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A COMPARATIVE STUDY OF NOISE POLLUTION DURING A FESTIVE DAYS OF NAVRATRI AND NORMAL DAYS IN JABALPUR CITY

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Abstract - *The paper deals with monitoring of Noise Pollution at various locations of Jabalpur city during normal festival. Assessment of Noise pollution is significant task in the developing countries like India which adversely affects the health standards of human beings. Navratri celebration is accompanied with the bursting of loud noise orchestras, lighting and playing loud speakers which ultimately increase the noise levels. This study is primarily focusing on the monitoring of noise pollution at various places of Jabalpur City during Navratri festival. In this study, noise monitoring was carried out with the help of sound level meter (SL-4023SD) at predefined selected locations in the city for the nine continuous days during Navratri festival and after it (five days) at selected time duration. Sound that is unwanted or disrupts one 's quality of life is called as noise. When there is lot of noise in the environment, it is termed as noise pollution. Sound becomes undesirable when it disturbs the normal activities such as working, sleeping, and during conversations. It is an underrated environmental problem because of the fact that we can't see, smell, or taste it.*

Key Words: **Navratri Festival, Normal Days, Noise Pollution, Sound System, Jabalpur City.**

1. INTRODUCTION

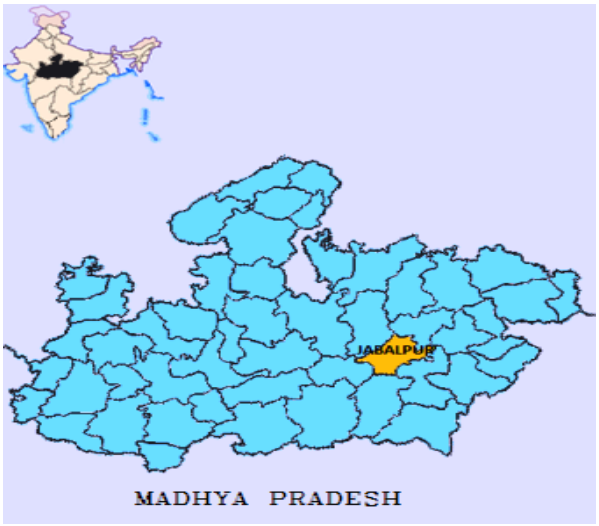
Noise can be defined as the level of sound which exceeds the acceptable level and creates annoyance. Frequent exposure to high level of noise causes severe stress on the auditory and nervous system. Extended exposure to excessive sound has proved physical and psychological damage. Because of its annoyance and disturbance implications, noise adds to mental stress and hence affects the general well-being of those exposed to it. Noise is a major source of friction among individuals [1]. Continuous high level of noise can cause serious stress on the auditory and non-auditory, and nervous system of the city dwellers [2, 3]. At certain levels and durations of exposure, it can cause physical damage to the eardrum and results in temporary or permanent hearing loss. Noise pollution has become a severe problem for the society. India and all other countries are facing this environmental problem for a long period. Noise from sound systems is one of the most important environmental problems. Mainly sound systems are used in festive occasions in India and other countries. Various studies carried out in India and around the world have shown concerns over the rising noise levels of the major cities. Various studies have been carried out in India Although significant numbers of research papers have been published on various cities of India[4]-[11] carried out noise level assessment of Kerala, Vishakhapatnam, Bareilly, Guwahati, Dehradun, Bhadrak city, Kolhapur cities, Gorakhpur city(NH28), Navi Mumbai and Gorakhpur city respectively and all of them found that the noise level of their respective cities was higher than the prescribed limit by Noise Pollution (Control and Regulation) Rules, 2000 and MoEF (Ministry of Environment and Forest, Govt. of India).

1.1 BACKGROUND

India is well known for its culture all over the world. The Indian culture is an admixture of diverse cultures within the country. The Navratri festival is celebrated by the Hindus in India in the Hindu month of (September/October) from the baithki (the First Day of Navratri) to the Navami (the Last Day of Navratri) i.e. usually the period of 9 days.

2 DETAILS OF CITY AND SAMPLING SITE

Jabalpur is a city in the state of Madhya Pradesh. Jabalpur is also the headquarters of the "Jabalpur Division" which is one of the ten divisions of the state of Madhya Pradesh. Jabalpur city is geographically located at 23°10′N 79°57′E / 23.17°N 79.95°E. The average altitude is 411 metres (1348 ft.) Above MSL. The total area of the Municipal Corporation is about 53 Sq. Km. and the population as per 2011 census record is 10, 55,525 souls. The present study was conducted during Navratri festival and after it in normal days 2017 Sound level will be measured by following standard procedure prescribed by CPCB using calibrated sound level (SL-4023SD) meter and recorded at 03 different selected locations of the town between 7.00 am to 9.00 am and 06.00 pm to 10.00 pm. The instrument used in the range of 30 – 180 dB (A). Standard noise level for different location during day and night time is followed according to CPCB guideline [4].



JABALPURCITY MAP

METHODLOGY

In the present study, a noise sample size of 5 minute in each hour at a distance 1.2 meter from the edge of road and at right angle to the centreline of road will be taken. Noise sample will be collected in dB (A) scale at every 5 second interval or total 60 reading in one sample size for 5 days from 8.00am to 10.00 am and 6.00 pm to 10.00 pm. Instrument used for recording the noise level is digital sound level meter (SL-4023SD) The instrument used in the range of 30 – 180 dB (A).

