Noise Pollution and its Probable Impacts on Public Health in Dhaka City.

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Abstract : Along with water and air pollution, noise pollution has become a hazard to the quality of life in Dhaka. The noise level in different locations of the metropolitan area exceeds specified standard limits by as much as 20dB. In the "so-called" silent zones, it does not fall below 55dB even in the morning hours. World Health Organization (WHO) identified many adverse effects of long exposure to moderate-level noise or sudden exposure to excessive noise. In Dhaka, the average sound level is 80-110dB in prime areas such as Farmgate, Karwan Bazar, Shahbagh, Gabtoli and Mohakhali Bus Terminal, says the study report. This is almost twice the maximum noise level that can be tolerated by humans -60dB- without suffering a gradual loss of hearing, according to the WHO. Sound pollution and traffic jam are two major problems in most of the city roads of developing cities like Dhaka, Bangladesh. Traffic jam and mixed traffic condition is the major cause of sound pollution on the city roads.The survey indicates that noise results in reduced efficiency and affects individual social behavior. It also causes interference in speech communication and sleeplessness. It appears that, nowadays, people are becoming more aware of the bad impacts of noise pollution and the significance of noise pollution control. But still, there is much work to be done to educate the people in this regard.

Keywords: Noise Pollution, Health Impact Assessment, Annoyance, Cardiovascular Disease, Hearing loss.

1. Introduction

Noise is a "loud and unpleasant" sound that exceeds the acceptable level and creates Annoyance. With urbanization and increasing human activities, the problem of noise pollution in Dhaka, the capital city of Bangladesh, is worsening day by day. Along with water and air pollution, noise pollution has also become a hazard to the quality of life. Noise pollution is a subtle killer. Even a relatively low noise level affects human health

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adversely[1]. In Dhaka, the average sound level is 80-110dB in prime areas such as Farmgate, Karwan Bazar, Shahbagh, Gabtoli, and Mohakhali Bus Terminal, says the study report. This is almost twice the maximum noise level that can be tolerated by humans – 60dB – without suffering a gradual loss of hearing, according to the World Health Organization (WHO).

UN Environment Program *(UNEP, 2022)* report declared Dhaka as the world's noisest city. Against the permissible limits of 55 decibels, as set by the WHO, the noise levels in Dhaka were found to be at least twice that, at 110-132 decibels.75% of noise pollution in Dhaka originates from vehicles[7].

According to the WHO, around 5% of the world population is facing several kinds of health hazards due to complexities related to noise pollution. Around 11.7% of the population in Bangladesh has lost their hearing due to noise pollution, says the DoE study, which was conducted in order to check noise pollution, the government has introduced Bangladesh Sound Pollution (Control) Rules, 2006. According to the guidelines, exceeding the maximum noise level in a certain area is a punishable offense [2, 11].

Also, using a stone breaker machine in a residential area is prohibited, and a permit from the DoE is required to organize any social or religious event that could generate loud noise in a residential area. However, the rules have never been properly implemented anywhere in the country, the study has found. The department of environment occasionally monitors traffic and industrial noise pollution.The major sources of noise pollution in urban areas are traffic and loud horns. The DoE found that in Dhaka, 500-1,000 vehicles honk at the same time when stuck in traffic[5, 7.] Other causes of noise pollution include loud music during social, political, and religious programs, construction work, and factory noise *(DoE, 2018*).

It may cause hypertension, disrupt sleep, and/or hinder cognitive development in children. The effects of excessive noise could be so severe that either there is a permanent loss of hearing and memory or a psychiatric disorder[2]. Besides, World Health Organization (WHO) identified many other adverse effects of long exposure to moderate level noise or sudden exposure to excessive noise. Due to the environmentalist 17th International Congress on Sound and Vibration (ICSV17), Cairo, Egypt, 18-22 July 2010 movements in different countries, some remarkable

