562                          | <0.0001          | 0.158           |
| Female              | 127 (18.1)    | 69 (54.3)                                     | 58 (45.7)                            |                                 |                  |
| Residence           |               |                                               |                                      |                                 |                  |
| Urban               | 314 (44.9)    | 62 (19.7)                                     | 252 (80.3)                           | 80.541                          | <0.0001          | 0.339           |
| Rural               | 386 (55.1)    | 204 (52.8)                                    | 182 (47.2)                           |                                 |                  |
| Education           |               |                                               |                                      |                                 |                  |
| Illiterate          | 147 (21.0)    | 102 (69.4)                                    | 45 (30.6)                            | 77.810                          | <0.0001          | 0.333           |
| Literate            | 553 (79.0)    | 164 (29.7)                                    | 389 (70.3)                           |                                 |                  |
| Occupation          |               |                                               |                                      |                                 |                  |
| Job                 | 211 (30.1)    | 21 (10.0)                                     | 190 (90.0)                           | 100.851                         | <0.0001          | 0.380           |
| Others              | 489 (69.9)    | 245 (50.1)                                    | 244 (49.9)                           |                                 |                  |
| Economic status     |               |                                               |                                      |                                 |                  |
| Low                 | 369 (56.6)    | 174 (43.9)                                    | 222 (56.1)                           | 15.020                          | 0.001            | 0.146           |
| Middle              | 227 (32.4)    | 73 (32.2)                                     | 154 (61.8)                           |                                 |                  |
| High                | 77 (11.0)     | 19 (24.7)                                     | 58 (75.3)                            |                                 |                  |
| Categories of victims |             |                                               |                                      |                                 |                  |
| Passerby            | 190 (27.1)    | 105 (55.3)                                    | 85 (44.7)                            | 36.855                          | <0.0001          | 0.229           |
| Driver              | 198 (28.3)    | 52 (32.2)                                     | 146 (73.7)                           |                                 |                  |
| Passenger           | 312 (44.6)    | 109 (34.9)                                    | 203 (65.1)                           |                                 |                  |
| Aware about RTA     |               |                                               |                                      |                                 |                  |
| No                  | 284 (40.6)    | 153 (53.9)                                    | 131 (46.1)                           | 51.107                          | <0.0001          | 0.270           |
| Yes                 | 416 (59.4)    | 113 (27.2)                                    | 303 (72.8)                           |                                 |                  |

RTA: Road traffic accident

a businessman and labor, but lamentably only 49% of them had knowledge and awareness about traffic rules. Expectedly, 75.3% of people with higher economic status had knowledge and awareness about traffic rules, whereas only 56.1% of lower-income people had knowledge and awareness about traffic rules. The survey observed that the main victims of RTA were the passengers (44.6%) with a respectable amount of drivers (28.3%). Moreover, 73.7% of the drivers had knowledge and awareness about traffic rules compared to pedestrians (44.7%). If it was observed particularly, the drivers of public transport (75.7%) had higher knowledge and awareness about traffic rules but the motorcyclist (57.8%) had poorest knowledge and awareness about traffic rules [Figure 1]. Besides, a better part of respondents with awareness about RTA (72.8%) had knowledge and awareness about traffic rules. Cramer’s V correlation shows that respondent’s education, residence, occupation, categories of victims, and awareness about RTA was highly correlated with having knowledge and awareness about traffic rules.

**Determinants of knowledge and awareness about traffic rules**

Table 2 represents the result of multivariate logistic regression analysis for having knowledge and awareness about traffic rules according to selected background characteristics. The likelihood of having knowledge and awareness about traffic laws was increased among respondents aged over 30 (Odds ratio [OR] = 2.019, confidence interval [CI]: 1.377–2.960) than the respondents aged ≤30 years. Again, the probability of having knowledge and awareness about traffic laws was decreased among females (OR = 0.583, CI: 0.348–0.975) respondents than the males. Besides, the OR for the rural resident was 0.288 (CI: 0.193–0.431) which indicated that the rural participants had 0.288 times fewer chances of having knowledge and awareness about traffic laws than the respondents from urban areas. In this study, the possibilities of having knowledge and awareness about traffic rules were increased among literate (OR = 5.064, CI: 3.332–7.698) victims of RTA than the illiterate respondents. However, the likelihood of having knowledge and awareness about traffic laws was increased among drivers (OR = 2.731, CI: 1.676–4.450) and passenger (OR = 1.869, CI: 1.198–2.916) than the respondents who were a passer-by. The participants with awareness about RTA had 2.523 (CI: 1.737–3.666) times more probable of having knowledge and awareness about traffic laws than who was not aware of RTA.

