



A Study on Noise Pollution of Gazipur City Corporation

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Abstract

The study was conducted in 4 industries, 4 bus stands and 3 hospitals/clinics through interviewing of workers, staffs of the industries and traffic polices, drivers, passersby, road nearest shopkeepers and patients, nurses, staffs, doctors and other peoples of the medical institutes. Environmental multi-function meter was used to measure the noise intensity (dB) as instrumental survey. From the study it was found that in the industrial sector minimum noise level was 84.71 dB and maximum noise level was 105 dB, in the hospitals/clinics minimum noise level was 75 dB and maximum noise level was 89 dB and in the traffic places minimum noise level was 78 dB and maximum noise level was 107 dB which were crossed the standard level of noise. The traffic places, medical institutes and industries of Gazipur City Corporation were in critical condition in the cases of noise pollution. The major causes of noise pollution in industries were using of old machines, lack of engineering controls, lack of knowledge of authority of the industries about the impact of noise pollution, poor maintenance of the tools, building design and lack of noise reducing instruments. Questionnaire survey determined the noise related health impacts on respondents. The common impacts of noise pollution which they suffered from were headache, heart diseases, hypertension and hearing problem.

Key words: Gazipur, Noise level, Noise pollution

Introduction

Environmental pollution has been described as the contamination of the environment by biological, chemical, and or physical agents that are harmful to human, animal or plant life and the general environment and may arise through the natural events, industrial and human activities or the interaction of all (Otukong, 2002). The word noise comes from the Latin word 'nausea' meaning seasickness. Noise is unacceptable level of sound that creates annoyance, hampers mental and physical peace, and may induce severe damage to the health. The source of most outdoor noise worldwide is transportation systems, including motor vehicle noise, aircraft noise and rail noise. Poor urban planning may give rise to noise pollution, since side-by-side industrial and residential buildings can result in noise pollution in the residential area. Other sources of indoor and outdoor noise pollution are car alarms, emergency service sirens, office equipment, factory machinery, construction work, grounds keeping equipment, barking dogs, appliances, power tools, lighting hum, audio entertainment systems, loudspeakers and noisy people. The level of noise pollution is very closely related with urbanization and motorization. Although there are many sources of noise, which include industries, construction works and indiscriminate use of loud speakers, motorized traffic is the principal source of creating noise. Disturbances created by noise may cause hypertension, headache, indigestion, peptic ulcer, pharyngitis, atherosclerosis, bradycardia and ectopic beat (Papacostas and Prevedouros, 1993; Kadiyali, 1997). According to Ahmed (1998), exposure to high level of noise causes severe stress on the auditory and nervous system. Along with the

increasing degree of air and water pollution, noise pollution is also emerging as a new threat to the inhabitants of Gazipur city Corporation. Exposure to high level of noise may cause severe stress on the auditory and nervous system of the urban dwellers, particularly the children. The study aims to determine the level of noise pollution in Gazipur city Corporation and analyzing its level of severity.

Materials and Methods

Study area

Gazipur City Corporation is the Largest City Corporation of Bangladesh and one of the most nearest City Corporation of the capital city Dhaka. It is located at 23° 59' 20" N and 90° 22' 30" E. Gazipur City Corporation: (in short: GCC) established at 16 January in 2013, is one of the city corporations of Bangladesh. Before its establishment as City Corporation, it was a municipal corporation. The total area of this City Corporation is 329.23 sq. kilometers with approximately 25, 00,000 populations. It has 57 wards (proposed) and Ward Councilor 76 (Male-57, Female-19) (proposed).

Data collection

The research was carried out on the bases of primary and secondary data. In this research, different methodologies as well as interview with local people, questionnaire survey, focus group discussion (FGD) was applied for the data collection. The electronic and web based information were used for data collection.

