

Assessment of noise level in Burdwan town, West Bengal

J. K. Datta¹, S. Sadhu², S. Gupta¹, R. Saha¹, N. K. Mondal³ and B. Mukhopadhyay¹

¹Department of Environmental Science, ²Department of Law,

³Institute of Science Education, Burdwan University, Burdwan-713 104, India

(Received: 16 October 2004 ; Accepted: 8 July, 2005)

Abstract: Cities and towns of the world are now facing enormous rise of noise pollution problem due to very high population rise, transport congestion and associated commercial and industrial activities. Burdwan, a district headquarter (100 km away from Kolkata) is one such town where noise pollution is very frequent. In order to assess noise level, noise data were collected from various places of the town by sound level meter with a duration of 30minutes/location during specified time like 6.00am, 10.00am, 1.00pm, 4.00pm and 6.00pm. Most of the monitoring places either belongs to silence category or commercial category areas. From the tabulated data, it was found that sound level lies within the range of 64-85dB or above in different time at different places. The locations that belong to the silence zone have the noise level up to 90dB. Statistically noise level in all these zones differ significantly at their peak hours. Noise pollution adversely affects our environment as well as human beings. Sound causes both pathological and psychological disorders in human beings. Implementation of rules and regulations under section 20, 21J, 41, 68(I), 70, 90, 111A of Environment Protection Act, 1986 and of course various technological methods and public awareness are very essential to check noise pollution in Burdwan town.

Key words: Noise level, Burdwan, West Bengal, Sound level meter

Introduction

Today one of the major environmental pollution due to anthropogenic activities is noise pollution. Definition of pollution from a legal point of view is the wrongful contamination of the atmosphere, or of water, or of soil, to the material injury of the right of an individual. Thus noise as pollutant produces contaminated environment that becomes a nuisance and affects the health of a person, his activities and mental abilities. So noise pollution may be defined as unwanted sound, which gets dumped into the atmosphere without taking care to the adverse effect it may be having. A survey by central pollution control board (CPCB) showed that in Delhi, the noise level in most places exceeded the permissible limit. Similarly, a study by NEERI had revealed that noise levels in residential, commercial and industrial areas and silence zones of Delhi and towns of National Capital Region (NCR) far exceeded the prescribed standards. The average noise level in Delhi is 80dB while the ambient limit is 55dB. Mumbai too suffers from high levels of noise pollution. For example, Shetye *et al.* (1981) had estimated that noise level in crowded location in Mumbai was almost double that of residential standards adopted by most countries (45dB during day and 35dB at night). Ravichandran *et al.* (2000), measured noise levels at selected place of Pudukkottai, Tamilnadu, found that vehicular traffic and pressure hours are the main cause of noise pollution in the city. The noise levels prevailing in commercial areas of Jabalpur city had been investigated by Pandya and Shrivastava (1999). It is found that the noise level data in commercial locations observed normal distributions with an average value of 75, 74, 88dB in morning, afternoon and evening respectively. The high noise levels are associated with higher population density, human activities, traffic density and lack of greenery. Santra (2000) made a comparison of noise level of selected sites of

Kolkata as recorded during winter 1990 and winter 1995. From the survey, it was concluded that the level of noise in Kolkata city is much higher than the prescribed limit as fixed up in the standard mentioned in the Acts relating to noise pollution. Santra (2000) gave the noise levels of selected cities of the world. Noise pollution of densely populated city of Buenos Aires was recognized by Bogo *et al.* (2001). Miedema and Oudshoorn (2001) presented a model of the distribution of noise annoyance with the mean varying as a function of the noise exposure. Various workers have studied effects of noise pollution on human health. According to De (2000) 65dB noise level at a distance of one meter affects human heart while 125dB gives the sensation of pain in the ear and 150dB might kill a human being. Sharma (2001) also highlighted that the permanent loss of hearing at 100dB. According to Santra (2001) high frequencies or ultrasonic sound above the normal audible range can affect the semicircular canals of the inner ear and cause nausea or dizziness. Tripathy and Patnaik (1994) reported various impact of noise stress on human health for e.g. hearing impairment like temporary/permanent loss of hearing, trinities, physiological impacts like cardiovascular constriction, gastro intestinal modification, respiratory modification, skin resistance alteration, headache, muscular tension, neurological disorder, paling of skin; task interference like reduced work efficiency, increased proneness accidents and lastly personal behavior like annoyance, anxiety, fatigue and fear. Burdwan, located in the state of West Bengal, is situated at a distance of 100km from Kolkata and is a district head quarter. Burdwan is a developing town with good facilities for education, medical, market for grain and other commercial commodities. Population according to 2001 census is around 2,86,058. Noise pollution is very frequent in this town. Burdwan town is not an industrial area, therefore, noise mainly arises from the transportation system. Various

Table – 1: Noise level (dB) variations from different locations of Burdwan town at different time interval.