In the fitted model in Table 2, the Cox and Snell $R^2$ was 36.3% and that was calculated from the linear relationship...
between the independent variables and the overall model was significant when all explanatory variables were entered in the model. Besides, the stability of the model was 34.72%, the shrinkage coefficient was 0.0158, and the stability of $R^2$ was 0.9842. Besides, the Hosmer and Lemeshow test $P$-value was 0.725. The smaller shrinkage coefficient and higher $P$-value tend to 1 are indicating that the regression model was a better fit.

**DISCUSSION**

In this study, it was tried to investigate the background characteristics of RTA and factors that affect the knowledge and awareness of traffic rules in Bangladesh. Our findings concerning the main reasons behind RTA are the unskilled driver, faulty vehicle, carrying an excessive passenger, violation of traffic rules, damaged road, and lack of footpath which is similar to the findings of several previous studies.\[18-24\] Besides, supporting our findings, few earlier attempts have identified that lack of knowledge and violation of traffic rules and signals is the most important reason behind RTA in Saudi Arabia, Poland, and Canada.\[18,20,23\] In Bangladesh, violation of traffic rules mainly occurs due to the poor knowledge and lack of awareness about traffic rules which are putting an immense impact on RTA.

The study result regarding higher involvedness in RTA of people aged ≤30 years and the male is most vulnerable to RTA is showing consistency with the findings of Sango et al.\[25\] and also closer estimation is found in many other endeavors.\[5,10,26-30\] In Pune city of India, a cross-sectional study has observed the high prevalence of RTA among males aged 15–30 in the year 2014.\[12\] In Bangladesh, the depiction is very similar to India, but unfortunately, a good amount of these young people have no knowledge and awareness about traffic rules according to our findings. As a result, these people are violating the traffic rules now and again. Hence, to reduce RTA among male young people, urgent initiatives are needed to increase the knowledge and awareness about traffic rules among them.

However, most of the victims in this study were from the rural area and literate people that is consistent...
with the hypothesis of Mishra et al.[31] As expected, a higher percentage of rural and illiterate people have no knowledge and awareness of traffic rules. This is because, in a rural area, there is no such program related to increasing knowledge and awareness in traffic rules as well as RTA is held. Hence, the initiatives are badly needed to improve the situation to make the people aware of traffic rules. Moreover, this demonstration shows that the respondents from profession like businessman, labor, etc., and from low-economic status are the main victims of RTA in Bangladesh. Normally, professionals like businessman, labor, etc., have to travel more than the serviceman. However, their knowledge and awareness of traffic rules are very poor in Bangladesh.

The present study examines that most of RTA victims were passengers with a respectably ample amount of drivers and pedestrians in Bangladesh, which shows similarities with the result of a study in developing countries[32] but shows a contradiction with several previous demonstrations.[33-35] In Bangladesh, the drivers have almost three time’s higher knowledge and awareness of traffic rules than pedestrians. In addition, earlier endeavors have mentioned Bangladesh as a low middle-income country and the pedestrians are at high risk of getting involved in RTA.[33-35] Some studies have identified motorcyclists are at high risk of getting involved in RTA,[10,11,15,36,37] perhaps, the situation is similar in Bangladesh. However, unfortunately, the knowledge and awareness about traffic rules among the motorcyclists are very poor in Bangladesh and the commercial vehicle drivers are in the second position of the row.

There are various sources of knowledge about traffic rules were identified in Bangladesh. Among them, TV, Internet, mobile, etc., are the most effective source to increase knowledge and awareness about traffic rules than the radio. Hopefully, by broadcasting different knowledge and awareness-related programs regarding traffic rules in TV and spreading them through Internet, especially with the help of social media, the Bangladeshi people could be more aware of the country’s traffic rules.

Limitations and strengths of the study
There were some limitations on this study. The cost was not sufficient as there was no funding source, some respondents could not remember exact answers such as age, income, and expenses and some respondents expect some incentives, but it was not possible due to lack of budget. Although of these obstacles, we tried to discover the factors that are influencing the knowledge and awareness about traffic rules among people. To our knowledge, there is no such study that described the knowledge and awareness about traffic rules among people. Perhaps, this work will enrich the available information and helps in further investigations.