Primary data collection

Primary data were collected in two ways

- a. Instrumental survey
- b. Questionnaire survey

a. Instrumental survey

The measurement of noise levels in different industries, traffic places and hospitals/clinics of Gazipur city corporation area were carried out between the periods from 9am to 5pm with the help of noise meter (Multi-Function Environmental Meter, Model:ST-8820, Made in China) which consists of a microphone that converts the pattern of sound pressure fluctuations into a similar pattern of electric voltage, amplifiers and a voltage meter that is normally calibrated to read in decibel.

Measurement Range

- i) $L_o=35\sim 100\text{dB}$
- ii) $H_i=65\sim 130\text{dB}$ (Frequency Weighting: A, C)

Sound level meters are usually equipped with weighting circuits which filter out selected frequencies. It has been found that the A-scale on a sound level meter best approximates the frequency response of the human ear.

The most common measure of sound level is sound intensity and pressure. Sound intensity is the average rate of sound energy transmitted through a unit is perpendicular to the direction of the sound propagation, typically measure in Pico-watts per square meter. Sound pressure levels measured on the scale of a sound meter are abbreviated dB. The sound level in decibel is defined as follows:

$$\begin{aligned} \text{Sound level (dB)} &= 10 \log_{10} \left(\frac{P}{P_0} \right)^2 \\ &= 20 \log_{10} \left(\frac{P}{P_0} \right) \end{aligned}$$

Where,

- P = Root-mean square sound pressure
- P_0 = Standard reference pressure corresponding to the weakest audible sound (20 micro Newton) per square meter.

b. Questionnaire survey

Data were collected through in depth interview from the randomly selected respondents of workers and stuffs of industries, doctors, nurses, and patients of hospitals/clinics, passersby, vehicle staffs of traffic places by the open-ended and close-ended questionnaire. The noise level was collected in three sectors (i) industries (ii) traffic places (iii) medical institutes. The randomly selected industries were (i) Posmi Sweaters Ltd Chandana , Gazipur, (ii) The Delta Carton Industries, Konabari,(iii) JM future knit fashion, Konabari,(iv) MI knit wear, Konabari, medical institutes were (i) Zilla sadar hospital ,Gazipur,(ii) Konabari clinic and diagnostic centre unit (iii) Lab view diagnostic, Konabari and traffic places were (i)Joydebpur bus stand (ii) Chaurasta bus stand (iii)Konabari bus stand (iv) Konabari bscic gate. At first maximum noise level in every hour was measured then average noise level was calculated from these places.

Secondary data collection

For this study, secondary data were collected from different offices, noise pollution related journals, books, literatures, reports, thesis papers and websites.

Data processing, analysis and interpretation

The collected data were processed and analyzed by computer based software such as MS Excel and data were interpreted in different technique such as tables, graphs and pie diagrams.

Results and Discussion

Sources of noise in study area

Table 1 shows many sources of noise in industries, traffic places, residential areas, educational institutes, medical institutes which has many negative impacts on public health etc.

Table 1. Sources of Noise in the Study Area (Source: Field survey, 2014)

Type of the Institutes	Major Sources
Industries	Finishing machines, Auto machines, Preparatory machines, Ring fan, Spreader machines, Rolling machines, Sewing
Traffic place	Bus, Tracks, Auto rickshaw and other motor based vehicles.
Medical institute	Patient`s sound, Testing instruments.

Noise Levels (dB) of the selected industries

Posmi Sweaters LTD Chandana , Gazipur

Table 2 shows Noise Level of Posmi, Sweaters LTD, Chandana, Gazipur. Posmi sweaters Ltd is the industries which has nine floor spaces and produces various types of products besides sweaters. In the knitting floor at 14pm-15pm noise level was 88 dB which was the highest in this section, the highest

noise level was 95.7dB at 14 pm- 15pm in the linking floor, in near the generator at13 pm-14pm the highest noise level was 105dB, and in the weaving floor at14 pm-15 pm the highest noise level was 100.03 dB. It was noticed that generator chamber and weaving floor created more noise intensity.