1. Various locations of Jabalpur city for measuring the noise.

2. Noise Levels will have been recorded by means of "Precision Noise Level Meter"

3. The basic parts of a sound level meter include acoustic calibrator and a display reading in decibel (one-tenth part of "Bel", unit of sound).

4. The data will collect for overall 6 hours on the respective day at the selected sites.

5. The time being selected the most prior ones.

6. The location possibly, the readings have been taken from at least 1.5 m above the ground level and 1.2 meter far away from road edge, at the concerned hours for 5 minutes as is expanded by the fluctuating levels over the same time.

Further, calculations have been done using formula of

$$L_{eq} = 10log \sum_{i=1}^{i=n} 10^{L_i/10} \times t_i$$

Where,

n	=	Total number of sound samples
L_i	=	Noise level of any i^{th} sample
t_i	=	Time duration of i^{th} sample expressed as fraction of total time sample
L_{eq}	=	Statistical value of sound pressure level that can be equated to any fluctuating noise level.

Thus,
Leq is defined as const. Noise level which over a given time expands the same amount of energy as is expanded by the fluctuating levels over the same time.

ACCEPTABLE LEVELS OF NOISE IN INDIA

Noise has been recognized as ambient air pollutant. Standards in this regard are laid down under Environment (protection) rules, 1986.

Table1: Zone wise Standards in Respect of Noise

Area Code	Category of Zone	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

HEALTH EFFECTS FROM NOISE

Noise pollution is like a modern plague. There are both objective and subjective evidence of noise pollution on health. The primary sleep disturbances are difficulty falling asleep, frequent awakenings, waking too early, and alterations in sleep stages and depth, especially a reduction in REM sleep [7]. Apart from various effects on sleep itself, noise during sleep causes increased blood pressure, increased heart rate, increased pulse amplitude, vasoconstriction and changes in respiration, cardiac arrhythmias, and increased body movement. For each of these, the threshold and response relationships may be different [8].