initiatives have been taken to check the noise level. For example, the USA has established sites where human-caused noise pollution is not tolerated[3]. Similarly, the European Union prepared 'noise maps' of big cities. The laws of the Netherlands do not permit the construction of houses in areas where 24-hour average noise levels exceed 50dB. In Great Britain and India, the Noise Act empowers the local authorities to confiscate noisy equipment and take legal action against people who create excessive noise at night. Several countries are also investing in newer technology, which can curtail noise pollution. It is reported that most of the dwellers of Dhaka city are not aware of the ill effects of noise pollution. They even do not consider noise a pollutant and take it as a part of routine life[6, 12]. The environmentalist movements here are also not much serious about noise pollution. However, it has been recognized as a pollutant in some recent studies. In Bangladesh, a set of guidelines for regulation and control of noise and for establishing "silent zones" around educational and medical institutions has been formulated in Bangladesh Environment Conservation Act, 1995. Bangladesh High Court gave a ruling on 27 March 2002 banning hydraulic and all sorts of excessively noisy horns in vehicles. In a gazette notification in 2006, the ministry of environment and forest affairs empowered the authorities to confiscate noisy equipment or vehicle and fine people guilty of causing noise pollution [9, 14].

2. Methodology

The data expressed in percentages are analyzed to understand the opinions of the respondents. Noise levels have been measured at ten major locations in Dhaka City from 8 am to 8 pm on working days. The locations are Bangabandhu Sheikh Mujib Medical University (BSMMU), Azimpur, Dhaka Medical College Hospital (DMCH), Science Laboratory, Farmgate, Karwan Bazar, Shahbagh, Gabtoli and Mohakhali Bus Terminal, Dhanmondi, Motijeel, Gulshan, Baily-road, Farm-gate, etc. Almost all the locations are situated in mixed areas whereas few of these are situated in residential and commercial areas. Noise levels have been measured at the roadside as well as at a distance of about 50 m away from the roadside. This is done to analyze the effects of distance and roadside barriers on the reduction of noise levels. Noise levels have been measured at every 1 min intervals and averaged it. The values of these measurements have been recorded as the noise level for the corresponding location. From the recorded values of noise level, noise parameters have been estimated using the equations described earlier.

This study is based on a survey conducted in different areas of Dhaka from January to September 2022. A total of 1874 persons (807 students, traffic police150, driver 147, 241 service-holders, 224 responses human, and 305 Public awareness persons) took part in the survey. The data were collected by using a structured questionnaire selected to understand their opinion. In these areas data were collected with the help of a noise meter (Model–AS 824). These noise meters were activated with batteries. Noise pollution, the problems they experience, and what they feel should be done. The printed question paper along with multiple answers to choose from is distributed among the respondents and no attempt was taken to influence their responses. The data expressed in percentages are analyzed to understand the opinions of the respondents.

Table 2.1: Maximum Noise Levels in Different Areas

Areas	**Maximum noise level (dB)**
Sensitive areas (Education, Hospital, Mosque)	40-50
Residential zones	45-55
Mixed areas	60-70
Commercial areas	65-70
Industrial areas	70-75

Source: Bangladesh Noise Pollution (Control) Rules, 2006.

It is reported that most of the dwellers of Dhaka city are not aware of the ill effects of noise pollution. They even do not consider noise a pollutant and take it as a part of routine life. The environmentalist movements here are also not much serious about noise pollution[3, 8]. However, it has been recognized as a pollutant in some recent studies. In Bangladesh, a set of guidelines for regulation and control of noise and for establishing "silent zones" around educational and medical institutions has been formulated in Bangladesh Environment Conservation Act, 1995. Bangladesh High Court given a ruling on 27 March 2002 banning hydraulic and all sorts of excessively noisy horns in vehicles. In a gazette notification in 2006, the ministry of environment and forest affairs empowered the authorities to confiscate noisy equipment or vehicle and fine people guilty of causing noise pollution.The department of environment

occasionally monitors traffic and industrial noise pollution. The ambient levels of noise for different areas/zones specified in the act are indicated in Table 2.1.

3. Result and Discussion

Accepted levels for noise are set by the type of neighborhood-sensitive, residential, mixed, commercial, and industrial –as well as by the time of day (morning and afternoon). As table 2.1 shows, the range is from 40 to 75 decibels. However, the actual situation in Dhaka city is quite different from the desired one portrayed by the limits of particular interest are the concept of a silent-zone. According to the Ministry of Environment and Forest's Environmental Conservation Rules 1997, as cited by Unnayan Shamannay, "Area within 100 meters of hospital or educational institution or government designed /to be designated specifically institution/ establishment are considered silent zones. Use of motor vehicle horns or other signals and loudspeakers are forbidden in silent- zone." As table 3.1 shows, noise levels around some schools and hospitals far exceed what is allowed by a startling 22 to 38 decibels. A similar situation likely exists as regards most other schools, hospitals, and government institutions in Bangladesh.

