

Assessment of Outdoor and Indoor Noise Pollution in Silence Zone of Gorakhpur City

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Abstract- The present paper is concerned with assessment of outdoor and indoor noise pollution in silence zone of Gorakhpur city. Ambient noise level was carried out for indoor and outdoor noise level of silence zone which comprise of School, Colleges, Hospitals, Courts and worship places which require peaceful environment. The sample data obtained by site observation using Sound Level Meter (Brule and Kjare), model 2232 for day and night hour and the status with respect to regulatory standards given in Act “Noise Pollution (Regulation and Control) Rules, 2000” has been evaluated. The sampling stations were selected at twelve different locations in silence area of Gorakhpur city and Energy Equivalent sound level (L_{eq}) for hourly observations for outdoor and indoor noise was made at these sites. The relative standing of outdoor and indoor noise with respect to regulatory norms was looked into and the range of minimum and maximum values of L_{eq} was also workout. It was found that the outdoor noise levels are influenced by traffic volume, shops, crowd, congested and uneven road and submergence of zones. It is also seen that, on many sites, significant increase in indoor noise is observed in morning and evening hours in temples when large number of worshipers come to temple for worship and in afternoon at school around 2.00 p.m.- 3.00 p.m. when school off. The peak level in hospital is seen in afternoon hours around 2.00 p.m. – 3.00 p.m. It also observed that, even though there is a reduction in the noise level at indoor points as compared to outdoor points yet it is a point of concern that for most of time during the day both the outdoor and indoor noise levels for beyond the maximum permissible limit of 50 dB (A), thus it is concluded that there is a need to adopt suitable control measures for the reduction of noise at outdoor and indoor points.

Keywords — Energy Equivalent sound level (L_{eq}), Outdoor and indoor noise, ambient noise level, Gorakhpur city.

1. INTRODUCTION

Noise is defined as unpleasant, unwanted loud sound causing nuisance and disturbance to the receiver. Sound becomes noise when it interferes with normal activities. The rapid growth and development of nation in terms of industrialization, urbanization and commercialization of places has given birth to various types of pollution which continue to modify the environment, the noise pollution is one of them. Each and every activity of an individual contribute to some kind of pollution to the environment directly or indirectly, therefore, it is almost impossible to completely eliminate the pollutant which is generated by essential function or activities but can be controlled or reduce. A permissible limit is being set by the government for all types of pollutants. The measurement of pollution especially in the case of noise pollution is all the most essential because auditory system gets automatically adjusted to ambient sound and slow increase in the sound level go unnoticed. The potential health effects of noise pollution ranging from psychological to physiological such as sleep disturbance, reduced working efficiency, auditory damage, speech interference, increase in blood pressure, fatigue etc. the effects of noise are temporary and are seldom catastrophic but adverse effects that impair health can be cumulative with prolonged or repeated exposure.

Gorakhpur is an important city from historic point of view of Uttar Pradesh. Now, getting attention of industrial owner of big brands and name to set their plant and retail shops here. In last few years the face of city has been changed a lot. Many fashion brand shops and consumer products acquire the place in market. This all invite many mall in city. Gorakhpur is now known for the educational institutions whereas Gorakhpur has many private and government

schools, colleges and university. The Gorakhnath temple and Gita press are favorite tourist place.

The developing city brings along the variety of population as well. With increasing trend of population many environmental problems such as water, air and land pollution arises. Noise is a form of air pollution many time given least preference in comparison of other type of pollution problems. But doing this thing gives rise to this problem. As in doctors word, precaution is better than cure. So, the problem of noise pollution should be taken seriously so that population will not face the ill effects of noise pollution. Thus, Gorakhpur being an important place needs attention as well.

The present paper concerned with the assessment of outdoor and indoor noise pollution at silence zones of Gorakhpur city. This attempt has been made to know that how is the silence zone of city such as schools, universities, hospitals, courts and worship places which come in category of silence zones are affected by noise pollution. The increase in volume of traffic, population explosion and changes in life style of the people in the city have increased the noise several folds in past decade. The development without care of environment and other facts will never be fruitful. So, proper care and discipline should take to assess the environmental impact of development projects.

