



## Research Article

# Insights on Driver's Behavior Regarding Hydraulic Horn use in Transport Vehicles of Bangladesh

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**Received:** 03 January 2022; **Accepted:** 17 January 2022; **Published:** 15 February 2022

**Citation:** Nasrin Akter, Bilkis Banu, Sujana Haque Chowdhury, Kazi Rakibul Islam, Md. Tanzeerul Islam, Sarder Mahmud Hossain. Insights on Driver's Behavior Regarding Hydraulic Horn use in Transport Vehicles of Bangladesh. Journal of Environmental Science and Public Health 6 (2022): 069-081.

### Abstract

This study aimed to identify the crucial determinants provoking the hydraulic honking behaviors among motor vehicle drivers. It was a cross-sectional study with 206 drivers randomly selected from Dhaka city. Data were collected using a semi-structured pre-tested questionnaire. Miserably, the study revealed that is almost half (44.7%) of the respondents were identified as hydraulic horn users. Most of them were used in overcrowding (23%) and overtaking (18%) situations. The study analyzed the significant predictors associated with the behavior of hydraulic horn use. Youngers (AOR= 5.81,  $p < 0.01$ ); illiterate

(AOR= 10.6,  $p < 0.01$ ) drivers used hydraulic horn in the motor vehicles.

**Keywords:** Hydraulic horn; Transport vehicles; Driver's behavior

### 1. Brief Subheads

1. A remarkable number of drivers are using the hydraulic horns in their motor vehicle in Dhaka city and used to honking in overcrowding and overtaking situations.
2. Especially younger drivers with less experience are found as more prone to

practice hydraulic honking as a result of their reckless driving behavior.

3. The unique findings might help the policymakers to plan for the specific intervention among the specified driver groups considering the predictors associated with the hydraulic honking behavior.

## **2. Background**

Use of different types of vehicle tends to be increased alarmingly throughout the Dhaka district for the last few decades due to rapid unplanned urbanization. Likewise, the urban areas of other developing countries of the world are witnessing the same situation. Users of this huge number of vehicles, especially drivers and helpers, have different types of demographic characteristics which may provoke the practice of hydraulic horn use among them specially in the country like Bangladesh. Traffic noise pollution due to ‘barking’ of hydraulic horn has been increasing in double manner from the standard level in Dhaka as well as other cities in Bangladesh [1, 2]. Noise pollution seems to be a common problem found almost everywhere in the world. In terms of population and size, Dhaka is the largest of the eight metropolitan cities in Bangladesh. As the major environmental sources of noise pollution in Dhaka city, it encompasses transportation, vehicular horn including hydraulic horn, loud audio system, and commercial activities along with some other human activities [3].

Though hydraulic horn is prohibited by the law, it is being extensively used by trucks and buses for several years in Bangladesh. Such honking acts like a major source of noise pollution even till now. Consequently,

a remarkable number of health consequences are occurred, meanwhile that would be the cause for the national burden. For instance, high decibel noise of hydraulic horn affecting the hearing power of thousands of children every day in Dhaka city [2]. As a miserable fate, noise from hydraulic horn might grasp 30 dB hearing power of Dhaka city dwellers [4]. Findings from the study carried out in Dhaka city revealed a significant relationship between the intensity of the drivers of various types of vehicle to press hydraulic horn for having free accesses throughout the road and the signal provided by traffic police at different locations of Dhaka city and the maximum noise level found as 106.3 dB in Banani [5]. The sound level of hydraulic horns measured 95 dB while it is indicated that exposure of 80-85 dB for 2 hours causes temporary hearing loss and permanent hearing loss can be caused by the sound of 120 decibels [6, 7].