Table 3.1: Measured Noise Levels in Some Sensitive Areas of Dhaka

Location (Inside the facility)	Measured noise level average (dB)	
	Morning	Afternoon
Eden Mohila College	69	67
Viqarunnisa Noon School and College	65	57
Willes Little Flower School and College	66	69
Motijheel Ideal School and College	77	72
Curzon Hall (Dhaka University)	87	77
Dhaka Medical College Hospital	89	91
Bangabandhu Sheikh Mujib Medical University	90	95
Ever care Hospital	55	53
Ramna park	57	54

Source: Field survey, 2022

According to table 3.1, it can be observed that the sensitive areas have a maximum sound level of 95 dB in Bangabandhu Sheikh Mujib Medical University followed by Dhaka Medical College Hospital, Curzon Hall (Dhaka University), Motijheel Ideal School and College, Willes Little Flower School and College, Eden Mohila College, Viqarunnisa Noon School and College, Ever Care Hospital, Ramna park. A significantly high amount can cause health issues such as hearing and sleeping problems, and cardiovascular problems/ heart problems.

Table 3.2: Measured Noise Levels in Some Residential Areas of Dhaka

Area	Measured noise level average (dB)
Baily Road Officers Quarter	71
Bashundhara Residential Area	55
Dhaka University Residential Area	47
Cantonment Area	43
Gulshan -1	68
Azimpur Residential Area	74

Source: Field survey, 2022

According to table 3.2, it can be observed that the residential areas have a maximum sound level of 74 dB in Azimpur R/A and a minimum sound level of 43 dB in the Cantonment area, a significantly high amount that can cause health issues.

Table 3.3: Noise Levels in Selected Mixed Areas of Dhaka

Area	Measured noise level average (dB)
Baily Road	98
Mirpur -11	115
Dhanmondi -27	97
Dhaka University	87
Uttara -12	79
Mohakhali Bus Stand	105
Hazrat Shahjalal International Airport	107
Karwan Bazar	103
Gabtoli	112
Science Laboratory	94
Shahbagh	108
Farmgate	117

Source: Field survey, 2022

According to table 3.3, it can be observed that a maximum mean sound level is found at Farmgate (mean =117dB) followed by Mirpur -11 (mean=115dB), Gabtoli (mean =112dB), Shahbagh (mean=108dB), Hazrat Shahjalal International Airport (mean=107dB), Mohakhali bus stand (mean =105dB). A mixed area according to the DoE must have sound limits of 60 -70dB. But the researchers found a high ervalue than the DoE value. If more than 100 dB of sound is exposed to anyone for 15 minutes, it could result in temporary hearing loss. A 120 dB sound could result in permanent hearing loss. A significantly high amount can cause health issues and also impact the economy.

Table 3.4: Responses of Human on Noise Pollution Level, Sources and Impacts

Sex		Male and Female	
Age, Yrs.		Below 30	30-40
Respondent (total 224)		70	154
Noise level	Tolerable	3(6%)	14 (9%)
	Intolerable	67(96 %)	140 (91%)
Daily variation	Morning	26(37%)	40(26%)
	Afternoon	44(63 %)	59(38%)
	Evening	32(46%)	55(36%)
Sources of noise	Vehicle/horn	35(50 %)	59(38%)
	Machinery	12(17 %)	30(20%)
	Loudspeaker	16(23 %)	45(29%)
	Others	7(10%)	20(13 %)
Effect on environment	Severe	63(90%)	138(90%)
	Medium	7(10%)	16(10%)
	None	0(4%)	0(0%)

Source: Field survey, 2022

The responses to the questions on the level and sources of noise pollution and its impact on the environment are summarized in Table 3.4. It is seen that 91% of the 224 respondents answered that the noise level in Dhaka is intolerable and the level is high all day long. However, the majority of them feel that the noise level in the evening is the highest during the day. Vehicle horns are identified as the principal source of noise pollution in the city by more than 50% of the respondents. Other major sources include machined loudspeakers (23%). Other major source machineries (17%) and other functions (10%). There is a scope for the reduction of noise pollution in Dhaka by improving traffic management. Regarding the impact of noise on environmental

pollution, 90% think that the impact is severe. The rate of noise pollution in Dhaka city is alarming.

