



## ASSESSMENT OF TRAFFIC NOISE POLLUTION IN JAIPUR CITY AND ITS IMPACT ON HUMAN HEALTH

Preeti Srivastava<sup>1\*</sup>, <sup>2</sup>Sanjeev Jain and <sup>3</sup>Nisha Jain

<sup>1</sup>\*Department of Zoology, S. S. Jain Subodh P. G. College, Jaipur, (Raj) India.

<sup>2</sup>Department of Electronics, Government Engineering College, Bikaner (Raj), India.

<sup>3</sup>Department of Zoology, University of Rajasthan, Jaipur (Raj) India.

\* Corresponding Author: Preeti Srivastava

Department of Zoology, S. S. Jain Subodh P. G. College, Jaipur, (Raj) India.

Article Received on 15/03/2016

Article Revised on 04/04/2016

Article Accepted on 24/04/2016

### ABSTRACT

Noise is a disturbance to the human environment that is escalating at such a high rate that it will become a major threat to the quality of human lives. In the past thirty years, noise in all areas, especially in urban areas, have been increasing rapidly because it is associated with rapid industrialization, urbanization, (expansion of road network) and population growth. The drastic rise in the number of vehicles has increased noise pollution in the Jaipur city. The present study on Jaipur city was performed to find out the impact of traffic noise level on attitudes of exposed pollution. The study was carried out at 5 different locations with Sound Level Meter to assess the day noise level. The study revealed the fact that noise levels have reached an alarming level. People reported that traffic noise is the main cause of headache, high BP and dizziness problems. It is observed that all the selected location, the level of noise was found to be above prescribed noise standard level of Central Pollution Control Board (CPCB) India and Bureau of Indian Standard (BIS). This is considered to be harmful for physiological well being of people and which can interfere with normal activities for humans. The present study is aimed to investigate the impact of noise pollution on residents/community residing near roadside. The degree of annoyance was assessed by means of a questionnaire. It was found that among all noise-generating sources, road traffic was the major source of noise. A health survey reported about 55% of population was suffering by frequent irritation. 46% respondent felt hypertension, and 48.6% observed loss of sleep due to noise pollution. The most serious health hazards associated with high level of noise exposure is deafness which initially causes temporary hearing problem which has been reported in the study area. It is also observed from the study that places with high traffic congestion, narrow roads, and poor traffic management are more vulnerable to high levels of noise and more ill health effects.

**KEYWORDS:** Jaipur city, Traffic Noise Pollution, health effects.

### INTRODUCTION

Noise is defined as, "the unwanted, unpleasant or disagreeable sound that causes discomfort to all living beings". The noise level in our cities is rapidly increasing. Traffic noise is also the biggest environmental problem affecting health after air pollution. The main objective of this paper is to evaluate the noise pollution problem in the Jaipur city and its effect on the public health. Noise from road traffic is major source of environmental pollution and it has detrimental effects on human beings. Traffic noise is one of the most immediate and identifiable environmental problem associated with rapid industrialization, urbanization, (expansion of road network) and population growth<sup>[1]</sup> The drastic rise in the number of vehicles has increased noise pollution in the city .In 1997 the number of registered vehicles in the city was 5 lakhs which has increased to 15 lakh in 2009 and now it is

approximate 25 lakh in 2016. It adversely affects human health.<sup>[2]</sup> Generally high exposure to noise level may cause feeling of annoyance and irritation, damage to auditory mechanisms, number of health related effects like physiological disorders, psychological disorders, disturbance of daily activities and performances, hypertensions and schematic heart diseases.<sup>[3]</sup> The most serious health hazards associated with high level of noise exposure is deafness which initially causes temporary hearing problem or deafness while prolonged exposure to high noise level causes permanent deafness hearing damage.<sup>[4]</sup> It also causes significant health effects, such as cardiovascular problems, increased levels of diabetes, change in social behavior and quality of life.<sup>[5]</sup> Nowadays, noise pollution is considered as one of the main problems of urban communities which has many hazardous effects on urban environment and may result in a great deal of costs on the society.<sup>[6, 7, 8]</sup> The present

study on Jaipur city was performed to find out the impact of traffic noise level on attitudes of exposed pollution and its ill effect on general public.