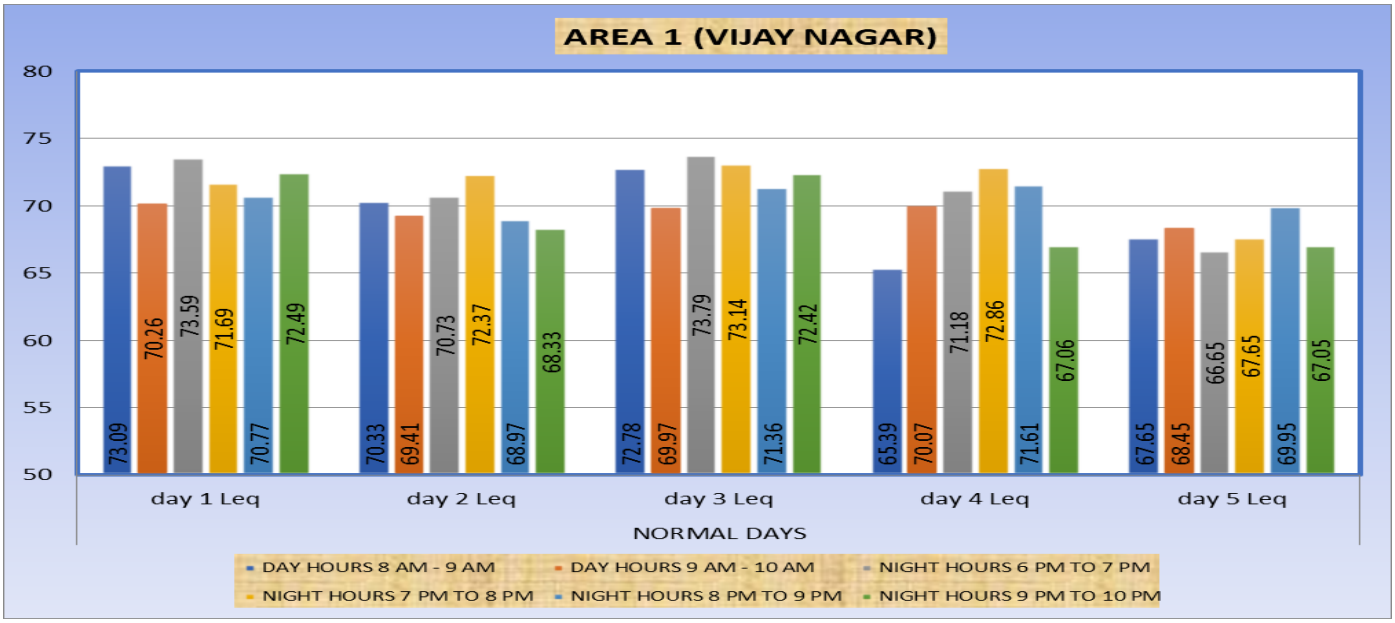
RESULTS AND DISCUSSION

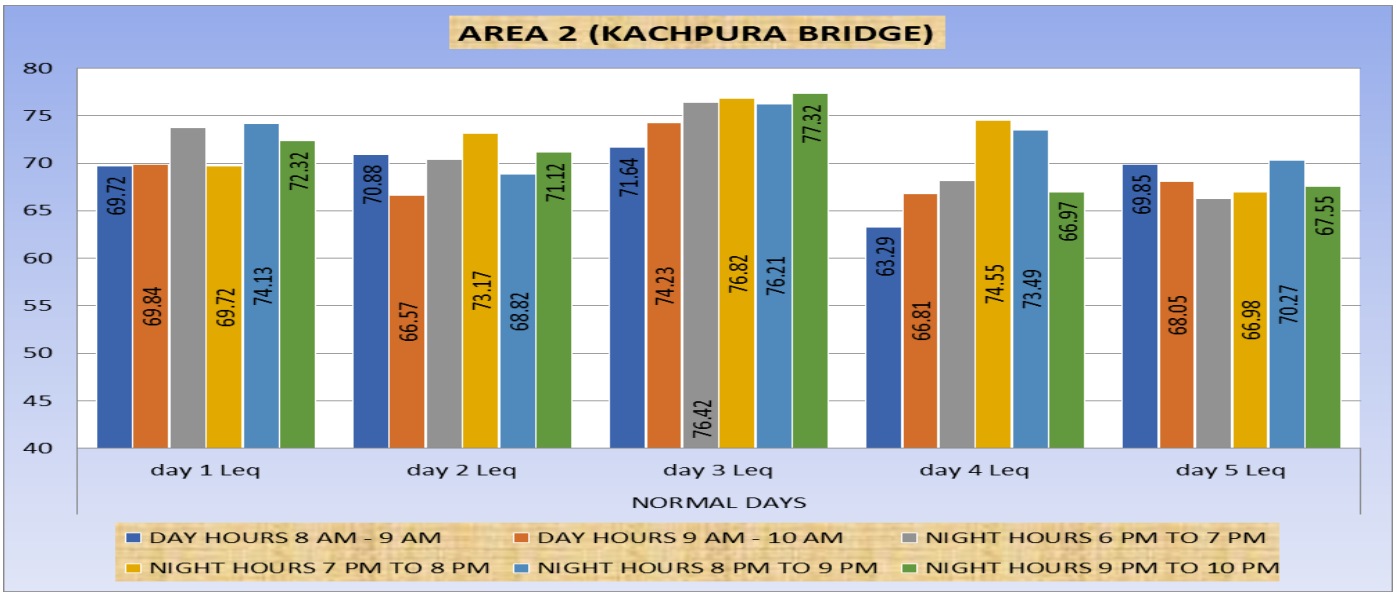
The noise levels recorded at various locations in Jabalpur city during the study period are shown in table 1. Table 