Table 3.5: Effects of Noise Pollution on Traffic Police, Driver

Sex	Traffic police			Driver		
Age,Yrs.	Below 30	30-40	40-50	Below 30	30-40	40-50
Respondent (total) 297	25	73	52	35	77	35
Loses of attention and performance	10 (40%)	23 (32%)	7 (13%)	14 (40%)	23 (29%)	8 (23%)
Insomnia. stress - related illness	3 (12%)	11 (15%)	15 (29%)	7 (20%)	11 (14%)	5 (14%)
High blood pressure	2 (8%)	12 (16%)	10 (19%)	3 (8%)	16 (21%)	7 (20%)
Hearing and sleeping disturbance	6 (24%)	17 (23%)	7 (13%)	8 (23%)	19 (25%)	8 (23%)
Annoyance and aggression	3 (12%)	7 (10%)	8 (16%)	2 (6%)	6 (8%)	3 (8%)
Cardiovascular problems/ heart problems	1 (4%)	3 (4%)	5 (10%)	1 (3%)	2 (3%)	4 (12%)

Source: Field survey, 2022

The World Health Organization (WHO) has documented seven categories of adverse health effects of noise pollution on humans which are: hearing loss, interference in speech communication, sleep disturbance, cardiovascular and physiological effects, mental health disturbance, impaired task performance, negative social behavior and, annoyance. These are grouped into 6 groups as shown in Tables 3.5, 3.6, and 3.7. The respondents are asked to choose the kind of problem he/she is facing due to noise pollution. The identified most dominant problems caused by noise pollution are loss of attention and performance in study or job and bad temper/annoyance, hearing and sleeping disturbance. Both are, in fact, interrelated. It isdifficult for a disturbed mind to concentrate ona job and perform properly.

Significantly, among the Traffic police, Drivers interviewed, almost all of both said that hearing loss, interference in speech communication, sleep disturbance, mental

health disturbance, negative social behavior and annoyance. They face a family crisis. About 9% of traffic police are at risk of permanent hearing loss, while 20% are suffering from temporary hearing problems due to acute noise pollution. About 10 % of drivers are at risk of permanent hearing loss, 17% are suffering from temporary hearing problems, 7% high blood pressure due to acute noise pollution.

Table 3.6: Effects of Noise Pollution on Service-holders

Sex	Male and Female			
Age,Yrs.	Below 30	30-40	40-50	Over 50
Respondent (total 241)	25	73	90	53
Loses of attention and performance	10 (40%)	23 (32%)	21 (23%)	12 (23%)
Insomnia. stress -related illness	3 (12%)	11 (15%)	11 (12%)	10 (19%)
High blood pressure	2 (8%)	12 (16%)	1 5(17%)	11 (21%)
Hearing and sleeping disturbance	6 (24%)	17 (23%)	23 (26%)	13 (24%)
Annoyance and aggression	3 (12%)	7 (10%)	12 (13%)	2 (4%)
Cardiovascular problems/ heart problems	1 (4%)	3(4%)	8 (9%)	5 (9%)

Source: Field survey, 2022

Significantly, among the service-holders interviewed, almost all of both said that hearing loss, interference in speech communication, sleep disturbance, cardiovascular and physiological effects, mental health disturbance, impaired task performance, negative social behavior and annoyance. About 15% of service-holders are at risk of insomnia, and stress-related illness, while 24% are suffering from temporary hearing problems due to acute noise pollution.