Considering the devastating consequences of noise pollution due to honking researchers conceptualized smart traffic signal, silent horn and underground parking towards the sustainable and smart Dhaka. A silent horn system was proposed modifying the existing hydraulic horn which might contribute in reduction of noise pollution [8]. A number of attempts have been taken to reduce the effects and causes for noise pollution i.e. to get rid of this day-to-day life hampering pollution, hydraulic horns have been banned in Dhaka metropolitan city by the government [9]. However, the use of banned hydraulic horns has increased by 15-25 percent on Dhaka city roads predominantly due to the honking hydraulic horn. Pedestrian, other drivers, passengers, bikers, rickshaw pullers etc. are often affected by sickening loud noise

which causes various health issues among them [7]. No studies are found to reveal the status of hydraulic horn use in Dhaka city as well as the factors which provoke the use among the driver population in Bangladesh. Furthermore, very few studies showed the road traffic noise pollution status and the reasons behind it in Dhaka city. Hence this study is intended to find out the status of hydraulic horn use and the underlying matters regarding this behavior among the drivers in Dhaka city. The outcome from this study might guide the policymakers to plan effectively in minimizing the road traffic noise pollution as well as the health-related consequences both among the drivers and the general city dwellers.

### **3. Literature Review**

Hydraulic horn is one type of blow horn, which produces high frequency noise by compressing the air preserved on a rubber like chamber of the device. Frequent hydraulic honking is a dominating factor of noise pollution in Dhaka city, Bangladesh. Life style in Dhaka city is becoming miserable day by day due to uncontrolled noise pollution. The hydraulic horns used by buses, trucks and other motor vehicles in the crowded city streets are dangerous for human being. Such noise pollution in Dhaka city is affecting the hearing power of thousands of children everyday [2].

An approach to reveal the nature and vulnerability of road traffic noise pollution in Dhaka city identified the most noisy places as (hav = highest average value and lav = lowest average value) Banglamotor (hav 86.7dB and lav 75dB), Shahbag - front of BSMMU and BIRDEM (hav 85.6 dB and lav 75 dB), Maghbazar (hav 85 dB and lav 76.7 dB), front of Matsa Bhaban (hav 83.7 dB and lav 73.7 dB),

Sheraton/Ruposhi Bangla (hav 83 dB and lav 71.3 dB) and so on [10].

Another study reported that the hearing power of the inhabitants of Dhaka city had reduced during the ten years [8]. About five to seven percent of the patients admitted in hospital were suffering from permanent deafness due to noise pollution. Disturbance created by noise may cause hypertension, headache, and indigestion. As the major environmental sources of noise pollution in Dhaka city, it encompasses transportation, vehicular horn including hydraulic horn, loud audio system, and commercial activities along with some other human activities [3].

Quamrul et al. (2015) stated that majority of respondents (31%) used to honking during traffic jam while parking (27%), overcrowding (19%), overtaking (13%) was also claimed by the respondents [11]. In addition, respondents mostly suffered from headache (41%) and heart beat (30%) and comparatively lesser number were affected by hearing problem (12%) due to traffic noise pollution. Some regulation regarding use of horns, particularly banning hydraulic horns and raising public awareness against the habit of honking can help in solving the miserable situation of noise pollution in Dhaka city to a large extent [1].

However, the use of this harmful device has been increasing in 15-25 percent during last few years due to lack of effective implementation and proper monitoring of existing regulation. Therefore, this study has been proposed to assess the current status of hydraulic horn use in Dhaka city as well as the

behaviors of the drivers that poses the frequent honking in their vehicle.

#### **4. Methods**

The study was a descriptive type of cross-sectional design and conducted in the Dhaka city of Bangladesh. The participants were adult drivers who met the inclusion criteria: aged 18 years or more; and had willingness to participate in the study. Data were collected from the drivers of five types of transports i.e. Bus, Truck, Covered Van, Auto-Rickshaw (locally called CNG) and Auto Tempo (oversized auto-rickshaw) available in ten zones of Dhaka district, Bangladesh. The zones were selected according to the size of traffic flow in the areas which were Uttara, Ashulia, Savar, Shahbag, Motijhil, Dhanmondi, Banani, Gulshan, Mirpur and Gulistan (Figure 1). These areas were under the drivers' driving area such as Dhaka to Muktagacha (Uttara); Ashulia to Fulbaria (Uttara, Ashulia, Shahbag, Dhanmondi, Banani, Gulistan); Ashulia to Savar (Ashulia, Savar); Abdullahpur to Gabtoli (Uttara, Shahbag, Motijheel, Banani, Gulshan, Mirpur); Dhaka to Rangpur (Uttara, Banani).