Sl. No.	Location(s)	Time																	
		6 am			10 am			1 pm			4 pm			6 pm					
		Min	Max	Mean \pm SE	Min	Max	Mean \pm SE	Min	Max	Mean \pm SE	Min	Max	Mean \pm SE	Min	Max	Mean \pm SE			
1.	Near Vidyarthi Girls' High School	64	80	71 \pm 5.23	65	86	77 \pm 6.53	65	85	72 \pm 6.66	66	87	77 \pm 6.99	64	83	73 \pm 5.92			
2.	Municipal Boys' High School (G.T.Road)	66	85	75 \pm 6.74	73	93	83 \pm 7.15	72	92	83 \pm 6.12	73	92	83 \pm 5.57	70	92	82 \pm 6.24			
3.	Near C.M.S High School (B.C.Road)	72	84	79 \pm 3.74	78	93	84 \pm 4.88	74	88	81 \pm 4.71	76	87	80 \pm 3.52	79	92	83 \pm 3.97			
4.	Near Women's College	78	86	79 \pm 3.87	77	91	83 \pm 4.75	76	87	80 \pm 3.55	75	88	81 \pm 4.67	77	89	83 \pm 3.90			
5.	Near Hospital Main gate	65	75	72 \pm 1.97	70	82	74 \pm 3.82	68	80	72 \pm 3.82	70	81	73 \pm 6.42	70	81	74 \pm 3.52			
6.	University First Gate	60	71	65 \pm 4.27	65	75	70 \pm 3.22	63	80	72 \pm 5.00	66	80	74 \pm 4.38	62	74	70 \pm 3.82			
7.	Curzon Gate	69	84	76 \pm 5.35	78	95	87 \pm 5.57	74	89	78 \pm 6.00	61	82	76 \pm 6.10	79	95	87 \pm 5.50			
8.	Station Choumatha (crossing point of four roads)	69	87	78 \pm 5.53	75	90	80 \pm 4.60	74	92	83 \pm 5.80	76	95	85 \pm 5.46	80	94	88 \pm 4.38			
9.	B.C.Road (near Anita Cinema)	70	83	75 \pm 4.40	70	89	79 \pm 5.86	70	88	78 \pm 5.67	71	87	80 \pm 4.80	71	85	79 \pm 4.73			
10.	Raniganj Bazaar Choumatha	72	82	78 \pm 3.43	77	94	82 \pm 5.09	74	84	79 \pm 3.58	75	85	79 \pm 3.43	78	91	83 \pm 4.38			
11.	Tinkonia Bus stand	73	87	77 \pm 4.29	77	97	88 \pm 6.56	77	91	84 \pm 4.24	77	93	86 \pm 4.56	79	94	86 \pm 4.49			
12.	Near Rajbati	68	81	74 \pm 4.73	74	86	79 \pm 4.27	72	82	78 \pm 3.26	72	85	79 \pm 4.12	77	89	83 \pm 4.02			
13.	Telipukur More	72	96	84 \pm 6.21	85	102	96 \pm 4.69	74	98	86 \pm 7.27	72	95	85 \pm 6.70	73	94	83 \pm 6.34			
14.	Parbhatata More	71	91	83 \pm 5.85	76	96	87 \pm 6.29	75	94	83 \pm 5.35	74	93	85 \pm 5.90	77	93	83 \pm 4.86			
15.	Vivekananda College More	69	92	80 \pm 7.42	79	97	89 \pm 6.23	72	88	80 \pm 5.04	73	90	80 \pm 4.60	69	86	78 \pm 5.31			
16.	On the railway overbridge of Burdwan town	72	93	83 \pm 6.21	76	97	87 \pm 7.05	74	97	85 \pm 6.34	75	96	83 \pm 6.02	77	95	84 \pm 5.51			
17.	Golapbag More	75	86	79 \pm 3.69	76	92	86 \pm 5.08	74	90	82 \pm 4.98	73	94	83 \pm 5.57	73	94	84 \pm 5.95			

Sl. No. 1-6: Silence zone

Sl. No. 7-10 : Commercial zone

Sl. No. 11-17: Others and heavy loaded traffic areas

Table – 2: Analysis of variance in silence zone at 10am.