In the light of this measurement a program to assess the noise level of the some silence zones of Gorakhpur was taken up.

2. METHODOLOGY

In the present study, the noise levels have been recorded with the help of *Precision Noise Level Meter made by 'Bruel and Kjaer, Denmark (2232)'*. The data have been collected for overall 14 hours on the respective days at the selected sites during 8.00a.m.-1.00p.m. and 2.00 p.m. to 10.00p.m. during day hours and 5.00a.m. to 6.00a.m. during night hours. The time interval selected for observation cover most part of the day. The readings have been taken from at about 1.5 m above the ground level during the concerned hours for 10 minute duration at fixed intervals of 15 seconds.

SAMPLING POINTS

Twelve sampling points at schools, colleges, hospitals, court and worship places in silence zones have been selected. Moreover, each site has two to three observation sites generally located in a range from 100 to 200 meters. Utter care has been taken in noting down the observations in the silence zone. The sites have been selected so as to cover highly sensitive areas of the whole city paying equal

importance to the regions. Table1 shows the location of sampling points and schedule of observations.

Table 1: Location of Sampling Points and Schedule of Observations.

S.no.	Date	Sampling Point
1	31/7/2014	MMMUT, Gorakhpur
2	3/8/2014	BRD Medical College
3	5/8/2014	DDU Gorakhpur University
4	7/8/2014	Collectorate Court
5	12/8/2014	Hanuman Mandir, Betiahata
6	13/8/2014	Little Flower School, Dharampur
7	16/8/2014	District Hospital
8	19/8/2014	Carmel Girls Inter College
9	21/8/2014	KalimataMandir, Golghar
10	23/8/2014	GorakhnathMandir
11	26/8/2014	Star Hospital
12	29/8/2014	Civil Court

3. ANALYSIS OF DATA, RESULT AND DISCUSSION

The outdoor and indoor noise levels at all sampling points has been shown in the graphical form from Fig. 1 to Fig. 12. It is seen from Fig.1 to Fig.12 that the outdoor noise level remains above the permissible limit right from the early morning hours and shows the same trend during whole day time except at Hanuman Mandir, District Hospital, KalimataMandir where the noise level is at highest peak at 3.00p.m; 2.00p.m. and 7.00p.m. respectively. The indoor noise levels though less than the outdoor noise levels but still is above the permissible limit except at KalimataMandir where the indoor noise is totally influenced by outdoor noise where the indoor noise is more or less equal to the outdoor noise level at all day hours in the silence zones of the Gorakhpur City.

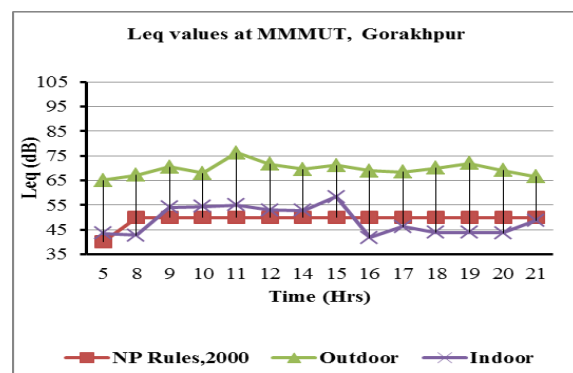


Fig1: Outdoor and Indoor Noise Levels at MMMUT, Gorakhpur

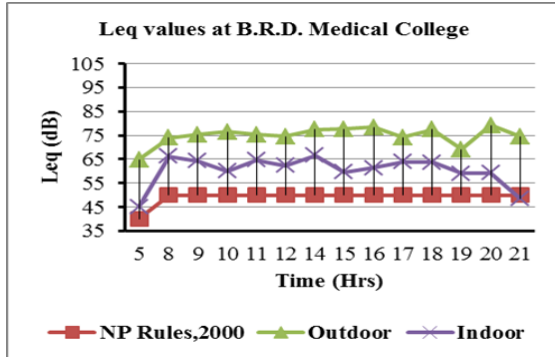


Fig2: Outdoor and Indoor Noise Levels at B.R.D. Medical College.