Table 2. Noise Level (dB) of the Posmi Sweaters LTD Chandana, Gazipur

Sample Location of the Industries	Time	Noise Level (dB)	Average	Standard(dB) (Day Time)
Knitting floor	11am-12am	82	93.73	75
	12am-13pm	87		
	13pm-14pm	81.02		
	14pm-15pm	88		
Linking floor	11am-12am	93.5		
	12am-13pm	88		
	13pm-14pm	90		
	14pm-15pm	95.7		
Generator	11am-12am	100		
	12am-13pm	103		
	13pm-14pm	105		
	14pm-15pm	102.5		
Weaving	11am-12am	92		
	12am-13pm	97		
	13pm-14pm	95.07		
	14pm-15pm	100.03		

(Source: Field survey, 2014)

The Delta Carton industries, Konabari and JM Future Knit Fashion, Konabari

The highest noise level was 92 dB in the working place at 12am-13pm and 82.3dB in the gate at 10am-11am in the Delta Carton industry (Table 3). It is noticed that working place was the more noise

intensity place. The highest noise level was 92.09 dB in the working place at 13pm-14pm and 82.40dB in the gate at 10am-11am in JM Future Knit Fashion industry.

Table 3. Noise Levels (dB) of The Delta Carton Industries, Konabari and JM Future Knit Fashion, Konabari

Sample Location of the Industries	Time	The Delta Carton Industries, Konabari		JM Future Knit Fashion, Konabari		Standard(dB) (Day Time)
		Noise Level(dB)	Average (dB)	Noise Level (dB)	Average (dB)	
Working place	9am-10am	89	83.96	89.59	83.51	75
	10am-11am	89		89		
	11am-12am	88		88		
	12am-13pm	92		88		
	13pm-14pm	87		92.09		
	14pm-15pm	88		88		
	At gate	9am-10am		80.2		
10am-11am	82.3	82.40				
11am-12am	77	77				
12am-13pm	78	77				
13pm-14pm	78	79				
14pm-15pm	79	77				

(Source: Field survey, 2014)

MI Knit Wear, Konabari

The highest noise level was 96 dB in the working place at 13pm-14pm, 14pm-15pm and 83dB in the

gate at 13pm-14pm and 14pm-15pm in this industry.

Table 4. Noise Level (dB) of MI Knit Wear, Konabari

Sample Location of the Industries	Time	Noise Level (db)	Average	Standard(dB) (Day Time)
Working place	9am-10am	88	87.16	75
	10am-11am	90		
	11am-12am	92		
	12am-13pm	92		
	13pm-14pm	96		
	14pm-15pm	96		
	At gate	9am-10am		
10am-11am		82		
11am-12am		82		
12am-13pm		82		
13pm-14pm		83		
14pm-15pm		83		

(Source: Field survey, 2014)

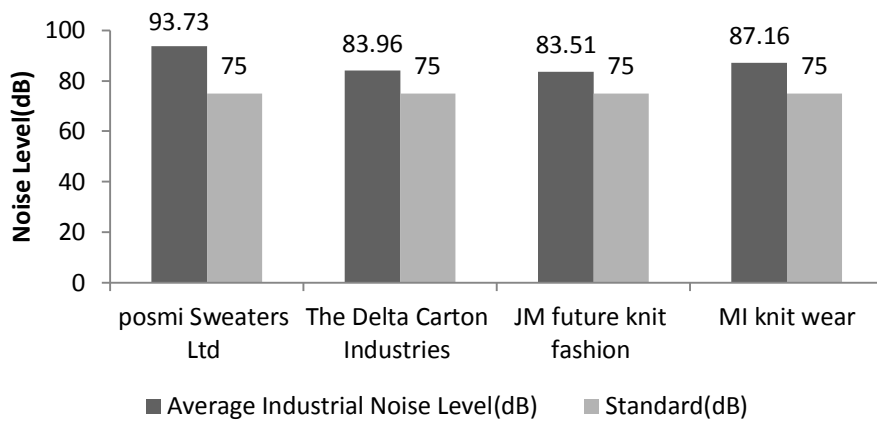


Fig.1. Average Noise Levels (dB) of the Selected Industries

The above figure shows that the industries existing average noise level was very high from standard level (75dB) which has adverse effect on public health. The average noise level was respectively

93.73 dB, 83.96dB, 83.51dB and 87.16dB in posmi Sweaters Ltd Chandana Gazipur, The Delta Carton Industries Konabari, JM future knit fashion Konabari and MI knit wear, Konabari.