2 and figure show location wise average values of noise levels.

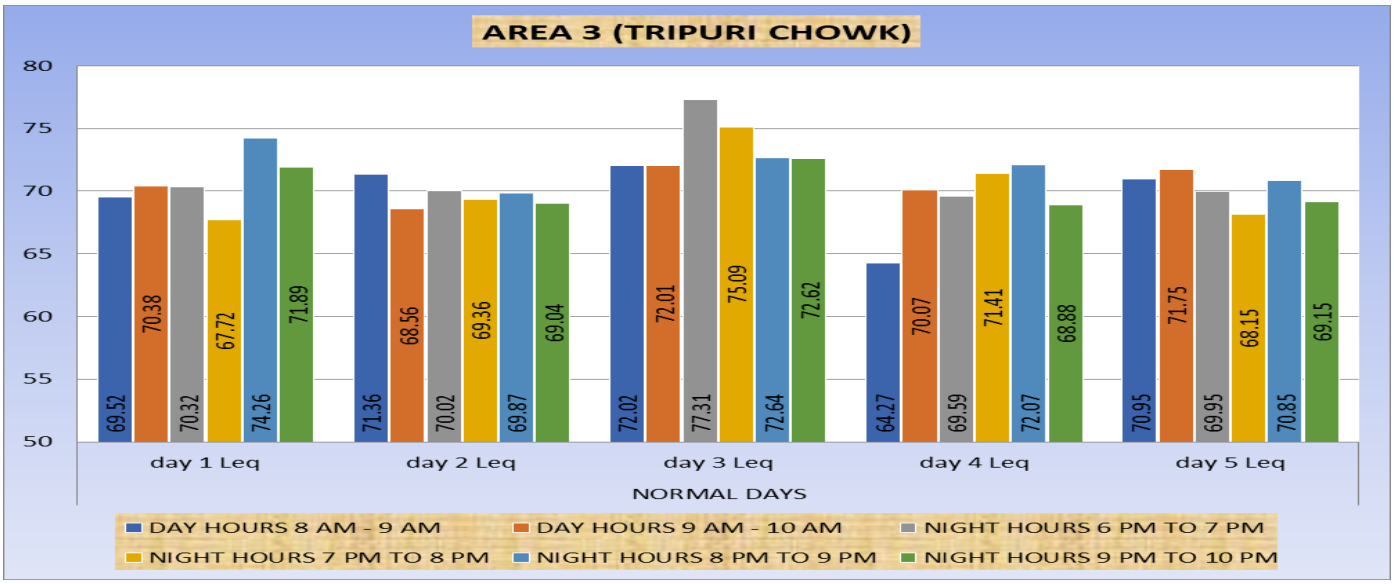
Table 1: Noise parameters (L_{eq}, L_{max}, L_{min}) at different monitored location at different time interval