According to the Bangladesh Road Transport Authority, a total of 1,01, 808 registered transports (5 types selected for this study) were available in the Dhaka city [12]. Considering the eight percent decreasing proportion of invalid registration 13 9366 motor vehicles were assumed as available in the 49 thanas/ areas under 06 Upazila of Dhaka district [14]. Followed the calculation, a number of 1912 of vehicles were taken into account from each area of 10 zones and one percent vehicle drivers i.e. 19 drivers were selected from each area. The calculated number

190 was added with the eight percent assumed non-response rate. Finally, 206 motor vehicle drivers were selected from the target zones by using random sampling.

Data were collected through interviewer administered method using a semi-structured and pre-tested questionnaire. Drivers' behavior such as status of hydraulic horn use, daily driving area, types of driving vehicle, driving experiences (in years), horn using situation, parking behavior of the vehicle, status of vehicle registration, ownership of driving license were collected from the potential respondents. Demographic characteristics of the drivers such as age, educational status, religion, family size and monthly family income were recorded. The survey questions were adapted and modified from previously published literature regarding drivers' behavior and approaches [15, 16].

Respondents' age, monthly family income, and educational status categorization were adapted by following the previous published literature [17-21]. All independent variables were tested individually by Chi-square ( $X^2$ ) and entered into the first model since they were associated with hydraulic horn use  $<0.05$  level of significance. Unadjusted and adjusted logistic regression models were used to identify predictors responsible for using hydraulic horn. The model was tested for sensitivity by the forward selection procedure (e.g., including and excluding specific variables) with the robust standard error. The predictor variables were included in the adjusted model only if any label of the predictor was significant at  $\leq 5\%$  risk level in the unadjusted logistic regression model which was used to adjust for the

effects of other potential confounders. The statistically significant level was considered a probability value (p-value) of  $\leq 0.05$ . All data analyses

were performed using statistical software SPSS (Statistical Package for Social Sciences) 20 version.

