



## **STATUS OF NOISE POLLUTION IN AN AROUND JHARSUGUDA URBAN AREA**

**N. C. DEBTA<sup>a</sup>, S. K. NAIK<sup>\*,b</sup>, N. K. BEHERA and A. MAHAPATRA**

P.G. Department of Chemistry, Sambalpur University, SAMBALPUR – 769023 (Odisha) INDIA

<sup>a</sup>Kaniha College, ANGUL (Odisha) INDIA

<sup>b</sup>Sundargarh Engineering College, SUNDARGARH (Odisha) INDIA

### **ABSTRACT**

In the present investigation, it was found that the sound of industrial zone in day time it is more [77.46 dB (A)] where as in commercial zone sound is less [60.0 dB (A)] with respect to ambient noise quality standard. The sound label of residential zone is [63.84 dB (A)], which is more than the ambient noise standard value but in the silence zone the sound is less [44.43 dB (A)] then the standard data. The average sound level in dB (A) of industrial commercial, residential zone even at night the sound is more in the zone. However at night silence zone is more silence [33.2 dB (A)] than the ambient noise standard.

**Key words:** Noise pollution, Jharsuguda.

### **INTRODUCTION**

There are several reports on traffic noise pollution<sup>1-5</sup>. There are also reports on noise pollution of human establishments, industries, mines<sup>6-13</sup>. The sources of noise, its intensity have been compared with the Indian conditions and impact on the workmen are also available in the literature<sup>14,15</sup>.

Worldwide 16% of the disabling hearing in adults is attributed to occupational noise, ranging from 7-12% in the various sub-regions. The effects of the exposure to occupational noise are longer for male than female in all sub regions and higher in the developing countries. Similarly, traffic noise received by inhabitants living by road side mainly depends on distance from road, diurnal variation, character of the traffic and street configuration. Twenty five percent of the European population is exposed to transportation noise at over 65 dB (A) and more than 30% are exposed at night to noise level exceeding 55 dB (A) and disturbing their sleep. There are evidences that a small number of individuals are also highly susceptible to noise<sup>16,17</sup>.

---

\* Author for correspondence; E-mail: sanjibsucho@rediffmail.com

There are evidences that loud unpredictable and intermittent noise exposure increase catecholamine and elevates blood pressure, heart beat and skin conductance. Noise also impairs and individual's senses of control over himself, especially in the case of children who generally lack the means of abate or avoid it so as to develop behavioural manifestation of passivity or helplessness. The other impact of masking one's auditory warning signals and thereby causes accidents resulting injury him or annoyance and general fatigue<sup>18-20</sup>.

In the Jharsguda district there are many coal-fired thermal power plants producing in total 4505 MW power. In the district, there is a huge deposit of coal in the Ib-Velly. Besides, there are several industries such as sponge iron, iron and steel plants, aluminium smelter, cement industry also located in the area. Small scale industries like rice mills and stone crushers are also operating. In short many types of machinery are working day and night in the above mentioned industries producing noise, which has got impact in the areas. In view of this, we have carried out a study on the assessment of noise pollution in an around Jharsguda urban area. In the present communication, we report the result of our study on "Status of Noise pollution in an around Jharsguda urban area".