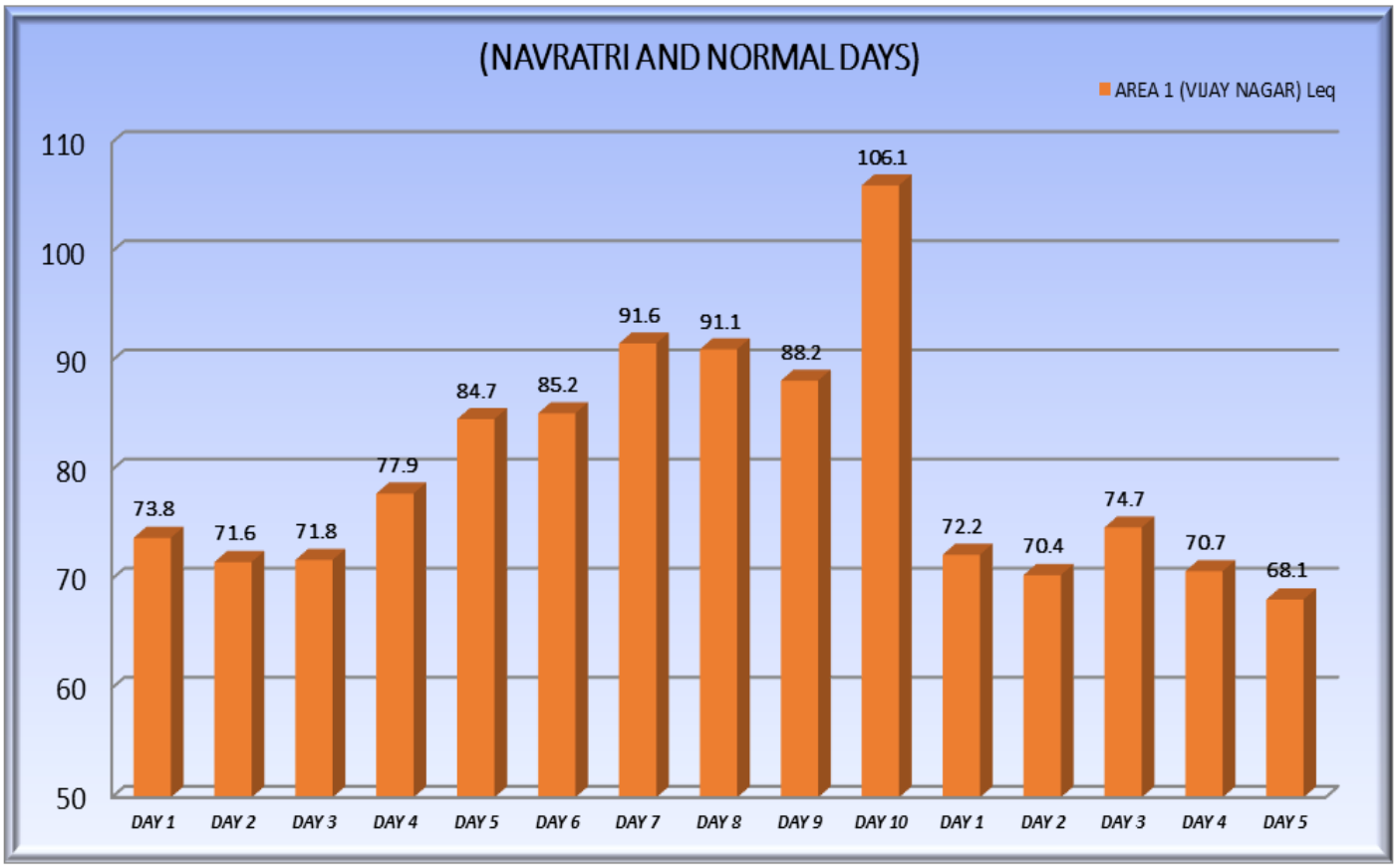
DATE	TIME	AREA 1 (VIJAY NAGAR)			AREA 2 (KACHPURA BRIDGE)			AREA 3 (TRIPURI CHOWK)		
		L_{eq}	L_{max}	L_{min}	L_{eq}	L_{max}	L_{min}	L_{eq}	L_{max}	L_{min}
01/10/2017	8 AM - 9 AM	73.1	87.8	54.1	69.7	84.5	53.7	69.5	84.3	53.5
	9 AM - 10 AM	70.2	85	54.2	69.8	84.6	53.8	70.3	85.2	54.4
	6 PM TO 7 PM	73.5	88.3	54.6	73.7	88.5	57.7	70.3	85.1	54.3
	7 PM TO 8 PM	71.6	86.4	52.7	69.7	84.5	53.7	67.7	82.5	51.7
	8 PM TO 9 PM	70.7	85.6	54.8	74.1	89	58.2	74.2	89.1	58.3
	9 PM TO 10 PM	72.4	87.2	53.5	72.3	87.1	56.3	71.8	86.6	52.9
02/10/2017	8 AM - 9 AM	70.3	83.5	54	70.8	83.5	47.2	71.3	84.2	51.2
	9 AM - 10 AM	69.4	83.5	41.5	66.5	77.1	45.2	68.5	82.3	40.1
	6 PM TO 7 PM	70.7	84.3	52.1	70.3	83.5	47	70.0	84.2	46.6
	7 PM TO 8 PM	72.3	86	48.4	73.1	86.8	49.2	69.3	83.1	40.9
	8 PM TO 9 PM	68.9	81.6	43.3	68.8	82.5	40.3	69.8	83.2	41.7
	9 PM TO 10 PM	68.3	83.5	42.8	71.1	83.5	40.1	69.0	82.9	39.7
03/10/2017	8 AM - 9 AM	72.7	82.7	52.3	71.6	79.1	51.4	72.0	80.2	53.2
	9 AM - 10 AM	69.9	75.5	41.6	74.2	83.1	53.3	72.0	79.4	55.3
	6 PM TO 7 PM	73.7	87.7	49.8	76.4	86.3	56.4	77.3	87.2	49.8
	7 PM TO 8 PM	77.1	89.7	55.9	76.8	86.7	56.8	75.0	84.2	48.7
	8 PM TO 9 PM	74.3	85	55.1	76.2	86.1	56.2	72.6	82.5	49.5
	9 PM TO 10 PM	75.4	85.3	55.4	77.8	87.2	57.3	72.6	82.5	52.6
04/10/2017	8 AM - 9 AM	65.3	70.4	55.4	63.2	68.2	59.4	64.2	69.1	51.4
	9 AM - 10 AM	70.0	75	54.9	66.8	71.8	55.4	70.0	75	56.7
	6 PM TO 7 PM	71.1	79.3	57.6	68.1	76.1	56.4	69.5	77	56.4
	7 PM TO 8 PM	72.8	78.9	52.3	74.5	80.6	55.4	71.4	77.4	59.5
	8 PM TO 9 PM	71.6	80.4	52.1	73.4	81.4	59.4	72.0	82.1	55.4
	9 PM TO 10 PM	67.0	79.4	58.1	66.9	76.8	57.1	68.8	78.4	53.4
05/10/2017	8 AM - 9 AM	67.6	79.5	45.5	69.8	84.2	45.1	70.9	82.8	48.6
	9 AM - 10 AM	68.4	82.8	43.7	68.0	82.4	43.3	71.7	86.1	47
	6 PM TO 7 PM	66.6	81	41.9	66.2	80.6	41.5	69.9	84.3	45.2
	7 PM TO 8 PM	67.6	79.2	40.5	66.9	84.2	40.1	68.1	82.5	43.4
	8 PM TO 9 PM	69.9	84.3	45.2	70.2	86.5	42	70.8	85.2	46.1
	9 PM TO 10 PM	67.0	81.4	42.3	67.5	81.9	42.8	69.1	81.6	42.5

