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Noise pollution level in central and South Kolkata, West Bengal

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Abstract
A study has been conducted to observe the level of noise pollution in different parts of Central Kolkata and South Kolkata residential areas. The survey was conducted during January to December 2014 and 2015. The results indicates that the noise pollution levels exceeds the recommended permissible limits at Central Kolkata, (studied area: Baubazar market, Chittaranjan Avenue Junction, Ganesh Chandra Avenew, Chandni Chawk, and Hare Street) compared to South Kolkata (studied area: Tollygunge, Taratalla and NewAlipur). The increasing rate of noise pollution causes adverse impacts on human health such as insomnia, hearing loss, reducing efficiency, sexual impotency, cardio vascular, respiratory and neurological damages and shortening the period of human life. To combat this rising problem, implementation of noise pollution control strategy has been suggested by adopting appropriate measures on affected noise pollution sites.

Keywords: environmental impacts, noise, pollution, noise level, road traffic, noise index

Introduction

The environmental pollution deals with unfavorable alteration of our surroundings or any change in our surrounding environment, which contributes to its deterioration (Keller, 1976) [11]. The problems are universal, both in the developed as well as developing countries. It is definite that at present, the air over urban and industrial centers is no longer breathable, the rivers and streams flowing past cities and towns have been fouled by the sewage and toxicants, the agricultural soils have been poisoned and the landscape has marred by heaps of ugly garbage and unwanted sound (noise) can damage psychological and physiological health. (Gouxia *et al*., 2006) [10]. As a matter of fact, Noise pollution is a growing problem, and all human activities contribute to noise pollution to varying extent and has become a hazard to quality of life. Definition given in the ILO Convention No. 148 is the term noise covers all the sound, which can result in hearing impairment or be harmful to health or otherwise dangerous (Garg, 2007) [9].

To find the sources of noise pollution, in true sense, all indoor or outdoor activities like, crowded cities, mechanized means of transport road traffic, jet planes, garbage trucks, construction equipment, manufacturing processes, lawn mowers, loud speakers, industries and festivals are the major sources of this unwanted sound that are routinely broadcasted in to the air act as noise pollution (Birgitta and Lindvall 1995 [4]; Dix 1981 [8]; Ali Mensoor and Tiwari, 1989) [2]. In addition to these the environmental disasters also causes major noise pollution.. In the present scenario noise is becoming an increasingly widespread and serious source of discomfort and danger which increasingly prejudicing social life and in some instances hearing capacity. Though noise pollution is a slow and subtle killer, yet very little efforts have been made to ameliorate the same Table 1. (Bhargawa, 2001) [3] indicates the adverse effects of noise pollution. Kiernan (1997) [12] finds that even relatively low levels of noise affect human health adversely; it may cause hypertension, disrupt sleep or hinder cognitive development in children. The effects of excessive noise could be so severe, may cause, permanent loss of memory or a psychiatric disorder (Bond, 1996) [6]. Sudden and unexpected noise has been observed to produce marked changes in the body, such as increased blood pressure, increased heart rate, and muscular contractions. Moreover, digestion, stomach contractions, and the flow of saliva and gastric juices all stop.

In India, the problem of noise pollution is wide spread. As a result it is responsible for rising incidence of deafness among the inhabitants (Bhargawa, 2001) [3].Several studies report that noise level in metropolitan cities exceeds specified standard limits. A study by Singh and Mahajan (1990) [14] conducted in Delhi and Calcutta, found that the noise level is 95dB as against the ambient limit of 45dB. Even at the "calm" places, it does not fall below 60dB. Murli and Murthy (1983) [13] also found that traffic noise in Vishakhapatanam exceeds 90dB even in morning hours that acts as a source of nuisance.

The seriousness lies in the fact that, repeated exposure to unexpected noise creates changes, which ultimately becomes induced in him and the person gets accustomed to that level (Broadbent, 1957) [5]. This calls for correct assessment of the noise problem and application of various administrative, engineering and medical control measures. To measure the intensity of the noise pollution accurate measurement during daytime and night time is most important. The noise is commonly measured as sound intensity that is determined in terms of the pressure of sound waves on the eardrums, and the scale is logarithmic (Agarwal and Jagetia, 2001) [1]. Loudness of sound corresponds to the degree of sensation depending on the intensity of sound and the sensitivity of the ear (Garg *et.*

al., 2007) [9]. The unit of sound intensity measurement is decibel (dB) and each decibel rise depicts ten-fold increase in sound intensity.

Table 1: denotes the effects of acute noise pollution (Bhargawa, 2001).