CONCLUSIONS

In this study, particular attention was paid to the general characteristics of RTA in the present traffic stream of Bangladesh and contributing factors of knowledge and awareness about traffic rules. With the growing population and urbanization, a sustainable transportation system with proper knowledge and awareness about traffic rules and regulations is needed for Bangladesh which will meet both present and future demand. Hence, it can be advised based on the study that the young and male people are at a most vulnerable position in RTA. Raising public awareness about RTA as well as traffic rules gets vital importance to reduce RTA. People can know the country’s traffic rules and be more conscious about the traffic rules through education, different training, and awareness program, especially in rural areas. If it can be added to the primary textbook that would be more beneficial. Besides, traffic laws must be strictly complied with and must have to follow. The government should not give license to unskilled drivers and to prohibit unfit vehicles. In addition, “Safety of road safety” must be a social movement. This circumstance intimates the necessity of immediate attention from a public health standpoint or educational awareness program.

Acknowledgments
This research is supported by PPPSE, UMT.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

Research quality and ethics statement
This study was approved by the Institutional Review Board / Ethics Committee. The authors followed applicable EQUATOR Network (http://www.equator-network.org/) guidelines during the conduct of this research project.

REFERENCES
1. World Health Organization. Global Status Report on Road Safety 2015. Geneva, Switzerland: World Health Organization; 2015. Available from: https://www.who.int/violence_injury_prevention/road_safety_status/2015/en/. [Last accessed on 2018 Dec 07].
2. Association for Safe International Road Travel. Association for Safe International Road Travel | Road Crash Statistics 2017. Association for Safe International Road Travel; 2017. Available from: https://www.asirt.org/safe-travel/road-safety-facts/. [Last accessed on 2018 Jun 20].
3. Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJ. Global and regional burden of disease and risk factors, 2001: Systematic analysis of population health data. Lancet 2006;367:1747-57.
4. United Nations. UN Data Country Profile. Bangladesh: United Nations; 2017. Available from: http://data.un.org/CountryProfile.aspx?crName=Bangladesh. [Last accessed on 2018 Aug 23].

International Journal of Critical Illness and Injury Science | Volume 10 | Issue 2 | April-June 2020
Islam, et al.: Road traffic accidents in Bangladesh

5. Alonge O, Agrawal P, Talab A, Rahman QS, Rahman AF, Arifeen SE, et al. Fatal and non-fatal injury outcomes: Results from a purposively sampled census of seven rural subdistricts in Bangladesh. Lancet Glob Health 2017;5:e818-27.

6. Worldbank. The World Bank | Urban Population Growth (Annual %) | Data. Worldbank; 2017. Available from: https://data.worldbank.org/indicator/SP.URB.RGOW. [Last accessed on 2018 Mar 14).

7. CEIC. Bangladesh Motor Vehicles | Automobile | Car Sales | Economic Indicators | CEIC; 2017. Available from: https://www.ceicdata.com/indicator/bangladesh/motor-vehicles-sales-growth. [Last accessed on 2018 May 20].

8. Bangladesh Road Transport Authority. Bangladesh Road Transport Authority (BRTA) | Road accident and casualties Statistic. Bangladesh Road Transport Authority; 2016. Available from: http://www.brtagov.bd/newsite/en/home/. [Last accessed on 2018 May 09].

9. Bangladesh Road Transport Authority. Bangladesh Road Transport Authority (BRTA) | Number of Registered Motor Vehicles in Bangladesh. Bangladesh Road Transport Authority; 2017. Available from: http://www.brtagov.bd/newsite/en/home/. [Last accessed on 2018 Jun 08].

10. Bachani AM, Koradia P, Herbert HK, Mogere S, Akungah D, Nyamari J, et al. Road traffic injuries in Kenya: The health burden and risk factors in two districts. Traffic Inj Prev 2012;13 Suppl 1:24-30.

11. Lagarde E. Road traffic injury is an escalating burden in Africa and deserves proportionate research efforts. PLoS Med 2007;4:e170.

12. Mirkazemi R, Kar A. A population-based study on road traffic injuries in Pune City, India. Traffic Inj Prev 2014;15:379-85.

13. Santamaría-Rubio E, Pérez K, Olabarriña M, Novoa AM. Gender differences in road traffic injury rate using time travelled as a measure of exposure. Accid Anal Prev 2014;65:1-7.

14. Rodriguez JM, Peñaloza RE, Moreno Montoya J. Road traffic injury trends in the City of Valledupar, Colombia. A time series study from 2008 to 2012. PLoS One 2015;10:e0144002.

15. Stewart BT, Lafta R, Cherewick M, Esa Al Shatari SA, Flaxman AD, Hagopian A, et al. Road traffic injuries in Baghdad from 2003 to 2014: Results of a randomised household cluster survey. Inj Prev 2016;22:321-7.