### Study Site

Jaipur is known as Heritage City because of its rich heritage culture, customs, traditions, fairs and festivals, civilization, and hundreds years old forts and monuments. The glorious architecture of Jaipur the Pink City is renowned across the world. The older city was developed by the king, while the outer city has been expanded by the Jaipur Development Authority. The city has not been designed as per future requirements. Therefore, the commercial, industrial, and residential sites have not been separated independently. It increased the mixed traffic load at all the selected locations. Further, the public and private transportation systems are available in the city, but they are not able to cover the regions of the city, as the city has not been expanded as per master plan. It has developed the tendency to have personalized modes among residents of the city.

It lies on the geographical coordinates of 26° 55' 0" N, 75° 49' 0" E. As of 2011, the city has a population of 6.66 million, making it the tenth most populous city in the country. It has a semiarid climate receiving over 650 millimeters (26 in) of rainfall annually. Temperatures remain relatively high throughout the year. Traffic noise level was monitored at five different busy locations of Jaipur city, i.e. Jawahar Nagar, walled City Area, Tonk Road Area, Mansarovar and Malviya Nagar.

### MATERIALS AND METHODS

Traffic noise level was monitored at five busy locations of Jaipur city, i.e. Jawahar Nagar, walled City Area, Tonk Road Area, Mansarovar and Malviya Nagar. 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.

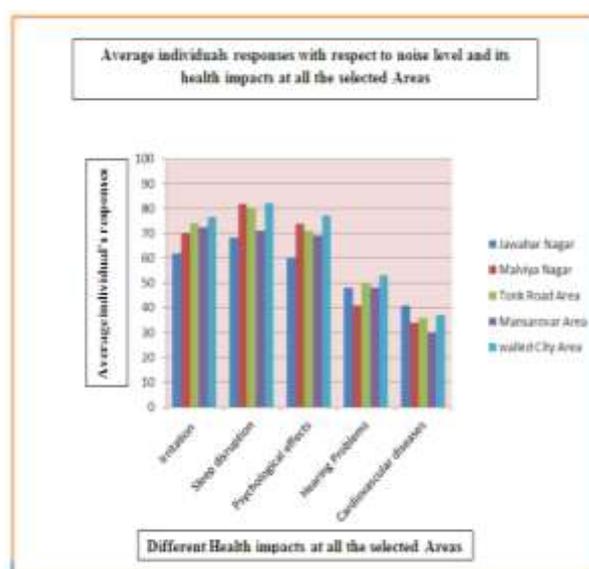
Sound level meter (Model LUTREN, SL-4001) recorded ten<sup>[10]</sup> measurements of noise data/location with 30 minutes duration during some specified time around 6.00am, 10.00am, 1.00pm, 4.00pm and 6.00pm. Sound level meter works on the principle of evaluation of sound pressure on a linear or weighted 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. In respect to evaluate the noise level impact on human health, a social survey was also conducted to investigate the people's perception towards noise annoyance and health effects. A total of 250 people were interviewed and were selected at each of the selected locations. A detailed noise social survey was conducted to know the opinion of the exposed individuals about how the noise is affecting their daily life.

**Table 1: Environmental noise standards as prescribed by the Central Pollution Control Board (CPCB), New Delhi, India.**

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

A comprehensive literature was studied to develop the survey questionnaire. This includes questions related to the personal information of the respondents such as age, sex, occupation, income and the time period in their present house, major sources of noise pollution. The health-related questionnaire covered the daily life problems. To estimate the level of noise annoyance and its effects on individuals, all data regarding reactions of individual were recorded and clubbed together to find a mean value of annoyance at all the selected locations.