Noise levels of Hospitals/Clinics

Zilla sadar hospital

The highest noise level was 77dB in indoor at 9am-10am, 89dB in outdoor at 11am-12am and 72dB in emergency at 9am-10am in Gazipur sadar hospital

(Table 5). The average noise pollution of outdoor was more than indoor and emergency division due to more public gathering here.

Table 5. Noise Level of Zilla Sadar Hospital

Time	Indoor (dB)	Outdoor (dB)	Emergency (dB)	Total Average (dB)	Standard(dB) (Day Time)
9am-10am	77	82	72	73.57	45
10am-11am	73	82	67		
11am-12am	69	89	69		
12am-13pm	72	85	69		
13pm-14pm	69	76	66		
14pm-15pm	69	74	66		
Average	71.2	81.33	68.16		

(Source: Field survey, 2014)

Konabari Clinic and Diagnostic Centre Unit and Lab View Diagnostic, Konabari

The highest noise level was 73dB in indoor at 9am-10am, 82dB in outdoor at 11am-12am and 75dB in emergency at 11am-12am in Konabari Clinic and Diagnostic Centre Unit (Table 6). The highest noise

level was 67dB in indoor at 11am-12am, 12am-13pm, 13pm-14pm, 78dB in outdoor at 12am-13pm and 75dB in emergency at 11am-12am in Lab view diagnostic, Konabari.

Table 6. Noise Level of Konabari Clinic and Diagnostic Centre Unit and Lab View Diagnostic, Konabari

Time	Konabari Clinic and Diagnostic Centre Unit				Lab View Diagnostic, Konabari				Standard (dB) (Day Time)
	Indoor (dB)	Outdoor (dB)	Emergency (dB)	Total Average (dB)	Indoor (dB)	Outdoor (dB)	Emergency (dB)	Total Average (dB)	
9am-10am	73	77	67	68.94	65	75	67	69.22	45
10am-11am	65	80	67						
11am-12am	65	82	75						
12am-13pm	67	69	68						
13pm-14pm	62	66	65						
14pm-15pm	62	66	65						
Average	65.67	73.33	67.83		65.33	74.5	67.83		

(Source: Field survey, 2014)

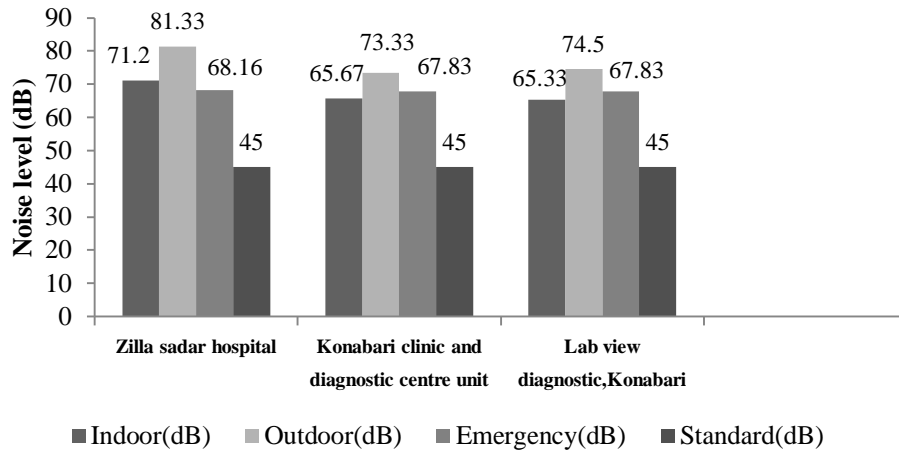


Fig. 2. Average Indoor and Outdoor Noise Level of Selected Hospitals and Clinics

From the figure it is evident that zilla sadar hospital is very polluted by noise due to huge population gathering. Outdoor is noisier than indoor and emergency division. The average noise levels of