16. Jacoby SF, Winston FK, Richmond TS. Using Local Context to Inform Road Traffic Injury Prevention in Global Employee Wellness Programs. Inj Prev 2015;16:835-41.

17. Algora-Buenafé AF, Suasnavas-Bermúdez, PR, Merino-Salazar P, Ramón Gómez García A. Epidemiological study of fatal road traffic accidents in Ecuador. Australasian Medical Journal 2017;10:238-45.

18. AnsiS, Akhdar F, Mandoorah M, Moutaery K. Causes and effects of road traffic accidents in Saudi Arabia. Public Health 2000;114:37-9.

19. Donroe J, Tincopa M, Gilman RH, Brugge D, Moore DA. Pediatric road traffic injuries in urban Peruvian children and adolescents: Case control analyses of personal and environmental risk factors. PLoS One 2008;3:e3166.

20. Goniewicz K, Goniewicz M. 896 Causes and Effects of Road Traffic Accidents in Poland. Tampere, Finland. BMJ Publishing Group Ltd.; 2016. p. A319-20.

21. Klauer SG, Guo F, Simons-Morton BG, Ouimet MC, Lee SE, Dingus TA. Distracted driving and risk of road crashes among novice and experienced drivers. N Engl J Med 2014;370:54-9.

22. Staton C, Vissoci J, Gong E, Toomey N, Wafula R, Abdelgadir J, et al. Road traffic injury prevention initiatives: A systematic review and metasummary of effectiveness in low and middle income countries. PLoS One. 2016;11:e0144971.

23. Zhang J, Lindsay J, Clarke K, Robbins G, Mao Y. Factors affecting the severity of motor vehicle traffic crashes involving elderly drivers in Ontario. Accid Anal Prev 2000;32:117-25.

24. Zimmerman K, Jinadasa D, Maega B, Guerrero A. Road traffic injury on rural roads in Tanzania: Measuring the effectiveness of a road safety program. Traffic Inj Prev 2015;16:456-60.

25. Sango HA, Testa J, Meda N, Conrand B, Traoré MS, Staccini P, et al. Mortality and morbidity of urban road traffic crashes in Africa: Capture-recapture estimates in Bamako, Mali, 2012. PLoS One 2016;11:e0149070.

26. Masherky SR, Rahman A, Khan TF, Faruque M, Svanström L, Rahman F. Hospital burden of road traffic injury: Major concern in primary and secondary level hospitals in Bangladesh. Public Health 2010;124:185-9.

27. Ditsuwun V, Veerman LJ, Barendregt JJ, Bertram M, Ves T. The national burden of road traffic injuries in Thailand. Popul Health Metr 2011;9:2.

28. Bahadorimomenfared A, Soori H, Mehrabi Y, Delpisheh A, Esmaili A, Salehi M, et al. Trends of fatal road traffic injuries in Iran (2004-2011). PLoS One 2013;8:e65198.

29. Orsi C, Bertuccio P, Morandi A, Levi F, Bosetti C, La Vecchia C. Trends in motor vehicle crash mortality in Europe, 1980-2007. Sci PhD 2012:50:1009-18.

30. Li YH, Rahim Y, Lu W, Song GX, Yan Y, De DZ, et al. Field data: A study on trend and prediction of fatal traffic injuries prevalence in Shanghai. Traffic Inj Prev 2006;7:403-7.

31. Mishra B, Sinha Mishra ND, Sukhla S, Sinha A. Epidemiological study of road traffic accident cases from Western Nepal. Indian J Community Med 2010;35:115-21.

32. Nantulya VM, Reich MR. The neglected epidemic: Road traffic injuries in developing countries. BMJ 2002;324:1139-41.

33. Constant A, Lagarde E. Protecting vulnerable road users from injury. PLoS Med 2010;7:e1000228.

34. Naci H, Chisholm D, Baker TD. Distribution of road traffic deaths by risk: A global comparison. Inj Prev 2009;15:55-9.

35. Rus Ma D, Peek-Asa C, Baragan EA, Chereches RM, Mocean F. Epidemiology of road traffic injuries treated in a large Romanian emergency department in Tîrgu-Mureş between 2009 and 2010. Traffic Inj Prev 2015;16:835-41.

36. Berecki-Gisolf J, Yiengprugsawan V, Kelly M, McClure R, Seubsman SA, Hagopian A, et al. The impact of the Thai motorcycle transition on road traffic injury: Thai Cohort Study results. PLoS One 2015;10:e0120617.

37. Nantulya VM, Reich MR. Equity dimensions of road traffic injuries in low- and middle-income countries. Inj Control Saf Promot 2003;10:13-20.