**Figure -2: Average individual's responses with respect to noise level and its health impacts at all the selected Areas.**

### RESULT AND DISCUSSION

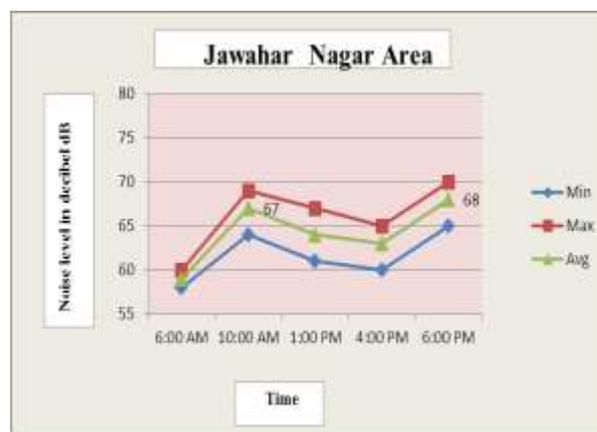
The present scenario is deteriorating day by day with exponential increase in population as well as number of vehicles<sup>[9]</sup> Road traffic noise is the most important major source of community noise specially near an important road with high volume of traffic of any major city. Another factor, in developing country like India where roads are in bad condition, and poorly maintained and has considerable number of vehicles of outdated technology, the road traffic noise assumes much more importance.<sup>[10]</sup> Noise is becoming an increasingly omnipresent, yet unnoticed form of pollution even in developed countries.<sup>[11]</sup>

In the present study the average noise level at all locations in all time intervals was found to be above the prescribed limits of CPCB. The noise level showed a significant variation at different sites which gradually increased or decreased on the basis of location of the site. Average noise levels during morning time 10.00 am and in the evening time at 6.00 pm were 67, 68 dB (Jawahar Nagar) 69, 71 dB (Walled city area) 73, 75dB (Tonk Road area) 71, 72 dB (Mansarovar area) 68, 69dB (Malviya Nagar area) respectively as compared to CPCB standards. From Graph 1, 2,3,4,5, it is observed that noise level in various location of Jaipur city during all time intervals were experienced above the prescribed limits due to playing more vehicles and huge accumulation of traffic. Sources of the sound are electronic horn, crowding of people, sirens, barking of dogs, hawkers, shops, advertising agencies, miking etc. and additional contributory factor of crowding of students at morning and evening. As urban population densities are increasing, many commercial activities now want to operate both during the day and at night. Commercial operations may enhance the vitality and culture of urban areas, but they can also create noise problems. We face another big problem that the residential areas are slowly converted into commercial areas so the noise levels in residential areas always much higher than permissible limit of CPCB. Implementation of rules and regulations under Environment Protection Act (1986) as well as various technological methods should be adopted to control this pollution.<sup>[12]</sup> The influences of noise on human health may be physical or psychological<sup>[13]</sup> Human response to noise displays a systematic qualitative pattern, but quantitative responses vary from one individual to another because of age, health, temperament and the like. Even with the same individual, they vary from time to time because of change in health, fatigue, and other factors. Variation is greatest at low to moderately high sound levels; at high levels, almost everyone feels discomfort.<sup>[14]</sup>

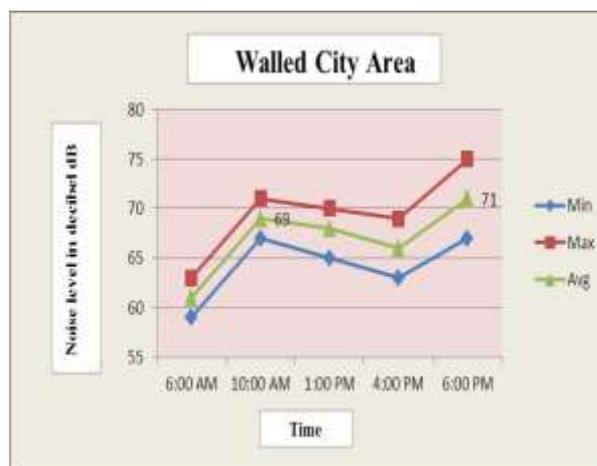
Table 2 shows average individuals health responses with respect to noise level. Frequent irritation due to traffic noise exposure was found higher in walled city area and in other areas almost above 60% individuals were suffer with this problem. Specific physiological effects begin at sound levels of 70 to 75 dB. Average 70% individuals felt hypertension, aggressive behavior, fatigue and suffered stress during daytime, While 72% individuals were unable to sleep because of noise. In the survey about 73% persons interviewers complained of hearing problems and 35.5% suffered from cardiovascular diseases and psychological disorders in their day-to-day life. It was investigated that the female respondents were more sensitive towards noise related-health problems. The reason perhaps that, in India, the numbers of housewives are higher than the working class females and due to continuously living in a particular surroundings they have to face noise-related problems daily.<sup>[15]</sup> The strongest evidence of an association between community noise and cardiovascular endpoints