indoor, outdoor and emergency divisions of selected hospitals and clinics were higher than the standard level (45dB) of noise.

Noise levels of the selected traffic places

Joydebpur bus stand, Chaurasta bus stand, Konabari bus stand and Konabari basic gate

The highest noise level was 107dB at 14pm-15pm in joydebpur bus stand which was more than the standard level of noise due to a lot of vehicles run

in this time. Chaurasta bus stand is very noisy bus stand in Gazipur City Corporation. The highest noise level was 102dB at 13pm-14pm in this bus stand.

Table 7. Noise Levels of the Selected Traffic Places

Time	Joydebpur Bus Stand		Chaurasta Bus Stand		Konabari Bus Stand		Konabari Basic Gate		Standard (dB) (Day Time)
	Noise Level (dB)	Average (dB)	Noise Level (dB)	Average (dB)	Noise Level (dB)	Average (dB)	Noise Level (dB)	Average (dB)	
9am-10am	95.3	102.22	90	99.83	93	100.6	94	100.5	70
10am-11am	100		99		99		99		
11am-12am	105		100		102		99		
12am-13pm	103		100		102		103		
13pm-14pm	103		102		103		103		
14pm-15pm	107		106		105		105		

Source: Field survey, 2014

The highest noise level was 105dB at 14pm-15pm in konabari bus stand. Konabari basic gate is another noisy bus stand in Gazipur City

Corporation. The highest noise level was 105dB at 14pm-15pm in konabari Basic Gate.

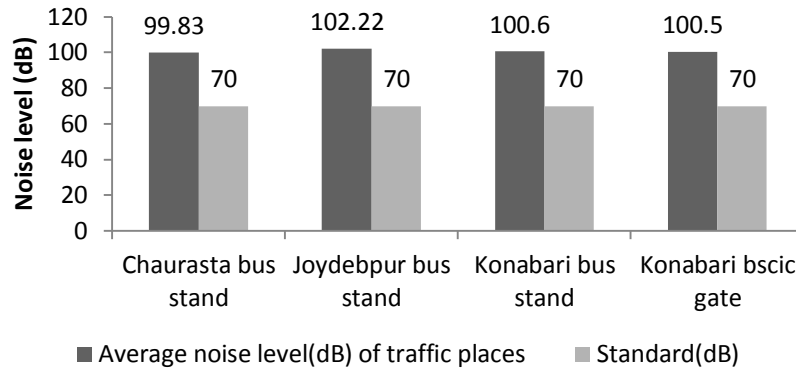


Fig. 3. Average Noise Levels of the Selected Traffic Places

From the figure 3 it is noticed that every bus stand crossed the standard level (75 dB). The average noise level of joydebpur bus stand was higher level

than other selected bus stands due to a lot of vehicles circulation in this place.

Effects of noise pollution on public health

Health status of workers, staffs of selected industries

8 workers and 5 staffs were asked about their health condition. Of them 3% were suffered from more heart beat, 9% were suffered from drowsiness, 62%

were suffered from headache, 26% were suffered from hearing problem (Fig. 4).