Sources of variation	Sum of squares (SS)	Degree of freedom (DF)	Mean squares (MS)	F values	
				Observed	Tabulated
Between silence zone	1655	5	275.83	9.02	F _{.05} =2.40
Within silence zone (Error)	1652	54	30.59		F _{.01} =3.40
Total	3307	59	-	-	-

Table – 3: Analysis of variance in commercial zone at 6 pm.

Sources of variation	Sum of squares (SS)	Degree of freedom (DF)	Mean squares (MS)	F values	
				Observed	Tabulated
Between commercial zones	507.5	3	126.87	5.02	F _{.05} =2.87
Within commercial zone (Error)	910.0	36	25.28		F _{.01} =4.41
Total	1417.5	39	-	-	-

Table – 4: Analysis of variance in traffic loaded zones at 10am.

Sources of variation	Sum of squares (SS)	Degree of freedom (DF)	Mean squares (MS)	F values	
				Observed	Tabulated
Between traffic zones	1497.14	6	213.88	5.68	F _{.05} =2.21
Within traffic zone (Error)	2372.00	63	37.65		F _{.01} =3.09
Total	3869.14	69	-	-	-

types of vehicle, automobile, cycle, rickshaw etc. create tremendous noise at various points of Burdwan. Burdwan is an old city having narrow roads and streets in unplanned manner. It is overcrowded by people of its own and by outsiders of nearby villages and districts. Since it is a district town with many offices and working places noise pollution gets its maximum level at office hours.

Materials and Methods

For monitoring noise level seventeen (17) different important locations of Burdwan town were selected on the basis of zone specific. According to Environmental Protection Rules, 1986 (Schedule- III) in respect of noise, most of these locations are in the category of commercial zone, silence zone and heavy traffic zones. Sound level meter (Model LUTREN, SL-4001) recorded ten (10) measurements of noise data/location with 30 minutes duration during some specified time around 6.00am, 10.00am, 1.00pm, 4.00pm and 6.00pm. Sound level meter works on the principle of evaluation of sound pressure on a linear or weighted scale. It normally indicates the rms value of the sound. The basic parts of most sound level meters include a microphone, amplifiers, weighting networks and display meter reading in dBs.

Results and Discussion

In the Burdwan town, the main contributors of noise are transportation (rail and road), community and religious activities. The noise data collected from various silence zone area of Burdwan town such as locations like Vidyarthi Girls' High School, Municipal Boys' High School, Women's college, C.M.S High School, Hospital Main Gate and University First Gate displayed wide ranges of noise level varying in different

time (Table-1). In case of Vidyathi Girls' High School noise ranges from 64 to 87dB. There is a morning shift in the school. Parents take their children by vehicles like motor cycles, scooters and cars. During this hours sound level remains high but during office hours traffic noise also contributed high decibel. In comparison to the Vidyarthi Girls' High School noise level recorded near Municipal Boys' High School showed higher value (Table-1). This is mainly due to the presence of G.T.Road, offices and banks in front of school. Both C.M.S High School and Women's College having same locational set up (both on the side of B.C.Road) displayed more or less similar noise level variation. Noise level monitoring was also carried out from various commercial zones like Curzon Gate, Raniganj Bazar Chaumatha, B.C.Road (near Anita Cinema) (Table-1). Curzon Gate is the busiest place of Burdwan town. It is a business place and encircled by many shops, offices, auditorium hall etc. Since the monitoring was performed in summer season noise level at 1.00pm was very much lower than the data of 10.00am and 6.00pm. Similar trend was observed at station Chaumatha and Raniganj Bazar. Cycles, rickshaws, motorcycles, scooters, cars and people of the market create noise pollution in all these commercial areas.

Apart from silence zone and commercial zone several other places like crossings of main roads (like Parbirhata More, Vivekananda College More, Telipukur More, Golapbag More), Bus Stand and Railway Over bridge were also selected for monitoring of noise level at same time interval (Table-1). Parbirhata More is one such crossing where three main roads dissect each other. Electric horn, engine of vehicles, collision of tyres exert tremendous noise. Location wise Vivakananda College More has similar set up like Parbirhata More except an

additional contributory factor of crowding of students at morning and afternoon. In case of Telipukur More and Golapbag More noise arises mainly from vehicles, collision of tyres, electric horns etc. The G.T.Road running through these locations carries the vehicles of Burdwan town and the vehicles of by-pass road. Exceptional noise level value (102dB) was recorded from Telipukur More. Tinkonia bus stand is the main bus stand of Burdwan town having high pressure of passengers and transportation systems. Sources of the sound are engine of vehicle, electronic horn, crowding of people, sirens, barking of dogs, hawkers, shops, advertising agencies, miking etc. In case of overcrowded railway over bridge main noise contributing factors are horns and high frequency sound emitted from trains, buses, trucks, motorcycles, rickshaw etc. Both these areas had registered a high noise level 72 to 97dB.