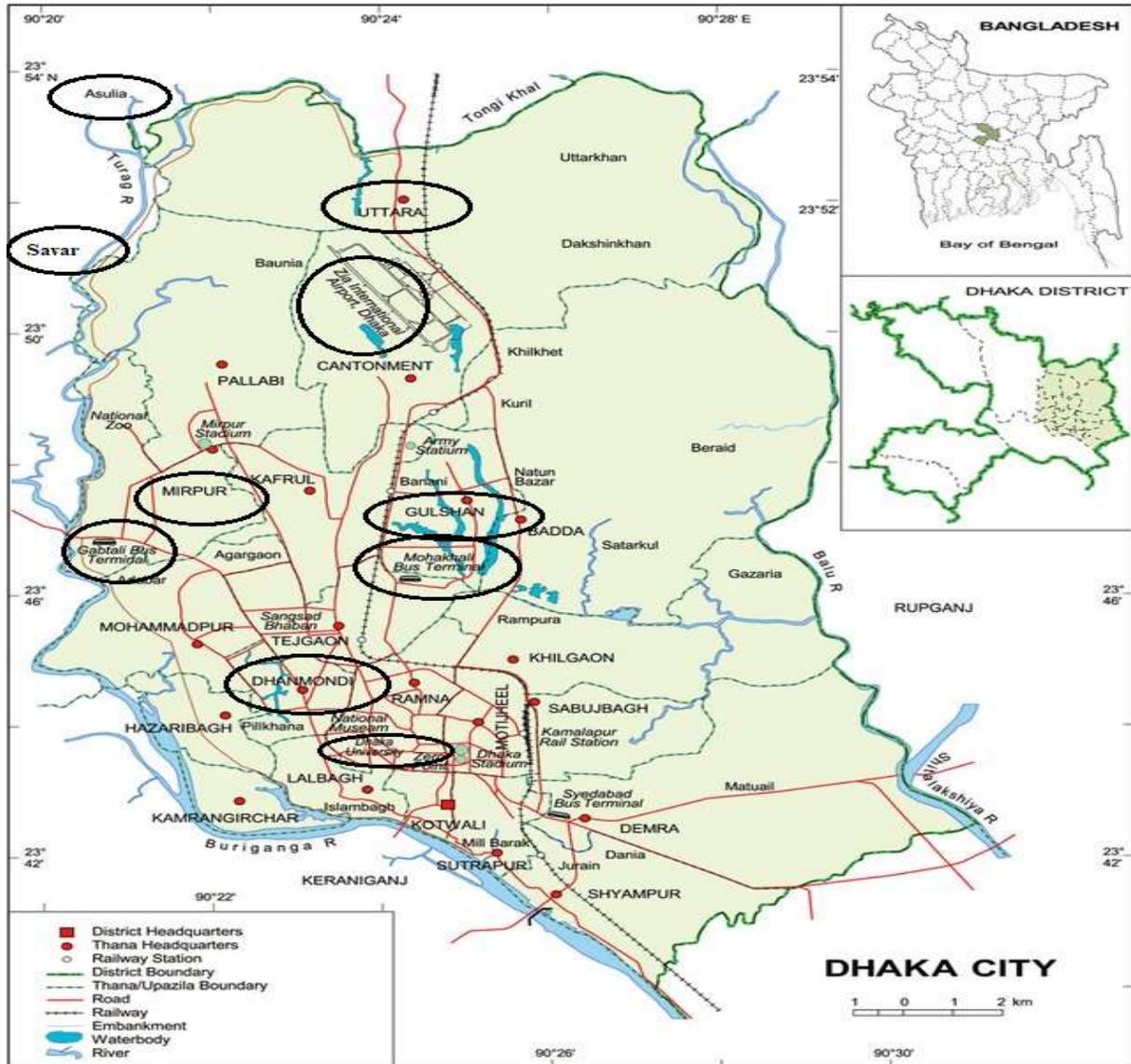


Figure 1: Selected ten study zones in Dhaka district.

The study complied with the Declaration of Helsinki and was approved by the respective Ethical Review Committee. Participation of the respondents was anonymous and voluntary. Informed consent was

sought from the respondents at the beginning point of survey and participants could withdraw from the survey at any time.

**5. Result**

This study was conducted among motor vehicles drivers of Dhaka, Bangladesh to identify the practice of hydraulic horn use in motor vehicles and its impact in Dhaka city, Bangladesh.

**5.1 Participants’ characteristics associated with the status of hydraulic horn use in transport vehicles**

Table 1 shows that majority of the participants were from less than 30 years of age group (48.5%) and had completed up to secondary level of education (61.2%). Greater part of the respondents were muslims (64.1%) in religion. Majority of motor vehicles drivers found to reside in a family with >4 members (56.3%) and earn monthly family income of (236.71-355.07) USD (19.4%).

Characteristics	Number of participants, n (%)	Status of hydraulic horn use		
		User, n (%)	Non-user, n (%)	p-value (≤0.05)
<b>Demographic characteristics</b>				
<b>Age (in years)</b>				
< 30	100 (48.5)	63 (30.6)	37 (18)	8.34 (0.02) *
30– 40	67 (32.5)	37 (18.0)	30 (14.6)	
>40	39 (18.9)	14 (6.8)	25 (12.1)	
<b>Educational status</b>				
≤Primary	41 (19.9)	35 (17)	6 (2.9)	20.52 (0.01) *
≤Secondary	126 (61.2)	64 (31.1)	62 (30.1)	
≤Higher Secondary	39 (18.9)	15 (7.3)	24 (11.7)	
<b>Religion</b>				
Muslim	132 (64.1)	71 (34.5)	61 (29.6)	0.36 (0.55)
Non-Muslim	74 (35.9)	43 (20.9)	31 (15)	
<b>Family size (In members)</b>				
≤4	90 (43.7)	45 (21.8)	45 (21.8)	1.84 (0.17)
>4	116 (56.3)	69 (33.5)	47 (22.8)	
<b>Monthly family income (in USD)</b>				
<236	36 (17.5)	53 (25.7)	36 (17.5)	1.61 (0.45)
236-355	40 (19.4)	47 (22.8)	40 (19.4)	
>355	16 (7.8)	14 (6.8)	16 (7.8)	
<b>Drivers’ behavior</b>				
<b>Daily driving area</b>				
Dhaka to muktagachha	34 (16.5)	19 (9.2)	15 (7.3)	5.24 (0.26)
Ashulia to Fulbaria	50 (24.3)	24 (11.7)	26 (12.6)	