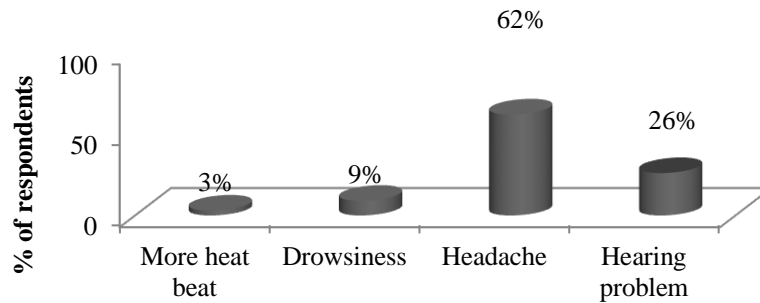


Fig. 4. Health Condition of Respondents due to Noise Pollution in the Working Places.

Health status of traffic polices, vehicle staffs, passengers and others of selected traffic places

5 Passersby, 2 traffic polices, 4 vehicle staffs, 4 roads nearest shopkeepers were asked about their health condition in this survey. Of them 10% were

suffered from more heart beat, 15% were suffered from hypertension, 25% were suffered from sleep disturbance, 55% were suffered from heart problems, 20% were suffered from hearing problems (Fig. 5).

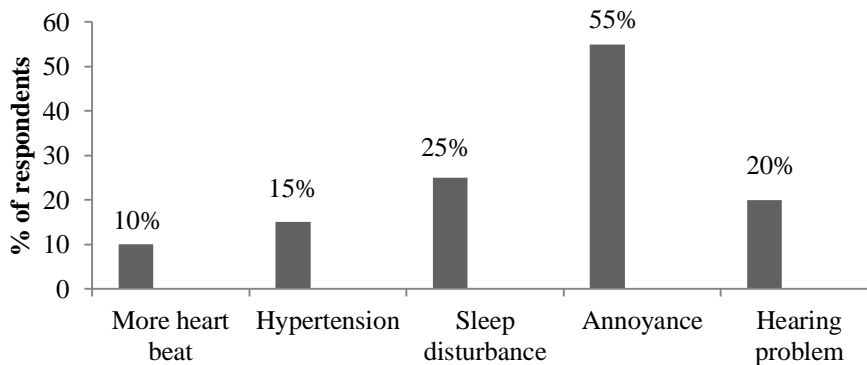


Fig. 5. Health Condition of Respondents due to Noise Pollution in the Traffic Places

Health status of patients, nurses, and doctors of selected hospitals/clinics

3 Doctors, 3 nurses, 5 patients were asked about their health condition in this survey. Of them 80% were suffered from annoyance, 10% were suffered from hypertension, 2% were suffered from sleep

disturbance, 2% were suffered from hearing problem, 6% were suffered from psychiatric disorders (Fig. 6).

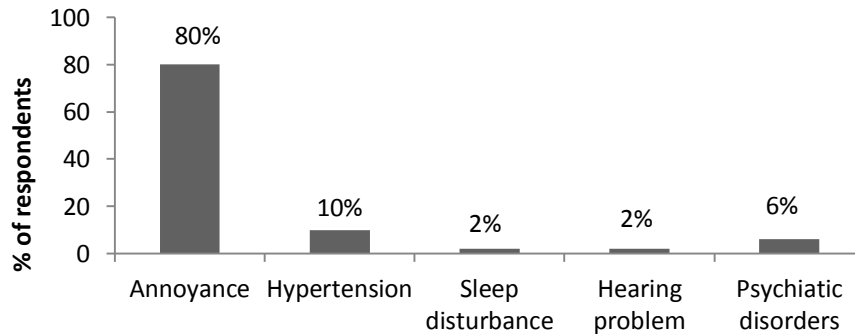


Fig. 6. Health Statuses of Respondents due to Noise Pollution in the Hospitals/ Clinics

Conclusions

This research has been completed through industries, traffic places, and hospitals/clinics. In the every cases noise intensity crossed the standard level and occurred adverse effect on respondents health such as more heartbeat, hypertension, hearing problem and sleep disturbance etc. Average

noise level of hospitals/clinics was 70.54dB, industries were 87.09 dB, and traffic places were 100.79 dB, which were excess than the standard noise level.

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