Analysis of variance are computed from all these silence zones, commercial zones and several other places like crossing of main roads, Bus Stand and Railway over bridge (Table 2,3 and 4 respectively) at their respective peak hours (viz. 10am, 6pm and 10am respectively). The observed values of F (viz. 9.02, 5.02 and 5.68 respectively) are larger than the 5% and 1% tabulated values corresponding to degree of freedom (DF) (5,54), (3,36) and (6,63) respectively and are significant at 5% and 1% level of significance, thereby suggesting that noise levels in all these above mentioned zones differ significantly at their peak hours.

Locations like Vidyarthi Girls' High School, Women's college, Municipal Boys' High School, C.M.S High School, Hospital Main Gate and University First Gate should belongs to silence zone, where permissible sound levels are 50dB and 40dB in day time and night time respectively (Tripathy, 1999). But in practice it was found that sound levels lies within the range of 60-90 dB in different time at those places. In the commercial zone, the sound level also is very high in comparison to permissible sound level of 65dB and 55dB in day and night respectively. In the Burdwan town, the commercial zone like B.C. Road (near Anita cinema), Raniganj Bazer, Station Choumatha etc., where sound level reaches up to 110dB. Less transportation pressure, presence of big trees, water streams encircling the Golapbag (University campus) are responsible for low noise level near University First Gate. There are many legal provisions to control or check the noise pollution. Many laws and acts have been amended to prevent

the noise pollution but implementation of these laws is in vein. Noise pollution is tremendously high in some points of Burdwan. Even in residential zone sound pollution is frequent. Legal measures under section 20, 21J, 41, 68(I), 70, 90, 111A of Environment Protection Act (1986) as well as various technological methods should be adopted to control this pollution.

Acknowledgments

Authors are very much grateful to Prof. L.K.Samanta, Department of Physics, Burdwan University and Dr. Apurba Ratan Ghosh, Department of Environmental Science, Burdwan University for their kind cooperation in carrying out the survey work.

References

- Bogo, H., D.R. Gomez, S.L. Reich, R.M. Negri and R.E San: Traffic pollution in a downtown site of Buenos Aires City. *Atmospheric Environ.*, **35(10)**, 1717-1727 (2001).
- De, A.K.: Environmental Chemistry; New Age International(P) Limited, Publishers 4835/24, Ansari road, Daryaganj, New Delhi- 110 002.(2000).
- Miedema, H.M.E. and C.G.M. Oudshoorn: Annoyance from transportation noise, relationships with exposure metrics DNL and DENL and their confidence intervals. *Environ. Hlth Perspectives*, **109(4)**, 409-416 (2001).
- Pandya, M. and R.K. Shrivastava: Analysis of noise levels and its health effects in commercial areas of Jabalpur city: Part I-Analysis of health effects. *Indian J. Environ. Sci.*, **4(1)**, 197-200 (1999).
- Ravichandran, C., G. Edwin Chandra Sekaran and M. Vijaya Kumar: Noise pollution assessment in Pudukkottai, Tamil Nadu. *Polln. Res.*, **19(3)**, 431-434 (2000).
- Santra, S.C.: Environmental Science, New Central Book Agency (P) Ltd., Kolkata (2001).
- Santra, S.C.: Status of noise pollution studies in Kolkata and current state of legal measures for abatement, environment. Issues and Challenges (Volume II), Academic staff college, the University of Burdwan, Burdwan. (2000).
- Sharma, P.D.: Ecology and environment, Rastogi Publications, Shivaji Road, Meerut-250 002. (2001).
- Shetye, R.P., R.K. Kapoor and T.N. Mahadevan: The noise festivals: can we not change? *Scavenger*, April, 3-8 (1981)
- Tripathy, D.P.: Noise pollution, A.P.H Publishing Corporation, New Delhi (1999).
- Tripathy, D.P. and N.K.Patnaik: Noise pollution in open cast mines- its impact on human environment. *Proc. of the Int. Symp. On the impact of mining on the environment problems and solutions*, Nagpur, A.A.Balkama (1994).

Correspondence to:

Prof. J. K. Datta, Head

Department Environmental Science, Golapbag More
Burdwan University, Burdwan-713 104 (W. B.), India

E-mail: profjkdata@yahoo.co.in

Tel.: +91- 342-2559255 (O) +91- 342-2663758 (R)

Fax: +91- 342-2557938