## EXPERIMENTAL

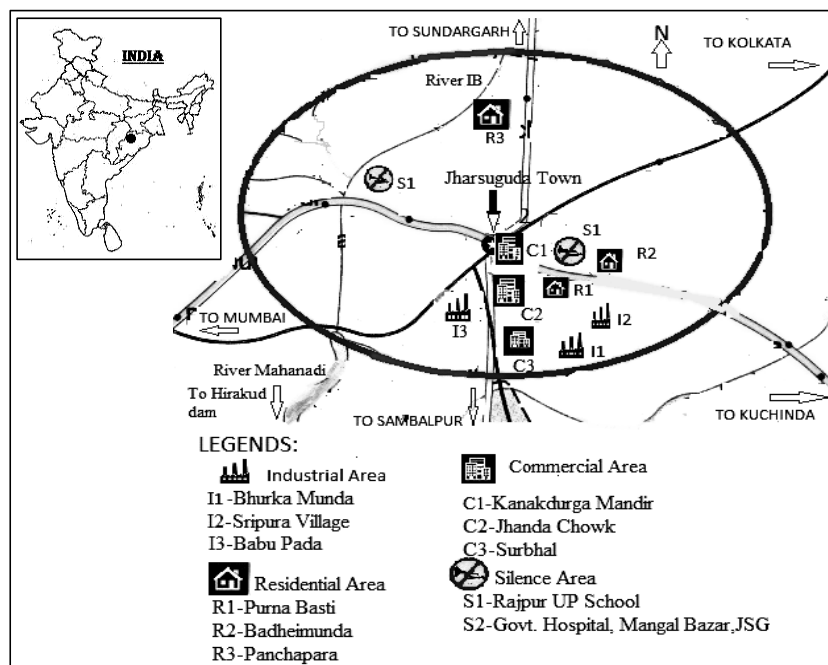
### Methodology

The monitoring sites for noise recording zone are chosen in (i) industrial, (ii) commercial, (iii) residential and (iv) silence zone in order to compare the observed values with the permissible levels for noise (Table 2). In total eleven numbers monitoring stations are selected and noise levels are measured and recorded by using noise level monitoring equipment [Sound Level Meter (SLM) and Data logger (DL) of the Cygnet Systems New Delhi, India]. Appropriate procedures are duly followed while taking such measurements. Prior to monitoring, the SLM (Model 2021) is set either in the range of 40-90 dB or 80-30 dB, depending on the situation, and all the measurements are taken in the 'A' weighting mode expressed as dB (A). The SLM is set at first auto mode and the Data logger is set to log the incoming records at an interval of 02 seconds. At the end of the measurement, data from the Data Logger (DL) are downloaded to the P.C. for computing the noise descriptors. Care is taken to avoid the unnecessary intermittent peaks while computing. For the assessment of the actual noise levels persisting in the study area, measurements at all the points are taken on working days, avoiding the holidays. The study was conducted for a period three years. (January 2010 to December 2012).

### Location of the monitoring stations

The locations of sampling stations of Jharsguda urban area are shown in Fig. 1. The study area consists of Jharsguda town and a few villages around the town of 97,730

populations (as per census 2011). The recording stations are located in Fig. 1 and details of the locations are given in Table 1. During day time recording is carried out in between 10 AM to 6 PM and of night time is in between 9 PM to 5 AM. The year wise day and night data of the study period is recorded in Table 2 and the average data of day and night is recorded in Table 3 zone wise. The graphical representation along with the standard data zone wise are shown in Fig. 2 and 3.



**Fig. 1: Location of monitoring stations in and around Jharsuguda Urban area**

**Table 1: Location of monitoring stations**

S. No.	Sampling stations code	Name of location	Types of localities
1	I1	Bhurka Munda	Industrial
2	I2	Sripura Village	Industrial
3	I3	Babu Pada	Industrial
4	C1	Kanakdurg Mandir	Commercial
5	C2	Jhanda Chowk	Commercial
6	C3	Surbhal	Commercial

Cont...

S. No.	Sampling stations code	Name of location	Types of localities
7	R1	Purna Basti	Residential
8	R2	Badheimunda	Residential
9	R3	Panchapara	Residential
10	S1	Rajpur UP School	Silence
11	S2	Govt. Hospital, Mangal Bazar, Jharsguda	Silence

I = Industrial area, C = Commercial area, R = Residential area, S = Silence zone

## RESULTS AND DISCUSSION

The annual average sound in dB (A) of three years of the study period January 2010 to December-2012 are recorded in Table 2. In Table 3 zone wise average sound in dB (A) of day and night are recorded. On comparisons of sound of industrial zone in day time with the ambient noise quality standard, it is noticed that the sound is more [77.4 dB (A)] whereas when it is compared with commercial zone the sound is less [60 dB (A)]. Similarly when the day time sound is compared with standard data of residential zone [63.84 dB (A)] whereas that of silence zone the sound is much less than 44.43 dB (A) than the standard data. The average sound in dB (A) of the industrial commercial, residential and silence zone are 63.78, 62.76, 55.34 and 37.2 dB (A), respectively. On comparison of the above mentioned data with the standard noise quality at night, it indicates that even at night the sound is more in both industrial commercial and residential zone but in silence zone the sound is less [37.2 dB (A)] than the ambient noise standard.

**Table 2: Annual average values of three years in dB (A)**

S. No.	Stations code	2010		2011		2012		Mean	
		Day time	Night time	Day time	Night time	Day time	Night time	Day time	Night time
1	I1	73.17	61.50	73.58	63.08	74.83	64.42	73.86	63.00
2	I2	79.58	63.83	79.58	63.75	82.00	65.67	80.39	64.42
3	I3	76.83	54.83	76.83	55.17	80.75	57.75	78.14	55.92
4	C1	82.75	62.08	81.58	61.92	84.08	64.67	82.80	62.89
5	C2	76.17	58.92	76.00	59.08	79.00	62.92	77.06	60.31
6	C3	75.00	62.25	75.58	61.83	69.17	71.17	73.25	65.08

Cont...