Ashulia to Savar	50 (24.3)	24 (11.7)	26 (12.6)	
Abdullahpur to Gabtoli	40 (19.4)	27 (13.1)	13 (6.3)	
Dhaka to Rangpur	32 (15.5)	20 (9.7)	12 (5.8)	
<b>Types of driving vehicle</b>				
Bus	75 (36.4)	42 (20.4)	33 (16)	3.17 (0.53)
Truck	46 (22.3)	23 (11.2)	23 (11.2)	
Van	39 (18.9)	24 (11.7)	15 (7.3)	
CNG	9 (4.4)	3 (1.5)	6 (2.9)	
Tempo	37 (18)	22 (10.7)	15 (7.3)	
<b>Driving experience (in years)</b>				
≤10	158 (76.7)	82 (39.8)	7.6 (36.9)	3.25 (0.07)
>10	48 (23.3)	32 (15.5)	16 (7.8)	
<b>Horn using situations</b>				
Traffic jam	27 (13.1)	17 (8.3)	10 (4.9)	5.77 (0.12)
Overcrowding	75 (36.4)	48 (23.3)	27 (13.1)	
Parking	26 (12.6)	12 (5.8)	14 (6.8)	
Overtaking	78 (37.9)	37 (18)	41 (19.9)	
<b>Eager to use hydraulic horn</b>				
Yes	127 (61.7)	63 (30.6)	64 (31.1)	4.41 (0.04) *
No	79 (38.3)	51 (24.8)	28 (13.6)	
Data are presented as frequency (n), percentage (%); *Statistical significance at p value ≤0.05. Chi-square test was used to observe the association.				

**Table 1:** Demographic characteristics and driving behaviors associated with the status of hydraulic horn use in Dhaka city (n=206).

In terms of drivers' behavior, it was observed that, in most of the cases; bus drivers (36%) with less than 10 years driving experience (76.7%) regularly practices use of hydraulic horn (20.4% & 39.6% respectively) specially during overcrowded (23.3%) situation. In addition, mostly they showed eagerness (30%) to use hydraulic horn in their vehicles as a result of poor implementation of traffic regulations and lack of awareness among passersby. Furthermore, it was observed that highest hydraulic horn was used in Abdullahpur and Gabtoli Road. In terms of

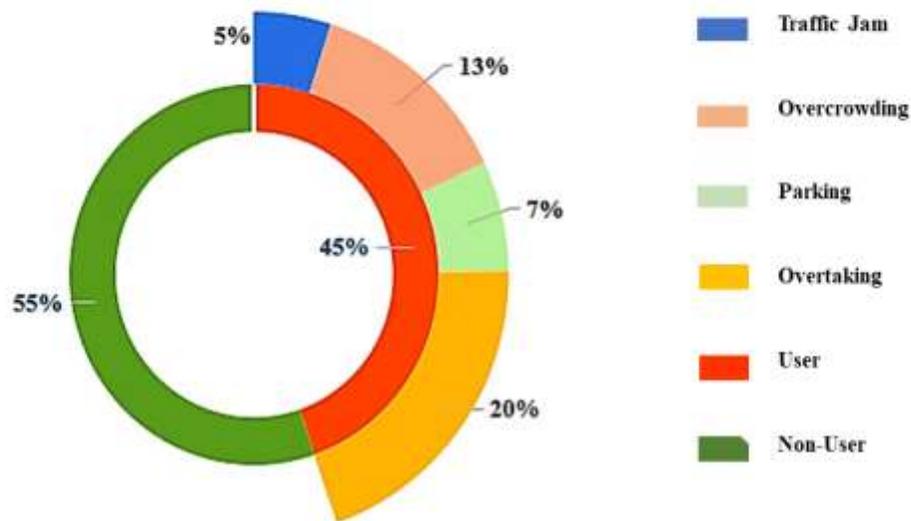
demographic character, drivers aged less than 30 years having educational qualification up to secondary school found to use more hydraulic horn (18% & 31.1% respectively) compare to other group.