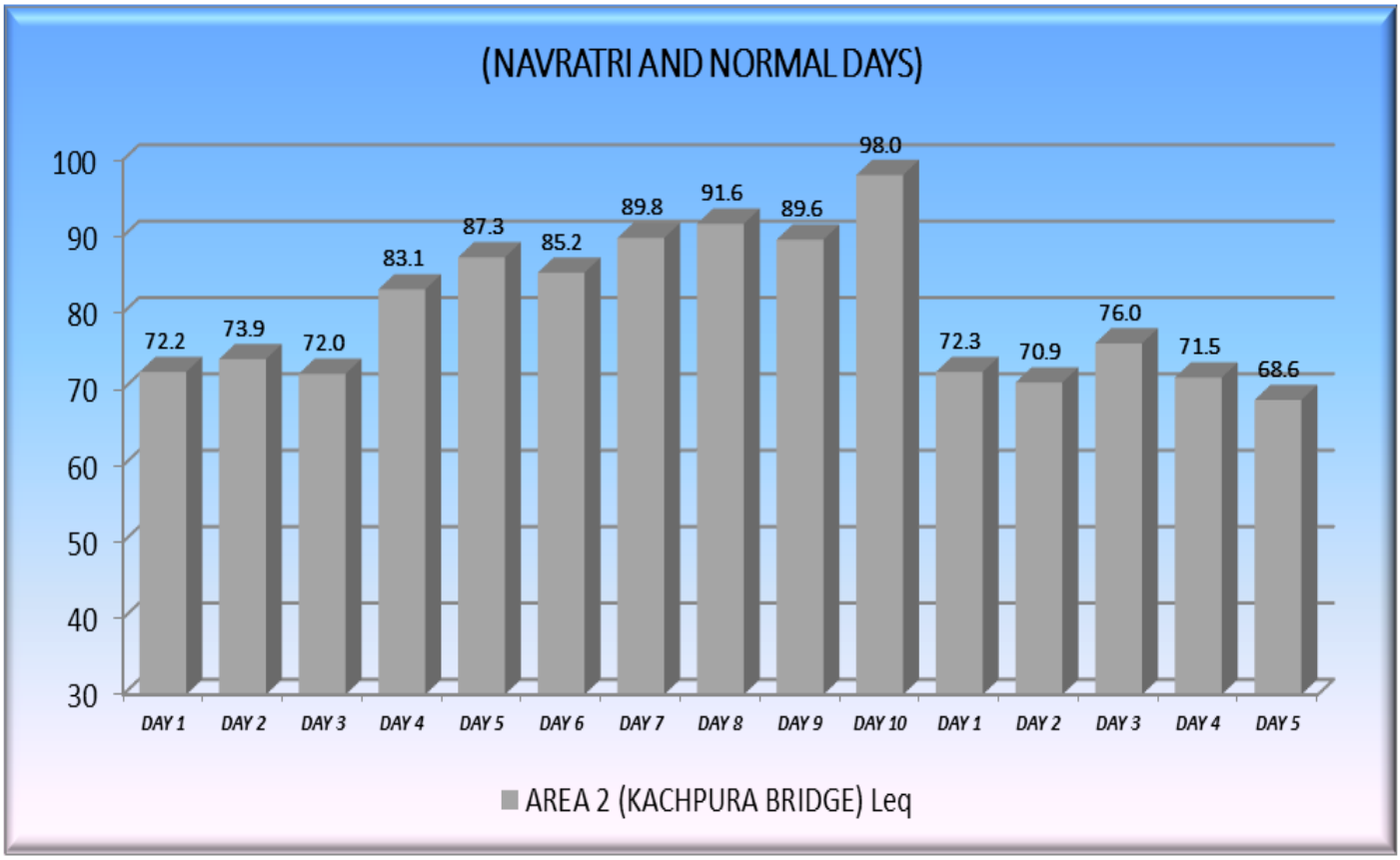
The noise levels recorded at various locations in Jabalpur city during the study period are shown in Table and figure 2 show location wise average values of noise levels. The results obtained from the study clearly indicate that noise levels in all the three localities under study during Navratri festival are much higher than that of the prescribed standard limits of CPCB, i.e. 45 dB (A) for residential area during night hours [5], It is like the values documented by some authors studied noise Pollution during Deepawali Festival in Kolhapur City of Maharashtra [6-10]. Sources, effects and control of noise Pollution and its Levels in different cities of India have also been studied by some scientists [11]. Noise pollution has become an environmental problem in Jabalpur and in other parts of India during religious festivals. This can cause negative impact on public health and welfare. Noise interferes in complex task performance, modifies social behaviour and causes annoyance.