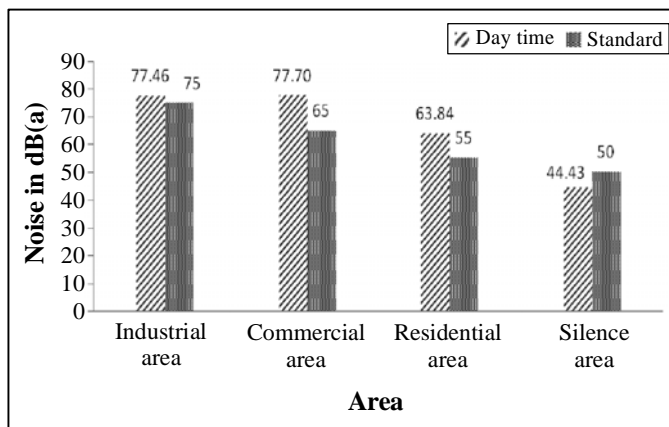
S. No.	Stations code	2010		2011		2012		Mean	
		Day time	Night time	Day time	Night time	Day time	Night time	Day time	Night time
7	R1	72.92	55.75	74.33	55.58	67.83	65.42	71.69	58.92
8	R2	57.25	48.50	58.17	50.42	60.25	53.33	58.56	50.75
9	R3	61.58	50.42	62.50	51.58	59.75	58.00	61.28	53.33
10	S1	42.08	36.50	41.75	35.92	42.17	39.67	42.00	37.36
11	S2	44.83	39.42	47.83	33.75	45.17	37.92	45.94	37.03

**Table 3: Zone wise average in dB (A)**

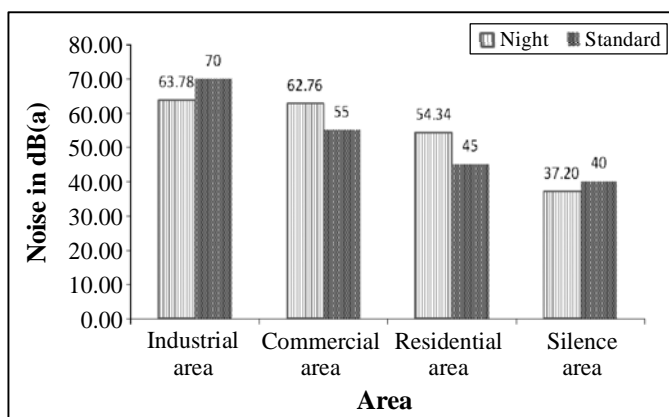
Types of zone	Years	Day time	Average	Night time	Average
Industrial zone	2010	76.53		60.05	
	2011	76.66	<b>77.46</b>	68.67	<b>63.78</b>
	2012	79.19		62.61	
Commercial zone	2010	77.97		61.08	
	2011	77.72	<b>77.70</b>	60.94	<b>62.76</b>
	2012	77.42		66.25	
Residential zone	2010	63.92		51.56	
	2011	65.00	<b>63.84</b>	52.53	<b>54.34</b>
	2012	62.61		58.92	
Silence zone	2010	44.83		37.96	
	2011	44.79	<b>44.43</b>	34.84	<b>37.2</b>
	2012	43.67		38.80	

**Table 4: Ambient noise quality standard<sup>21</sup>**

Area code	Category of area	Limits in dB (A) Leq	
		Day time	Night time
(A)	Industrial area	75	70
(B)	Commercial area	65	55
(C)	Residential area	55	45
(D)	Silence zone	50	40



**Fig. 2: Comparison of day time noise level with standard**



**Fig. 3: Comparison of night noise level with standard**

## REFERENCES

1. D. Banerjee, S. K. Chakraborty, S. Bhattacharya and A. Gangopadhyay, Modelling of Road Traffic Noise in the Industrial Town of Asansol, India Transportation Research Part D, **13**, 539-541 (2008).
2. P. Broker, If High Aircraft Noise Exposure Increase Hearth Arttack Risk, What do we do about it ? Acoust. Bull., **31**, 31-35 (2006).
3. L. Jarup, M. Dudley, W. Babish, D. Houtuijs, W. Swart, G. Preshagen, G. Bluhm, K. Katsouyanni, M. Velonakis, E. Cadum and F. Vigna-Taglianti, Hypertension and Exposure to Noise Near Airport (HYENA): Study Design and Noise Exposure Assessment, Environ, Hlth. Perspectives, **13**, 1473-1478 (2005).

