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Noise Assessment in Various Zones of South Delhi

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ABSTRACT
The increase in noise levels is resulting from combination of different sources, which causes adverse health impacts on out health such as risk of hypertension and heart disease, psychological stress and annoyance and sleepiness disease in adults. By Considering the excess of problems and its significance, it becomes very important to monitor noise level on routine basis to plan its mitigative measures. In this study, the noise levels have been monitored and identified at various zones of South Delhi. In this study South Delhi has been divided into four different zones viz. Industrial Zone (Okhla Industrial Area), Commercial Zone (Nehru Place), Residential Zone (Shaheen Bagh) and Sensitive Zone (Apollo Hospital). Every zone sub-divided into three locations for noise monitoring and analysis. The noise levels have been monitored using SL-4001 Sound Level meter from 9:00AM to 9:00PM. Noise levels have been monitored in every zone at identified three different locations for day time (12 hours). Its results and analysis are showing the noise levels of sensitive zone are alarming; however, the Industrial locations noise level is touching the prescribed close to permissible limits in day time. The noise levels monitored in commercial zone as well as residential zones observed to be exceeding prescribed / permissible limits in day time and sensitive zones were found to be alarming in compare to permissible limits during day time (9:00 am morning to 9:00 pm evening).
Keywords: Noise levels, Monitoring, Industrial, Commercial, Residential, Sensitive, Day time

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I. INTRODUCTION

I this modern era due to the development and urbanization noise become the major source of pollution of the world, development in technology, commerce, communication and education has enhanced the urban growth both in developed and developing countries coursing noise pollution, which defined as 'unwanted sound', is perceived as an environmental stressor and nuisance. Increasing noise exposure in most cities is considered a serious problem today and, high focus is currently concentrated into monitoring and calculating the actual noise exposure levels to understand the size of the actual problem. Noise is a prominent feature of the environment including noise from construction, traffic, transport, industry and communication sources.

The studies related to noise monitoring and assessment have also been reviewed and presented in the subsequent sections which covers sounds and impact of noise, it includes road traffic noise, commercial noise, Industrial Noise as one of the main sources of environmental pollution. Most impact studies have been associated with annoyance and attitudinal surveys only. Little scientific literature exists related to effects of traffic noise on human physiology in the Indian context. The findings of this review search and analysis observe that very little studies are available relating to traffic noise and health impacts. In review of different papers showed that the noise level causing by road traffic is major annoyance to a variety of degree among the respondents. **Centre for Science Environment, Delhi** (2011) has confirmed that New Delhi is the loudest city in India. The level of noise in the streets can go above 100 decibels, which is several times louder than Singapore. According to studies, the average age of citizens in New Delhi are 10 years older in terms of hearing, which means they are at greater risk of losing their hearing in their 50s or early 60s. **Mohan (2000) studied** traffic noise and community response of inhabitants living near an arterial road in New Delhi. In this study it was reported that up to the distance of 30 m from the road the people residing are more affected due to traffic noise. **Agarwal and Swami (2011)** studied the impact of noise near roadside in Jaipur city, his survey reported about 52% of subjects were suffering from frequent irritation, 46% had hypertension, and 48.6% reported difficulties in sleep due to traffic noise and that female subjects were more sensitive toward noise related health problems. **Wani and Jaiswal (2010)** studied traffic noise and subjective

community response in the Gwalior city. it was reported that 50% of the subjects were always annoyed and 33% had a constant headache for speech interference, 43% subjects reported highly affected, 21% moderately affected, 32% low, and 4% least affected. According to **Rao and Rao (1992)** carried out noise pollution studies and community survey in the city of Visakhapatnam. **Dasarathy (2015) reported** that presence of noise pollution in the traffic, construction sites, flour mills, etc., and its seriousness major disturbance by loudspeakers and automobiles is felt by age groups of 20-40 years somewhat lesser than other groups. **Jyoti and Dahiya (2011)** described that traffic related noise pollution accounts for nearly two-third of the total noise pollution in an urban area. Noise, **Harman (1973) summarized** the results of a noise surveyed and recommended for situations where the prediction formulas are not workable. **Oakes (1973)** reviewed and described use of curbsides measurements is justified for congested urban situations where the interference from pedestrians and the obstruction caused by the measuring and recording equipment can present serious problems. **Delany (1976) has organized** an improved procedure for prediction of noise levels L10 from road traffic. **Ko (1978)** informed an extensive results of traffic noise measurement and divided into three categories: first is enclosed sites, 2nd is semi-enclosed sites and third one is open sites. The differences were found in the sound pressure levels as L10, L50 and L90 and its standard deviations were obtaining at the enclosed site, semi-enclosed and open sites. **Mulholland (1977) describe** the development of means of using a scale model of a road and its surrounding urban environment to predict Leq, L10 and other measures of traffic noise. The all above reviews of the Literature shows the noise level measurement is very important for minimizing/control noise levels from identified sources. So, the given study was aiming to identify / monitor the noise level at different time of the day follows the various categories of land use like industrial, commercial, residential and silence zone of South Delhi and encouraging its mitigation measures as well and control measures subsequently.