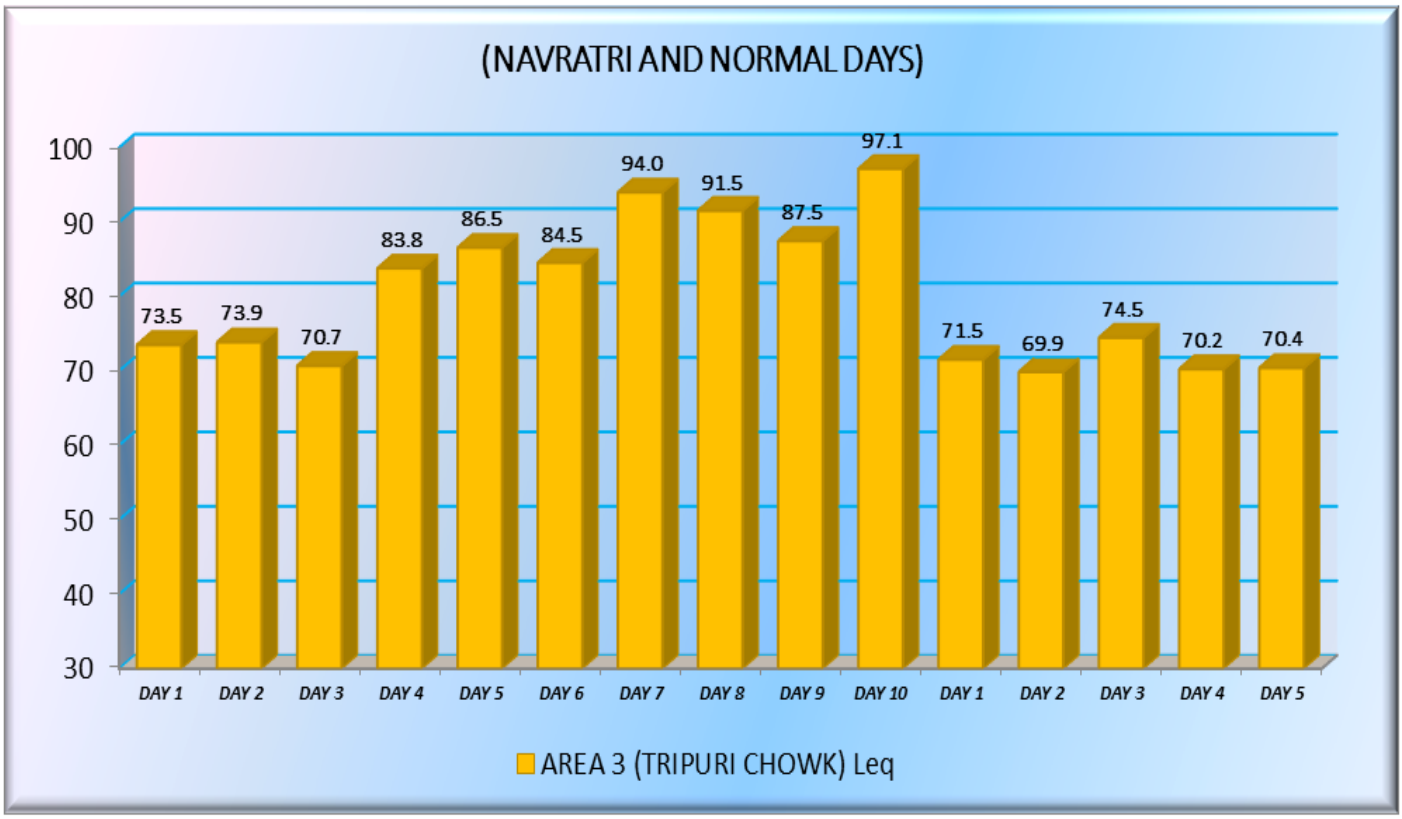

AREA 1 (VIJAY NAGAR)
80
75
70
65
60
55
50
73.09
70.26
73.59
71.69
70.77
72.49
70.33
69.41
70.73
72.37
68.97
68.33
72.78
69.97
73.79
73.14
71.36
72.42
65.39
70.07
71.18
72.86
71.61
67.06
67.65
68.45
66.65
67.65
69.95
67.05
day 1 Leq
day 2 Leq
day 3 Leq
day 4 Leq
day 5 Leq
NORMAL DAYS
DAY HOURS 8 AM - 9 AM
DAY HOURS 9 AM - 10 AM
NIGHT HOURS 6 PM TO 7 PM
NIGHT HOURS 7 PM TO 8 PM
NIGHT HOURS 8 PM TO 9 PM
NIGHT HOURS 9 PM TO 10 PM


AREA 2 (KACHPURA BRIDGE)
80
75
70
65
60
55
50
45
40
69.72
69.84
69.72
74.13
72.32
70.88
66.57
73.17
68.82
71.12
71.64
74.23
76.42
76.82
76.21
77.32
63.29
66.81
74.55
73.49
66.97
69.85
68.05
66.98
70.27
67.55
day 1 Leq
day 2 Leq
day 3 Leq
day 4 Leq
day 5 Leq
NORMAL DAYS
DAY HOURS 8 AM - 9 AM
DAY HOURS 9 AM - 10 AM
NIGHT HOURS 6 PM TO 7 PM
NIGHT HOURS 7 PM TO 8 PM
NIGHT HOURS 8 PM TO 9 PM
NIGHT HOURS 9 PM TO 10 PM


AREA 3 (TRIPURI CHOWK)
80
75
70
65
60
55
50
69.52
70.38
70.32
67.72
74.26
71.89
71.36
68.56
70.02
69.36
69.87
69.04
72.02
72.01
77.31
75.09
72.64
72.62
64.27
70.07
69.59
71.41
72.07
68.88
70.95
71.75
69.95
68.15
70.85
69.15
day 1 Leq
day 2 Leq
day 3 Leq
day 4 Leq
day 5 Leq
NORMAL DAYS
DAY HOURS 8 AM - 9 AM
DAY HOURS 9 AM - 10 AM
NIGHT HOURS 6 PM TO 7 PM
NIGHT HOURS 7 PM TO 8 PM
NIGHT HOURS 8 PM TO 9 PM
NIGHT HOURS 9 PM TO 10 PM


(NAVRATRI AND NORMAL DAYS)
AREA 1 (VIJAY NAGAR) Leq
110
100
90
80
70
60
50
73.8
71.6
71.8
77.9
84.7
85.2
91.6
91.1
88.2
106.1
72.2
70.4
74.7
70.7
68.1
DAY 1
DAY 2
DAY 3
DAY 4
DAY 5
DAY 6
DAY 7
DAY 8
DAY 9
DAY 10
DAY 1
DAY 2
DAY 3
DAY 4
DAY 5


(NAVRATRI AND NORMAL DAYS)
100
90
80
70
60
50
40
30
72.2
73.9
72.0
83.1
87.3
85.2
89.8
91.6
89.6
98.0
72.3
70.9
76.0
71.5
68.6
DAY 1
DAY 2
DAY 3
DAY 4
DAY 5
DAY 6
DAY 7
DAY 8
DAY 9
DAY 10
DAY 1
DAY 2
DAY 3
DAY 4
DAY 5
AREA 2 (KACHPURA BRIDGE) Leq



CONCLUSIONS

The Noise levels of all the stations are higher than the prescribed limits. The main source of noise is sound systems noise and huge loud speaker during Navratri festival days. Considering the above aspects, we can conclude that noise dominates the spectrum of environmental noise. The people living in noisy area especially above 70 dB(A) should take precaution in order to avoid noise induced hearing loss and other problems. Celebration of festivals should be eco-friendly. Unlimited use of powerful sound systems should be controlled. Public education appears to be the best method as suggested by the respondents. However, government and NGOs can play a significant role in this process. Therefore, need of Eco-City planning and awareness of people in the matter of environment will be a solution of noise pollution problem. Necessary preventive measures must be taken by the appropriate authority to implement the Noise Pollution (Regulation and Control) Rules, 2000 in time bound manner. As it is a short-term assessment of noise pollution problems in the town, further study may also be required to address the chronic effect of noise pollution in the Jabalpur city.