4. C. Clark, R. Martin, E. Van Kempen, J. Alfred Head, H. W. Davis, M. M. Haines, I. L. Barrio, M. Matheson and S. A. Stansfeld, Exposure-Effect Relations Between Aircraft and Road Traffic Noise Exposure at School and Reading Comprehension, *Am. J. Epidemiol.*, **163**, 27-37 (2006).
5. E. A. M. Franssen, C. M. A. G. Van Weichen, N. J. D. Nagelkerke and E. Lebet, Air Craft Noise around a International Airport and its Impact on General Health and Medication use, *Occup. Environ. Med.*, **61**, 405-413 (2004).
6. G. C. Kisku, K. Sharma S. C. Barman, M. M. Kidwai, S. K. Bhargav, A. H. Khan, R. Singh and D. Misra, Profile of Noise Pollution in Lucknow City and its Impact on Environment, *J. Environ. Biol.*, **27**, 409-412 (2006).
7. G. C. Kisku and S. K. Bhargav, Assessment of Noise Level of Medium Scale Thermal Power Plant, *Ind. J. Occup. Environ. Medicine*, **10(3)**, 133-139 (2006).
8. D. J. Parzych and G. Schott, Understanding the Noise Generation Mechanism of Industrial Combustion Turbines and Designing Effective Noise Control Treatment, *Proceeding of Inter-Noise*, Newport Beach, CA, USA (1995) p. 159.
9. G. C. Kisku, S. C. Barman, M. M. Kidwai and S. K. Bhargava, Environmental Impact of Noise Levels in and Around Open Cast Bauxite Mine, *J. Environ. Biol.*, **23**, 51-56 (2002).
10. B. B. Mandal and A. K. Srivastava, Risk from Vibration in Indian Mines, *Ind. J. Occup. Environ. Med.*, **10**, 53-57 (2006).
11. A. K. Pal and N. C. Saxena, Noise Impact Assessment for Coal Mining Residential Complexes, *Mintech*, **21**, 7-12 (2000).
12. V. K. Murthy, H. R. Rajmohan, B. K. Rajan and S. Raghavan and Y. Kakde, Noise Level Monitoring in Diesel Engine Power Plant in Bangalore, *Ind. J. Environ. Protect*, **19**, 508-511 (1999).
13. G. V. Prassana Kumar, K. N. Dewangan and A. Sarkar, Noise Exposure in Oil Mills India, *J. Occup. Environ. Med.*, **12**, 23-28 (2008).
14. S. Naik and K. M. Purohit, Studies on Noise Pollution Level in Residential Areas at Bondamunda of Rourkela Industrial Complex, *Pollut. Res.*, **22**, 433-438 (2003).
15. P. K. Singh, S. S. Prasad and T. N. Singh, Status of Noise Pollution in Dhanbad Municipal Area, India, *J. Environ. Protect*, **20**, 11-14 (2000).
16. D. S. Michaud, E. S. Keith and D. McMurchy, Noise Annoyance in Canada, *Noise Hlth.*, **7**, 39-47 (2005).

17. B. Griefahn and M. Spreng, Disturbed Sleep Pattern and Limitation of Noise, *Noise Hlth.*, **6**, 27-33 (2004).
18. E. Toppila, P. Ilmari and S. Jukka, Age and Noise Induces Hearing Loss Scandinavian, *Audiology*, **30**, 236-244 (2001).
19. D. I. Nelson, R. Y. Nelson, M. Concha-Barrient, P. H. Marilyn and M. Fingerhut, The Global Burden of Occupational Noise-Induced Hearing Loss, *Am. J. Ind. Med.*, **48**, 446-458 (2005).
20. M. Picard, S. A. Girardb, M. Simardb, R. Larocqueb, T. Lerouxa and F. Turcottec, Association of Work Related Accident with Noise Exposure in the Workplace and Noise Induced Hearing Loss Based on the Experience of some 240,000 Person-Years of Observation, *Accident Analysis Prevention*, **40**, 1644-1652 (2008).
21. The Noise Pollution (Regulation and Control) Rules, 2000, The Principal Rules were Published in the Gazette of India, Vide S.O. 123 (E), dated 14.2.2000 and Subsequently Amended Vide S.O. 1046 (E), dated 22.11.2000, S.O. 1088(E), dated 11.10.2002, S.O. 1569 (E), dated 19.09.2006 and S.O. 50 (E) dated 11.01.2010 under the Environment (Protection) Act (1986).

*Revised : 22.08.2014*

*Accepted : 24.08.2014*