Effects of Noise pollution	dB
Maximum for impulse noise	135
Maximum for instantaneous noise	150
Ear-drum rupture	180
Lung damage	194

Material method

Noise Pollution Analysis

Noise comprises those sounds occurring around us that are not part of the environment under consideration. It is also a type of pollution and keeps bad impacts on our health and wellness and the ability to do productive work. To combat noise pollution and identify the effect of the pollution, noise should be measured properly, by studying the intensity of the pollution and make people aware about it. Noise is commonly measured as sound intensity that is determined in terms of the pressure of sound waves on the eardrums, and the scale is logarithmic (Agarwal and Jagetia, 2001) [1] and loudness of sound corresponds to the degree of sensation depending on the intensity of sound and the sensitivity of the ear (Garg *et. al*.,2007) [9]. The unit of sound intensity measurement is decibel (dB) and each decibel rise depicts ten-fold increase in sound intensity.

The present study was conducted at different sites of Central Kolkata, (studied area: 1.BauBazar market, 2.Chittaranjan Avenue, 3.Baithakkhana Bazar, 4.Ganesh Chandra Avenew, 5. Central Avenue, 6.S. T. Road, 7. Hare Street, 8. B.B. Ganguli St, 9. Mahatma Gandhi Road, 10. N.S. Road) and in South Kolkata (studied area: 11.NewAlipur 12.Taratalla and 13.Tollygunge) during January to December 2014 and 2015. The sound level meter (which is a basic tool in measuring sound) was used to measure noise level within 24 minutes in a location for taking 1 reading, when noise level was consistent for 5 seconds. Reading was instantaneously tabulated. At a time twenty four sample reading was taken per month and prepared the average value chart. The sound level meter was used in high, medium and slow response setting and the instrument was used to record readings in dB mode.

Results

Present study identifies that the noise pollution levels at 5.Central Avenue. 6. S. T. Road**.** 7. Hare St 3.Baithakkhana Bazar: 4. Ganesh Chandra Avenue are more than the permissible limits (Figure 1). Results when correlated with Table 2. Valdiya, (1987) supports the fact. The study reveals the intensity of noise raised abnormally higher in some residential area in South and Central Kolkata during festival.

Table 2: Permissible Limits of Noise Levels (Environment (Protection) Act, 1986 as amended in 2002: Valdiya, 1987.). *The limit in dB denotes the time-weighted average of the level of sound in decibels on Scale A which is relatable to human hearing.

	Station	*dB
1.	Road traffic near residential areas	70
2.	Noise on sites of construction	70
3.	Factory (where workers spend eight hours a day)	90
4.	Threshold of pain (duration 20hrs)	120
5.	Industrial Area	75(Daytime)70(Nighttime)
6.	Commercial Area	65(Daytime)55(Nighttime)
7.	Residential Area	65(Daytime)45(Nighttime)

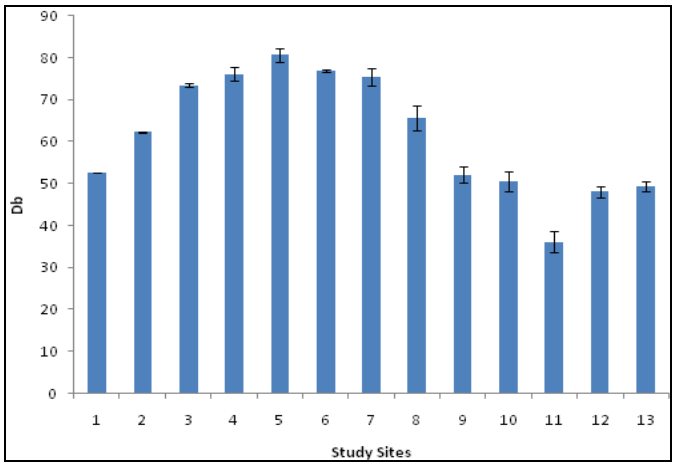
The study reveals that Central Avenue area is highest (dB) value mainly because the area is served by the scooters, motor-cycles, cars Buses etc. And it is situated at the nodal point of roads connecting it to all parts of important city of Kolkata. The population of this area is 1, 69,764 (as per Census, 20011) and near about 50 thousand of vehicles are running on the road. However, the locality in continuation to Central Avenue, 22°34'4"N 88°21'37"E., Bow Bazar, B. B. Ganguly Street, Mahatma Gandhi Road, Baithakkhana bazar, feels the same effect of the pollution. Study indicates an important fact, that there is also lack of division of the roads for movement of light and heavy vehicles and as a result a this area is always suffering heavy traffic load. According to Pollution Control Board, (2007) in Central Avenue and adjacent area, lowest noise level is 88 dB (A) in 2012. This is in support with the present study. The present study also indicates that, pollution level is worse in this area during 2014 as well as 2015.The study reveals that during festival, pollution level is higher at B.B. Ganguli Street (96.02dB) and hare Street (90.25dB). On the other hand, this level lowered down even to 25.23dB and 42dB respectively at night in normal days.