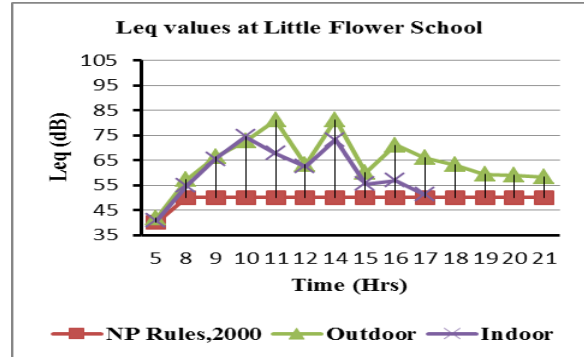


Fig6: Outdoor and Indoor Noise Levels at Little Flower School, Dharampur

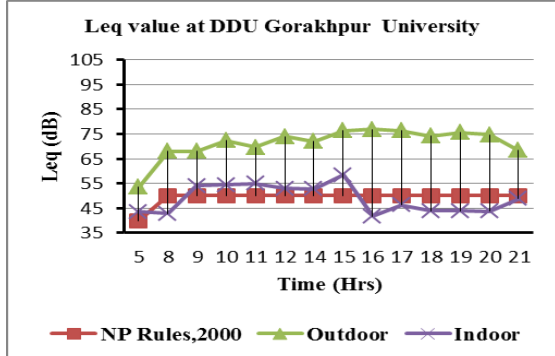


Fig3: Outdoor and Indoor Noise Levels at DDU Gorakhpur University

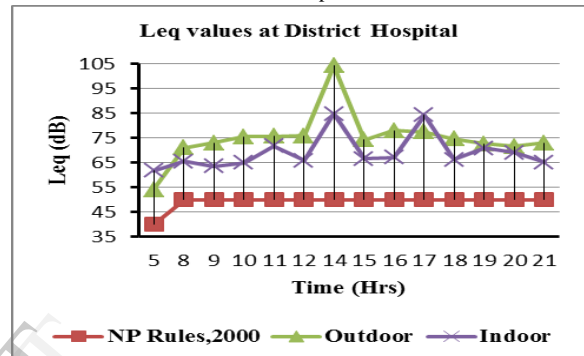


Fig7: Outdoor and Indoor Noise Levels at District Hospital

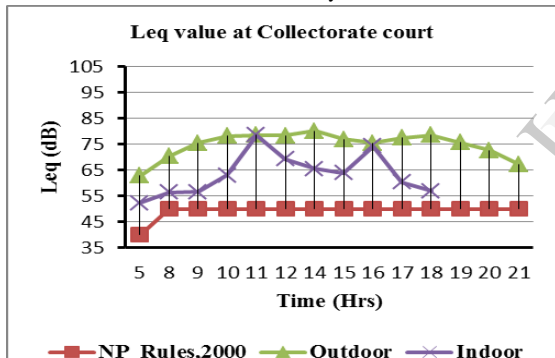


Fig4: Outdoor and Indoor Noise Levels at Collectorate Court

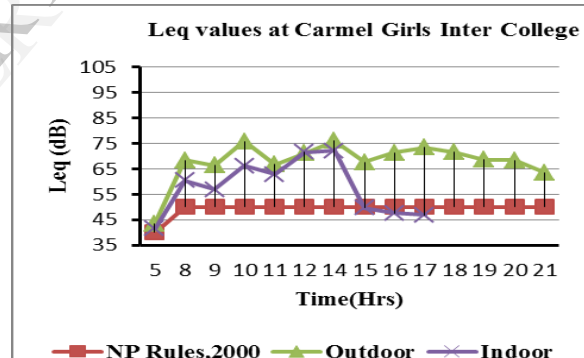


Fig8: Outdoor and Indoor Noise Levels at Carmel Girls Inter College

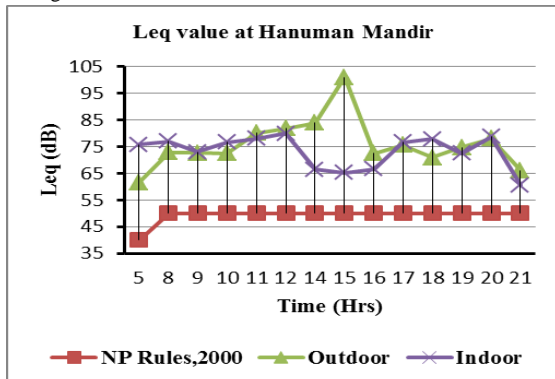


Fig5: Outdoor and Indoor Noise Levels at Hanuman Mandir, Betiahata

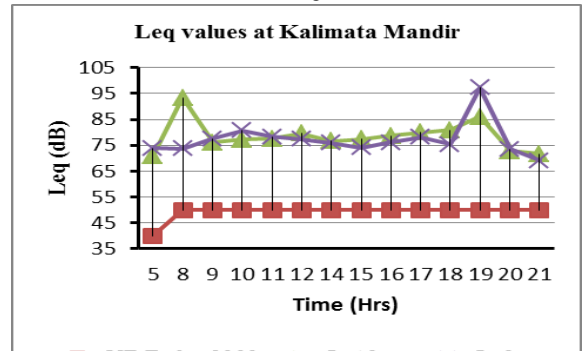


Fig9: Outdoor and Indoor Noise Levels at KalimataMandir, Golghar