II. METHODOLOGY

2.1 Site Description:

South Delhi is a main and most crowded area of Delhi Capital having emergence of hot spot for different Industrial belt and different construction industries are manufacturing goods for open marker, multipurpose commercial markets like Nehru place is a famous hub of IT goods and software material hub of India were different types of Computer, Computer parts, software, both software and hardware are available, In residential area popular VIP's colony like New friends colony having houses of VIP's living in Delhi, In silence zone famous hospitals like Apollo Hospital, Scot Heart Hospital, Holy family Hospital, Educational Institute Like Jamia Millia Islamia University and New friends colony Children school are selected for study area. The sites was selected according to Noise sensitivity zones and were covered as Industrial zone, Commercial Zone, Residential zone and silence zone were noise is very high and causing disturbance due to activities going on nearby. Four different land use were distributed and identified for noise level measurement and its analysis given in (Table-1 and Fig-1)

Table 1: Description of various Categories of land at South Delhi

S. No	Zone	Location	Latitude (North)	Longitude (East)
1	**Industrial zone**	Okhla Industrial Area	28.52′	77° 27′
2	**Commercial zone**	Nehru Place	28° 51″	77° 25″
3	**Residential zone**	Shaheen Bagh	28◦55′	77.29″
4	**Silence zone**	Apollo Hospital	28° 56′	77° 27′

Fig 1: Location Maps of South Delhi showing all four zones

2.2 Noise Monitoring Instrument

The sound level meter is used for acoustic (sound that travels through air) measurements. It is a common handy noise sampler with a small microphone system. In this diaphragm of the microphone responding to changes in pressure of air causing by sound waves. Sometime the instrument is referring as a Sound Pressure Level (SPL) Meter. The microphone is differentiated by the value of produced voltage while a known constant sound pressure is applicable on it. This is known as the microphone sensitivity. Its also needed the sensitivity of the microphone used. The instrument is capable for accurate conversion of electrical signal back to a sound pressure resulting sound pressure level (decibels dB) displayed. During study an effort were made to identify the noise level in various zones of South Delhi by using (SLM) sound level meter (SL-4001). The SLM's readings were collected during peak hours of the day (9.00 AM to 9.00 PM). Among all four zones each zone's sound level data were collected for 12 hours. Noise measurements were done at 3m from road side on an elevation of 130cm above the road surface. The sound level meter type chosen A and C type (SL-4001) during monitoring with the adjusted instruments capacity of measuring noise level from minimum 30 dB to maximum 130 dB at a height of 1.5 meter were used for measurements of Noise Pollution.

2.3 Noise Monitoring Procedure

During study effort was applied to identify the noise level at various zones of South Delhi by using handy sound level meter (SL-4001). The readings were taken during peak hours of the day from morning till evening (9.00 AM to 9.00 PM). In each zone the monitoring was done for 12 hours dived in three different locations and sampling was done at distance of three meter from road side and elevation from1.50 meter above the road surface.

S.No	Zone	Location	Morning)	Evening
1	**Industrial zone**	Okhla Industrial Area	9:00 am	9:00 pm
2	**Commercial zone**	Nehru Place	9:00 am	9:00 pm
3	**Residential zone**	Shaheen Bagh	9:00 am	9:00 pm
4	**Silence zone**	Apollo Hospital	9:00 am	9:00 pm

III. RESULTS AND DISCUSSION

Noise levels variations temporarily and which Includes all four zones like Industrial, Commercial, Residential and Silence zone, its process of monitoring, graphical representation, calculation of measured noise and its result and discussion by using digital sound level meter SL-4001. We have selected four different zones in our study and for each zone taken our readings at a different location at the distance of 1.5 m from the source. We have taken the readings in the time of 9 am morning till 9 pm night at an interval of one-

hour duration. The readings are summarized in the tabular form with respect to time and graphical representations were plotted for each identified location among all recommended zones by CPCB.