Table 3.7: Effects of Noise Pollution on Students

Sex	Male			Female		
Age,Yrs	Below 15	15-20	20-25	Below 15	15-20	20-25
Respondent (total 807)	70	175	110	50	171	231
Loss of attention and performance	21 (30%)	51 (30%)	23 (21%)	10 (20%)	69 (40%)	97 (42%)
Insomnia & stress -related illness	11 (16%)	32 (18%)	19 (17%)	8 (16%)	25 (15%)	39 (17%)
A problem in speech communication	15 (22%)	39 (22%)	24 (22%)	12 (24%)	27 (16%)	32 (14%)
Hearing and sleeping disturbance	13 (18%)	40 (23%)	29 (26%)	14 (28%)	31 (18%)	42 (18%)
Annoyance and aggression	10 (14%)	13 (7%)	15 (14%)	6 (12%)	19 (11%)	21 (9%)

Source: Field survey, 2022

Significantly, among the service-holders interviewed, almost all of both boys and girls said that their studying is disturbed by honking and building construction sounds. While the survey could not measure the extent of the disturbance, the finding is certainly troublesome- that the ability of students to concentrate on their studies is regularly affected by noise pollution. About 30% of students are at risk of loss of attention and performance, 16% of insomnia, and stress-related illness, while 23% are suffering from temporary hearing problems due to acute noise pollution.

Table 3.8: Public Awareness on Noise Pollution

Questions Respondent (total 305)	Options	Response	
		Number	Percentage
Do you think that people are aware of the adverse effects of noise pollution	Yes, aware No, not aware More or less aware	100 165 40	33% 54% 13%
What are the measures to be taken by the government?	Noise control act Include in curriculum Regulate horn Regulate loudspeaker Noise -free zone	77 40 70 60 58	25% 13% 23% 20% 19%

Source: Field survey, 2022

Table 3.8 summarizes the responses to the questions related to public awareness of noise pollution and the possible actions to reduce noise pollution. It is not surprising that major of the respondents (54%) told that the public is not aware of the ill effects of noise pollution. About 33% of respondents told that the public is aware of the ill effects of noise pollution. This implies that the mindset of Dhaka dwellers is still not proactive. While admitting that the noise pollution level is serious and affects them in various ways, people still look forward to the government for action against noise Pollution. It implies that People are not visualizing noise pollution as a serious hazard, although they are experiencing a high level of noise pollution every day. However, a close inspection of the responses to the other questions reveals that people prefer to depend on government action/ programs against noise pollution. Developing self, self-awareness informal education is chosen only by a quarter of the respondents.

Recommendations

* Make a conscious effort, and/or instruct your drivers, to honk as little as possible.

* Work with others in your neighborhood (home/ office) to control noise pollution.

Post a sign banning honking, and ask those who work outside to help enforce it. If a special source of noise is present- such as a shop selling music, or a brick-breaking machine –approach the owner as a group, and demand that the noise be reduced.

* Ban industrial activity in urban areas. This would have a double benefit: reduce both noise andair pollution.

* Visit neighborhood schools, and give the teachers and students leaflets about noisepollution and the need to reduce it.

* Work with media, or personally write a letter or article, about noise pollution. Stress the damages it causes, the need to reduce it through our own actions, and the importance of having strong noise pollution laws, to make Dhaka a more livable city.

* Try to get a local camera or cable TV station to air ads for free or with minimal cost, on the importance of action to reduce noise pollution.

Conclusion

Noise pollution is a serious and neglected issue in Dhaka and throughout Bangladesh. It is reported that most of the dwellers of Dhaka city are not aware of the ill effects of noise pollution. They even do not consider noise a pollutant and take it as a part of routine life. The environmentalist movements here are also not much serious about noise pollution. However, it has been recognized as a pollutant in some recent studies.It is time for NGOs,the media, and the Government of Bangladesh to work together to reduce the problem and increase the quality of life in this country. This paper presents the results of a survey conducted to explore the sources, effects, reactions, and suggestions for controlling excessive noise in Dhaka city. It investigates the people's perception of the status of noise pollution levels in Dhaka. The survey indicates that the noise pollution level is perceived to be high all day long and the principal source of noise pollution is vehicle horns. It also reveals that noise results in reduced efficiency and causes annoyance or bad temper, interference in speech communication, sleeplessness, etc. Nowadays people are becoming more aware bad impacts of noise pollution and the significance of noise pollution control. However, this much awareness is not enough to make them proactive in taking steps to abate this problem.

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