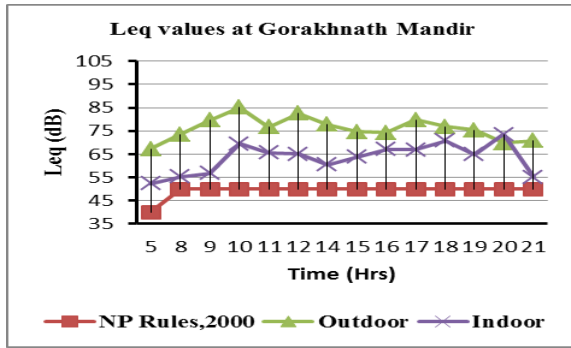


Fig10: Outdoor and Indoor Noise Levels at GorakhnathMandir

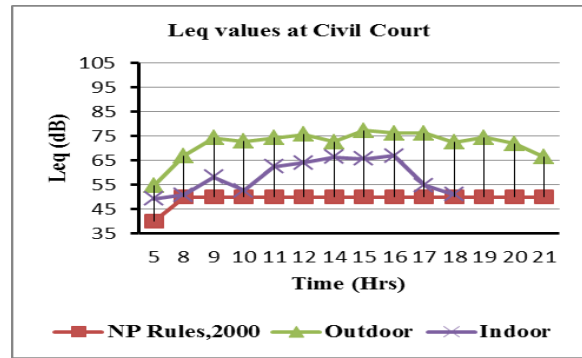


Fig12: Outdoor and Indoor Noise Levels at Civil Court.

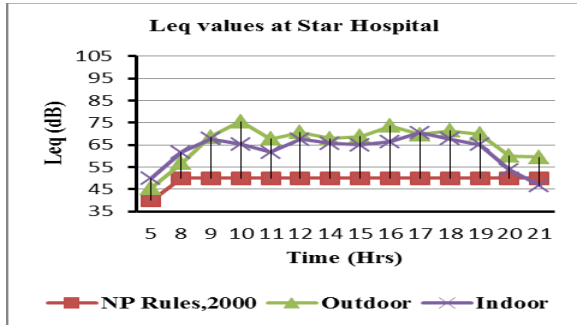


Fig11: Outdoor and Indoor Noise Levels at Star Hospital

At a glance at Table 2 reveals that the difference between maximum observed outdoor noise (Leq) and acceptable noise level of 50 dB(A) at various observation sites lies in the range 25.68– 54.30 dB(A) which is greater covered than 10 dB(A) with respect to the maximum permissible values of 50 dB(A) and is, therefore, covered for suitable action by the prescribed authority on complain as per Noise pollution(Regulation and Control) Rules, 2000.