was found for ischemic heart diseases in males because the incidence rates of ischemic heart disease are higher in middle-aged male subjects. In general, relative risks were found to be higher when mediating exposure factors like residence time, room orientation and window-opening habits were considered in the analyses. Both the "objective" exposure (sound level) and the "subjective" exposure (annoyance) were associated with a higher risk of ischemic heart disease.<sup>[16]</sup> A noise level 65dB 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 also highlighted that the permanent loss of hearing at 100dB.<sup>[17,18]</sup> High frequencies or ultrasonic sound above the normal audible range can affect the semicircular canals of the inner ear and cause nausea or dizziness.<sup>[19]</sup>

Exceptional noise level value in some areas like passing Highway nearby residential area Jawahar Nagar and Malviya Nagar, the noise level have been exceeded 90 dB which is considered to be harmful for physiological well being of people and which can interfere with normal activities for humans and wildlife, such as sleeping, conversation, reproduction, communication, or disrupt or diminish one's quality of life.



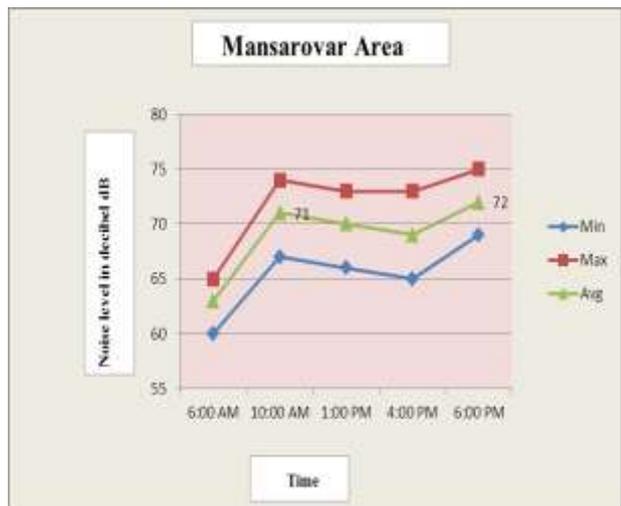
**Fig.1- Time interval variation in Noise Level at Jawahar Nagar, Jaipur.**



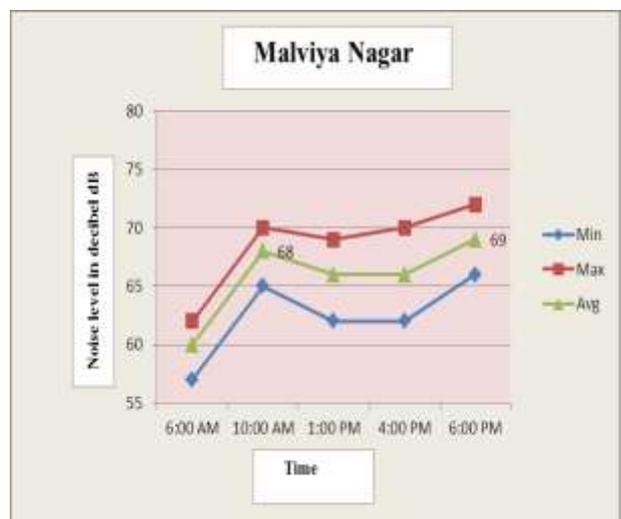
**Fig.2- Time interval variation in Noise Level at Walled City Area, Jaipur.**