The study indicates that,in highly traffic congested areas of South Kolkata, at Taratalla, recorded noise level is 75dB, but it falls down to 40 dB. in winter midnight.This locality is on Diamond Harbour Road (D.H.Road), which is one of the busiest road connections of the south and this spot is the gateway to Kolkata city from South 24 Parganas. Other than these factors, the construction of Metro railway on the middle of the D.H.Road creates the long standing problem of slow traffic movement in this area throughout the year. All these factors make this area extremely noisy throughout the entire noise monitoring period. Year-wise data shows that, 2015 was the highest noisy year with a recorded noise level 75dB at Taratalla where as the lowest is observed at Newalipur 12 dB in the same year and same time.

Central Avenue locality may be included into the extremely high noise risk area and may be included into the high noise risk category of the city. Newalipur locality is considered as lowest noise prone area of the south. Other two localities

brought under study area of south Kolkata are also included into high noise risk category of the city, the recorded noise values were found to be 75.12 dB at Taratalla and 66.0 dB at Tollygunj respectively.

Though in Newalipur area there are four big budget Durga *puja pandals* but the control measures are highly efficient and thus considered as less noisy zone in the South. The important fact is that, proper and systematic traffic management by Kolkata Police is one of the remarkable reasons for less noisy nature of this locality.



Number 1 to 13 represents the names of study sites.(1.Bau BazarMarket : 2. Chitta Ranjan Avenue; 3.Baithakkhana Bazar; 4. Ganesh Chandra Avenue; 5. Central Avenue; 6.S. T. Road; 7. Hare St; 8.B.B.Ganguli St; 9. Mahatma Gandhi Road; 10.N.S. Road; 11. NewAlipur; 12. Taratalla; 13.Tollygunge Phari.)

Fig 1: Noise Pollution level in Central and South Kolkata residential area.

Control of Noise Pollution

According to Dinesh *et al*., (2012) the noise pollution is decreasing considerably for the last three years and it is recorded minimum in 2009 as compared to 2008 and 2007 in Meerut City. The fact behind this achievement is definitely the strong steady control measures adopted by the responsible citizens as well as administration of Meerut City. So it is definite that the situation may change favorably in Kolkata also if there is a earnest self-interest of growing environmental awareness in the people of Kolkata.

In Kolkata the noise pollution can be best controlled by implementation of the following suggestions: 1.Monitoring total noise emissions from all the noise sources below the prescribed limits in the work area. 2. Maintaining the spacing between noise sources and operators. 3. Regulating the noise sources by a sound reducing structure that resents air- borne transmission. 4. Dropping the structure – borne transmission by isolation of the source. 5. Damping of the vibrating metal structures or by replacement with material such as the wood. 6. Reducing reflected noise by use of the absorbent materials on surfaces such as floors, roofs, and walls. 7. Inserting the attenuating screen between source and operator. 8. Controlling the inconsistency and vibration by the preventive protection. 9. Implementation a scheme for plantation of trees in big cities. 10. Provision of taxation on the undue use of sound amplifiers. 11. People can be educated through radio, TV, newsreels in cinema halls about noise pollution. 12. Vegetation buffer zones must be created in different parts of the city. Efforts should be made for roadside plantations. 13. Traffic noise can be reduced by using proper fuel, good tyres, good roads and by discouraging pressure horns. 14. Auditoria noise can be reduced by using sound absorbing materials like acoustical tiles, fiber glass carpet etc. Rapid industrialization, urbanization, use of modern means of transport, population growth, and increasing scale of human activities are some of the human factors responsible for noise pollution. 14,035,959 is the Total population strength of Kolkata City According to data released by Govt. of India for Census 2011. So the pollution load is accordingly very high affecting worse

Conclusion

The analysis has revealed that noise pollution levels are more than the permissible limits in areas of B.B. Ganguli Street, Hare Street, Central Avenue, Mahatma Gandhi Road, Ganesh Chandra Avenue, Baithakkhana Bazar, S. T. Road. The necessary control measures to reduce the level of noise in these areas should be implemented.

The grim situation of tremendous increase in number of vehicles is generating multiple problems in the city such as air and the noise pollution, encroachment, poor condition of roads, poor parking facilities, no traffic lights or control system of passing heavy traffic through the city, no facility of bypass or flyovers connecting the main roads from periphery of the city. So the city traffic has to bear the load of local traffic as well as heavy traffic passing through the core of the city without concern. Horns are a major contributor to noise pollution in Indian cities.

The World Health Organization (2011) (WHO) aims to make all peoples attain the highest possible level of health. Health is defined in the WHO Constitution as "[a] state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". By this broad definition that includes well-being, noise impacts can be clubbed as 'health' issues.It is suggested that the necessary abatement measures to reduce the noise levels in these studied areas should be implemented to improve the present status of human health and environment of the of Kolkata City.

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