Furthermore, motor vehicle drivers living in a family with more than 4 members and having monthly family income of (236.71-355.07) USD are likely to practice more use of hydraulic horn (33.5% & 22.8% respectively) than another groups.

**5.2 Driver’s horn using behavior associated with the situations**

Figure 2 shows that almost late half of drivers (44.7%) stated they use hydraulic horn enormously in overcrowding or overtaking situations; which in

terms, calls for immediate public health attention. Practice of hydraulic horn use among motor vehicle drivers was observed mostly during overtaking or overcrowding (20% & 13% respectively).



**Figure 2:** Hydraulic horn using status with the insight of most horn using situations in Dhaka city (n= 206).

**5.3 Predictors influencing hydraulic honking behavior among the respondents**

Predicting the causes of using hydraulic horn table 3 shows that age group less than 30 years (AOR= 5.19, p= 0.01) with education up to secondary school (AOR= 12.81, p= 0.01) are more likely to practice

use of hydraulic horn compare to other groups. Looking towards experience and behavior of a driver it was observed that drivers having driving experience more than 10 years and non- cooperative drivers use more hydraulic horn than others (Table 2).

Characteristics	Status hydraulic horn use			
	User vs Non-user counter			
	Un-adjusted OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value
<b>Age (in years)</b>				
< 30	3.04 (1.41- 6.57)	0.01*	5.19 (2.09- 12.89)	0.01*
30– 40	2.20 (0.98- 4.96)	0.06	2.04 (0.82- 5.08)	0.13
>40	1			
<b>Educational status</b>				
≤Primary	9.33 (3.17- 27.48)	0.01*	12.81 (4.07- 40.37)	0.01*
≤Secondary	2.20 (0.98- 4.96)	0.18	2.14 (0.96- 4.75)	0.06
≤Higher Secondary	1			
<b>Driving experience (in years)</b>				
≤10	0.54 (0.27- 1.06)	0.07	-	-
>10	1			
<b>Eager to use hydraulic horn</b>				
Yes	0.54 (0.30- 0.96)	0.04*	0.39 (0.19- 0.76)	0.01*
No	1			
Logistic Regression Analysis was used to identify the predictors among the hydraulic horn user group; hydraulic horn non-user group considered as reference category; * Statistical significance at p value ≤0.05.				

**Table 2:** Predictors associated with the behavior of hydraulic horn using status among the drivers of Dhaka city (n= 206).

### 6. Discussion

This study focused on exploring the core determinants and predictors provoking the hydraulic honking behaviors among motor vehicle drivers in the context of Dhaka city, Bangladesh. Hydraulic honking behaviors among the drivers are one of the most predominant public health issues in Indian subcontinent. As hydraulic horn use is one of the major determinants of noise pollution and related health hazards, in that concern our study findings are extremely pertinent to policy makers working in noise pollution mitigation considering such associated provoking factor in transportation sectors.

We found from our study that use of hydraulic horn among the participants is a routine work. It was explored that about half 44.7% were hydraulic horn users of their motor vehicles. Japan reported in a study among 140 drivers, 114 recalled using horn during the driving period which supports our study findings in a large scale [22].

This study guides that significant users of hydraulic horn is an alarming issue regarding the road traffic noise pollution in Dhaka city. Likewise, another study indicated hydraulic horn use is the dominant source of

noise pollution in Dhaka city [3]. Insight the several solutions, implementation of educational interventions and enforcement of existing policies regarding noise pollution and hydraulic honking among the drivers might be proved as best sustainable way out of this situation. Which is also recommended for the dwellers of Dhaka city by other researchers along with the public education and wearing precautionary appliances in the noise originating premises [3].