**Fig.3- Time interval variation in Noise Level at Tonk Road Area, Jaipur.**



**Fig.4- Time interval variation in Noise Level at Mansarovar Area, Jaipur.**



**Fig.5- Time interval variation in Noise Level at Malviya Nagar, Jaipur.**



**Fig.6 -7 Heavy Traffic Zone at Walled City and Tonk Road.**

**CONCLUSION**

Noise pollution is emerging as a major environmental problem in Jaipur. As noise is directly or indirectly affects the human health, a detailed social survey was carried out to investigate the ill effects of noise on exposed individuals. It was found that 60-85% people opined that vehicular road traffic was major source of noise pollution and creates annoyance among people. About 62% sample population reported frequent irritation, while 67% people were suffering by common noise-related problem like headache or loss of sleep. This can cause negative impact on public health and welfare. Considering the above aspects, we can conclude that noise dominates the spectrum of environmental noise. The people staying in noisy area especially above 70 dB (A) should take precautionary measures in order to avoid noise induced hearing loss. The cause of fighting noise pollution is making progress. The public is becoming more aware of physical & social harms of noise. More cities are passing & enforcing though noise ordinance. Every action towards a more peaceful society makes a difference. Success should not be expected from struggle with the noise pollution without partnership of the

people.<sup>[20]</sup> We have a power to create a healthier and safer environment.

#### REFERENCES

1. Pathak V, Tripathi BD, Mishra VK. (Evaluation of traffic noise pollution and attitudes of exposed individuals in working place) *Atmospheric Environment*, 2008; 42(16): 3892–3898.
2. Williams ID, McCrae, I S (Road traffic nuisance in residential and commercial areas. *Science of the Total Environment*), 1995; 169(1-3): 75-82.
3. Canter, LW (Environmental Impact Assessment). 1996; Mc Graw -Hill Publishers, Second edition, New York USA.
4. Alam W. (GIS based assessment of Noise Pollution in the Guwahati City of Assam), India. *International Journal of Environment Science*, 2011; 2(2): 744-751.
5. WHO 2001 Occupational and Community Noise, Fact Sheet 258.
6. Martin M.A, Tarrero M.A, Gonzalez A. and Machimbarrena, M. (Exposure–effect relationships between road traffic noise annoyance and noise cost valuations in Valladolid, Spain) *J Appl Acoust*, 2006; 67(10): 945-958.
7. Chien, M. K. and Shih, L H. (An empirical study of the implementation of green supply chain management practices in the electrical and electronic industry and their relation to organizational performances). *Int. J. Environ. Sci. Tech*, 2007; 4(3): 383-394.
8. Jamrah H, Al-Omari A, Sharabi R. (Evaluation of traffic noise pollution in Amman, Jordan), *Environ. Monit. Assess.*, 2006; 120(1-3): 499-525.
9. Singh D, Kaur A (Study of Traffic Noise Pollution at different location in Jalandhar City, Punjab), India, *International Journal of Environmental Sciences and Research* .2013; 2(2):135-139.
10. Marathe PD. Traffic Noise Pollution. 2012; *IJED*. 9(1): 63-68.
11. Chauhan A, Pawar M, Kumar D, Kumar N, Kumar R. Assessment of Noise Level Status in Different Areas of Moradabad City) Report and Opinion., 2010; 2(5): 59-61.
12. Datta JK, Sadhu S, Gupta S, Saha R, Mondal NK, Mukhopadhyay B. (Assessment Of Noise Level In Burdwan Town, West Bengal), *Journal of Environmental Biology.*, 2006; 27(3): 609-612.
13. Sisman EE, Unver E. Evaluation of traffic noise pollution in Corlu, Turkey, *Scientific Research and Essays.*, 2011; 6(14): 3027-3033.
14. Liu D H.F, Roberts (Noise Pollution), HC 1999; CRC Press LLC.
15. Agarwal S, Swami BL. (Road traffic noise, annoyance and community health survey - A case study for an Indian city) *Noise & Health*, 2011; 13(53): 272-276.
16. Babisch W (Road traffic noise and cardiovascular risk). *Noise & Health.*, 2008; 10(38): 27-33.
17. De, A.K *Environmental Chemistry*. New Age International (P) Limited, Publishers New Delhi. 2000
18. Sharma, PD *Ecology and Environment*, Rastogi Publications, Meerut. 2001.
19. Santra, S C. *Environmental Science*, New Central Book Agency (P) Ltd., Kolkata. 2001.
20. Ozer S, Yilmaz H, Yesil M, Yesil P (Evaluation Of Noise Pollution Caused By Vehicles In The City Of Tokat, Turkey). *Scientific Research and Essay.*, 2009; 4(11): 1205-1212.