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REFERENCES

1. Anisa B. Khan “Impact of noise pollution on community health – A study at Pondicherry”, Indian Association of Biomedical Scientists, Vol. 18, No. 3, 1998, pp 183-190.

2. Alam, J.B., Jobair.J. Rahman.M.M, Dikshit. A.K. and Khan S.K. Study on traffic noise level of sylhet by multiple regression analysis associated with health hazards||, Iran. J.Environ. Health. Sci.Eng., 2006; 3(2):71-78.

3. Murthy,V.K., Khanal, S.N., Assessment of traffic noise pollution in Banepa, a semi urban town of Nepal, Kathmandu university,Journal of science, engineering and technology, 2007;1:1-9.

4. [6]. S. Sampath, Das Murali S., Kumar Sasi V. (2004): Ambient noise levels in major cities in Kerala, J. Ind. Geophys. Union, Vol.8.No.4,pp 293-298.

5. [7]. T. VidyaSagarAnd G. NageshwarRao (2006), ‘Noise Pollution Levels in Visakhapatnam City (India)’, Journal of Environmental Science and Engineering, 48(2), pp 139142.

6. [8]. Gangwar, K K, Joshi, BD and Swami, A. (2006) : Noise pollution status at four selected intersections in commercial areas of Bareilly, Metropolitan City. Him.J.Env.and Zoo.,20(1)75-77.

7. [9]. Chauhan and Pande (2012), Study of noise level in different zones of Dehradun city, Uttarakhand, Report and opinion 2010, 2(7).

8. [10]. Alam, Wazir (2011), 'GIS based Assessment of Noise Pollution in Guwahati City of Assam, India', International Journal of Environmental Sciences, 2(2), pp 731-740.

9. [11]. Hunashal B. Rajiv, Patil B. Yogesh (2012) Assessment of noise pollution indices in the city of Kohlapur, India, International Conference on Emerging Economics- Prospects and Challenges(ICEE-2012), Procedia – Social and Behavioral.

10. [12]. PandeyGovind and DubeySoni, "Traffic Noise Prediction using FHWA Model on National Highway - 28 in India" J.Environ. Res. Develop. Vol. 7 No. 1, July-September 2012.

11. [13]. PandeyGovind and Renesha Singh,2013 A Study of Noise in Gorakhpur City, Uttar Pradesh (India). Int. journal Of structural and Civil engg. Research. 02, pp. 241-249.

12. (7)HuiXie, JianKang,and Gary H Mills, Clinical review: The impact of noise on patients' sleep and the effectiveness of noise reduction strategies in intensive care units, Crit Care.; 13(2): 208, 2009.

13. (8)SSRG International Journal of Civil Engineering (SSRG-IJCE) – volume 3 Issue 5 – May 2016 ISSN: 2348 – 8352 www.internationaljournalssrg.or Page 86 Assessment of Noise Level around the Hospitals of the Jaipur City and its impact on health.

14. A.K. Sharma, 'The structure of Indian Society', NCERT, 2003, pp 1-13. And http://info.acoustiblok.com/blog/bid/79695/Navaratri-Festival-Brings-Noise-Pollution-Levels-to-Historic-Highs

15. Concha-Barrientos M. Campbell-Lendrum D. and Steenland K., Occupational Noise, Assessing the Burden of Disease from Work- Related Hearing Impairment at National and Local Levels. Environmental Burden of Disease, Series No. 9, World Health Organization Protection of the Human Environment, Geneva, 1, (2004)

16. PH. Bhagwat and Pramod M. Meshram, International Journal of Pharmaceutical and chemical sciences, 2(1), (2013)

17. Tripathy D.B., Noise pollution, A.P.H. Publishing Corporation, New Delhi, India, (1999)

18. CPCB, The Noise Pollution (Regulation and Control) Rules, published in the Gazette of India, vide S.O. 123(E), dated 14.2.2000 and subsequently amended vide S.O. 1046(E), dated 19.09.2006 and S.O. 50 (E) dated 11.01.2010 under the Environment (Protection) Act 1986, (2000)

19. 6. C.P.C.B., (Pollution Control Acts, rules, and notifications issued there under. Pollution Control Series, PCL/2/1992 (I), New Delhi, (1995)

20. 7. Mangalekar S.B., Jadhav A.S. and Raut P.D., Study of noise pollution in Kolhapur city, Maharashtra, India, Universal journal of Environmental research and technology, 2(1), 65-69 (2012)

21. 8. Lad R. J., Patil V. N. and Raut P. D., Study of Noise Pollution during Deepawali Festival in Kolhapur City of Maharashtra, India, Indian Streams Research Journal, 1(VII), 82 (2011)

22. 9. Agarwal S. and Swami B.L., Status of Ambient Noise Levels in Jaipur City, Environment Conservation Journal, 11(1and2), 105-108 (2010).