Table 2: Observed maximum and minimum outdoor noise levels at various sampling station

S.no.	Sampling Station	Date	Day Time				Night Time		Difference between maximum and minimum value in dB(A)	Acceptable Noise Level dB(A) during day time	Difference b/w Max. Observed Leq and Acceptable Value dB(A)
			Maximum Observed Leq dB(A)		Minimum Observed Leq dB(A)		Observed Leq dB(A)				
			Hour	Level	Hour	Level	Hour	Level			
1	MMMUTGorakhpur	31/7/2014	11-12	76.2	21-22	66.48	5-6	65.16	9.72	50	26.2
2	BRD Medical College	3/8/2014	20-21	79.25	19-20	69.06	5-6	64.78	10.19	50	29.25
3	DDU Gorakhpur University	5/8/2014	16-17	76.88	9-10	68.06	5-6	53.6	8.82	50	26.88
4	Collectorate Court	7/8/2014	14-15	80.21	8-9	76.88	5-6	62.97	3.33	50	30.21
5	Hanuman Mandir, Betiahata	12/8/2014	15-16	101.09	21-22	66.14	5-6	61.7	34.95	50	51.09
6	Little Flower School, Dharampur	13/8/2014	14-15	81.34	8-9	57.27	5-6	41.72	24.07	50	31.34
7	District Hospital	16/8/2014	14-15	104.3	8-9	71.07	5-6	54.19	33.23	50	54.3
8	Carmel Girls Inter College	19/8/2014	14-15	76.11	21-22	63.49	5-6	43.46	12.62	50	26.11
9	KalimataMandir, Golghar	21/8/2014	8-9	93.48	21-22	71.64	5-6	70.91	21.84	50	43.48
10	GorakhnathMandir	23/8/2014	10-11	85.08	20-21	69.85	5-6	67.2	15.23	50	35.08
11	Star Hospital	26/8/2014	10-11	75.68	8-9	56.74	5-6	45.64	18.94	50	25.68
12	Civil Court	29/8/2014	15-16	77.41	21-22	66.48	5-6	54.63	10.93	50	27.41

The outdoor noisiest points are District Hospital, Hanuman Mandir (Betiahata) andKalimataMandir (Golghar) reason behind being noisiest place is submergence of zones, traffic congestion and less wide road. The action to reduce the traffic volume and speed needed.

Table 3: Observed maximum and minimum Indoor noise levels at various sampling station

S.NO.	Sampling Station	Date	Day Time				Night Time		Difference between maximum and minimum value in dB(A)	Acceptable Noise Level dB(A) during day time	Difference b/w Maximum Observed Leq and Acceptable Value dB(A)
			Maximum Observed Leq dB(A)		Minimum Observed Leq dB(A)		Observed Leq dB(A)				
			Hour	Level	Hour	Level	Hour	Level			
1	MMMUT Gorakhpur	31/7/2014	15-16	58.47	16-17	41.72	5-6	43.62	16.75	35	23.47
2	BRD Medical College	3/8/2014	14-15	66.55	21-22	48.55	5-6	45.05	18	30	36.55
3	DDU Gorakhpur University	5/8/2014	14-15	63.86	20-21	45.54	5-6	42.29	18.32	35	28.86
4	Collectorate Court	7/8/2014	11-12	78.54	8-9	56.44	5-6	52.45	22.1	35	43.54
5	Hanuman Mandir, Betiahata	12/8/2014	12-1	80.03	21-22	60.54	5-6	75.75	19.49	35	45.03
6	Little Flower School, Dharampur	13/8/2014	10-11	74.47	17-18	51.28	5-6	40.8	23.19	35	39.47
7	District Hospital	16/8/2014	14-15	84.86	9-10	63.55	5-6	61.81	21.31	30	54.86
8	Carmel Girls Inter College	19/8/2014	14-15	72.16	17-18	46.79	5-6	41.54	25.37	35	37.16
9	Kalimata Mandir, Golghar	21/8/2014	19-20	97.23	21-22	69.08	5-6	73.85	28.15	35	62.23
10	Gorakhnath Mandir	23/8/2014	20-21	73.52	21-22	55.1	5-6	52.29	18.42	35	38.52
11	Star Hospital	26/8/2014	17-18	70.43	19-20	46.79	5-6	49.98	23.64	35	35.43
12	Civil court	29/8/2014	16-17	66.98	18-19	50.93	5-6	49.43	16.05	35	31.98