Concerning on different situation of horn use, it was found that most of them were used in overtaking (20%) and overcrowding (13%) situations and few of them during parking (7%) too. Similar types of honking reasons found in another study conducted in Jamalpur, Bangladesh [11]. However, A different picture found from a study in Bangladesh which suggest that to use of hydraulic horn has a bigger relation with the signal provided by traffic police in different routes. The contributing factors regarding all this is related to waiting time, getting free access from the traffic police and also overtake the vehicles during green signal time [5]. A Korean study suggests that motor vehicles horn mostly used by the drivers due to communication purposes with others drivers, which suggest a positive clue on hydraulic horn uses [23]. A contrast picture found from our study regarding horn use, which was related to drivers' expression of gratitude [24].

Among the motor vehicle drivers in Dhaka city study revealed that 48.5% respondent's age were below [30]. Study result analyzed that respondents belonged <30 years of age (AOR= 5.81,  $p < 0.01$ ) more likely to press hydraulic horn in their nature. Especially younger drivers with  $\leq 10$  years of experience were

more prone to practice hydraulic honking as a result of their reckless driving behavior and eagerness to use hydraulic horn in their vehicle. There is no such previous study found regarding behavior of excessive hydraulic horn use and analyzing the associated predictors.

Moreover, uses of unadjusted and adjusted logistic regression models gives us sort out new predictors on behaviors of hydraulic horn uses among the drivers. Our analysis also indicates being lack of any kind of formal education (AOR= 10.6,  $p < 0.01$ ) and those who were married (AOR= 2.81,  $p = 0.01$ ) showed their gratitude to excessive use of hydraulic horn use in motor vehicles like Bus, Truck, Covered Van, Auto-Rickshaw, tempo etc. A previous study in Jamalpur district of our country suggests that main culprit of road traffic noise (57%) was due to horn use of auto-rickshaw and tempo drivers. It might give the similar picture of behavior of the drivers on hydraulics horn uses [11].

One of the key strengths of this study lies in the wide number of factors considered to drivers' behaviors on hydraulic horn use. The findings might help the policymakers to plan for the specific intervention among the specified driver groups considering the identified predictors associated with the hydraulic honking behavior. It allowed the researchers to find out alternate way through conduction of more specified surveys thus helping minimize environmental health hazards regarding noise pollution too.

## **7. Conclusion**

The unique outcomes of this study represent the

concrete miserable scenario of Dhaka city regarding noise pollution which is still alarmingly dominating our health. Remarkable number of drivers are using hydraulic horn in their vehicles thus more surveys need to combat this issue as well as the consequences. Although, a significant number of approaches has been taken place to ban hydraulic honking in Bangladesh, but still the use is been increasing profusely. Therefore, hydraulic horns should be banned completely through the effective enforcement of existing laws to minimize the health-related consequences due to noise pollution. Effective interventions need to apply considering the predictors associated with the driver's risky behaviors on hydraulic honking to minimize the issue.

### **Funding Source**

No funding sources.

### **Declarations of Interest**

None.

### **Authors' Contributions**

- Nasrin Akter: Conceived and designed the study; tools development; data curation; Formal analysis; Funding acquisition; Investigation; Methodology and interpreted the data; drafted and revised the article.
- Bilkis Banu: Conceived and designed the study; analyzed and interpreted the data; drafted the article; Supervision; Validation done.
- Sujana Haque Chawdhury: Conceived and designed the study; analyzed and interpreted the data; drafted the article.

- Kazi Rakibul Islam: Conceived and designed the study; analyzed and interpreted the data; drafted the article.
- Md. Tanzeerul Islam: Conceived and designed the study; analyzed and interpreted the data; drafted the article.
- Sarder Mahmud Hossain: Conceived and designed the study; analyzed and interpreted the data; drafted the article; Supervision; Validation done.

### **Acknowledgement**

Acknowledgement to the study participants and Northern University Bangladesh.

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