It is also revealed from Table 3 that the indoor noise levels, when compared to desirable values to 30-35 dB(A) as per WHO guidelines are found to have exceeded the range 23.47dB(A) – 62.23dB(A). This necessitates again the adoption to suitable remedial measures for control of outdoor noise and reduction of indoor noise. The **indoor noisiest points** are KalimataMandir (Golghar), District Hospital and Hanuman Mandir (Betiahata) which include worship and hospital which required peaceful environment. To control the noise level at this sites action to be needed.

4. CONCLUSION AND RECOMMENDATION

The assessment of outdoor and indoor noise pollution, which was carried out at twelve sampling stations, has revealed the following inferences:

1. It is found that the maximum observed outdoor noise level (Leq) lies in the range of 75.68 dB(A) - 104.3dB(A) and minimum observed outdoor noise level (Leq) are found in the range 56.74 dB(A) – 76.88 dB(A) during day time. Thus it is seen that the noise pollution exceeds the permissible limit of 50 dB(A) during day time at

all the sampling stations. Similarly the observed noise level (Leq) are found to lie in the range 41.72 dB(A) – 70.91dB(A) in morning hour during night time, which exceeds the acceptable limit of 40dB(A). It is, therefore, observed that the silence zone of Gorakhpur city do not remain silence zones in true sense in both day and night time.

2. The difference between maximum observed noise level (Leq) and acceptable value at different sampling stations lies in the range of 25.68 dB(A) – 54.3 dB(A) which greater than 10 dB(A) and hence complaint level for the action prescribed by the authority under Noise Pollution (Regulation and Control) Rules, 2000 has been exceeded at all the sampling stations.
3. The assessment of indoor noise level has indicated that the noise level at all the sampling station during day and night time exceeds the acceptable noise level in the range 23.47 dB(A) – 62.23 dB(A). This reflects a point of concern for the population present in Schools and Colleges, Hospitals, Courts and Religious places.
4. The comparison of outdoor and indoor noise level at various sampling station has revealed the reduction in noise level at sampling station,

namely, MMMUT, BRD Medical College, DDU Gorakhpur University, Collectorate Court and Civil Court.

However the reduction in noise level has been observed during certain hour at sampling station Hanuman Mandir(Betiahata), Little Flower School (Dharampur), District Hospital, Carmel Girls Inter College, KalimataMandir (Golghar), GorakhnathMandir and Star Hospital too but in some other hour the indoor noise level are found to exceeds even the outdoor noise level exceed.

- The District Hospital is found to be the highest noisy location in terms of outdoor noise level where as KalimataMandir (Golghar) is found to be highest noisy location in terms of indoor noise level.

The study has revealed that the silence zones of Gorakhpur city have been converted into noisy zones and the noise control measures such as control and diversion of traffic, provision of noise barriers and noise proofing of the interior of buildings may be adopted. If the need be, the affected building may also be relocated, wherever, feasible in the areas compliance with norms prescribed for silence zone. It is suggested that the adoption of noise control measure may be taken up urgently in the silence zone covering Hospital in priority. Hence it is recommended that the suitable action may be initiated for the noise control at source, in intermediate paths and at receiver end in the silence zones of Gorakhpur city as possible.

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