3.1Results of Noise Level at Industrial Zone - Okhla (L1)

Noise reading was absorbed during morning hours (9:00 am– 1:00pm) L.max is 79 dBA and Lmin 65 dBA and maximum is Leq recorded as 75.4 dBA as per standard for Industrial zone (Okhla Phase-I) it should between 75-70 dBA. So, from our observation we have found that Industrial zone is exceeding the prescribed Limit (Graphical representation of monitored data shown in below given Fig -2)

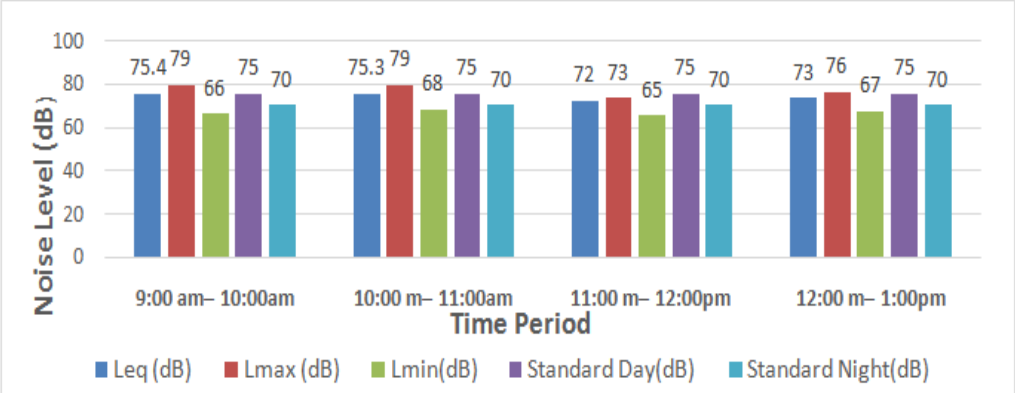

Fig-2 Comparative Noise level at Location 1 of Okhla Industrial Area

3.2 Results of Noise Level at Industrial Zone - Okhla (L2)

Noise reading was absorbed during morning hours (1:00pm- 5:00pm) L.max is 76 dBA and L.min 69 dBA and maximum is Leq recorded as 76.9 dBA as per standard for Industrial zone (Okhla Phase-I) it should between 75-70 dBA. So, from our observation we have found that Industrial zone is just crossing the prescribed Limit (graphical representations of monitored data of this location is shown below in Fig-3)

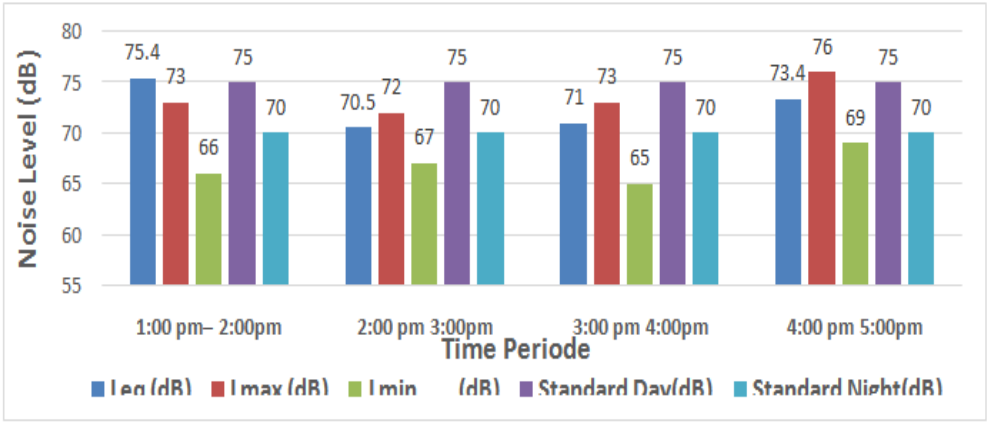

Fig-3 Comparative Noise level at Location 2 of Industrial Area

3.3 Results of Noise Level at Industrial Zone - Okhla (L3)

Noise reading was absorbed during morning hours (5:00pm-9:00pm) L.max is 78 dBA and L.min 56 dBA and maximum is Leq recorded as 74.2 dBA as per standard for Industrial zone (Okhla Phase-I) it should between 75-70 dBA. So, from our observation we have found that Industrial zone is touching the prescribed Limit (graphical representations of monitored data of this location is shown below in Fig-4)

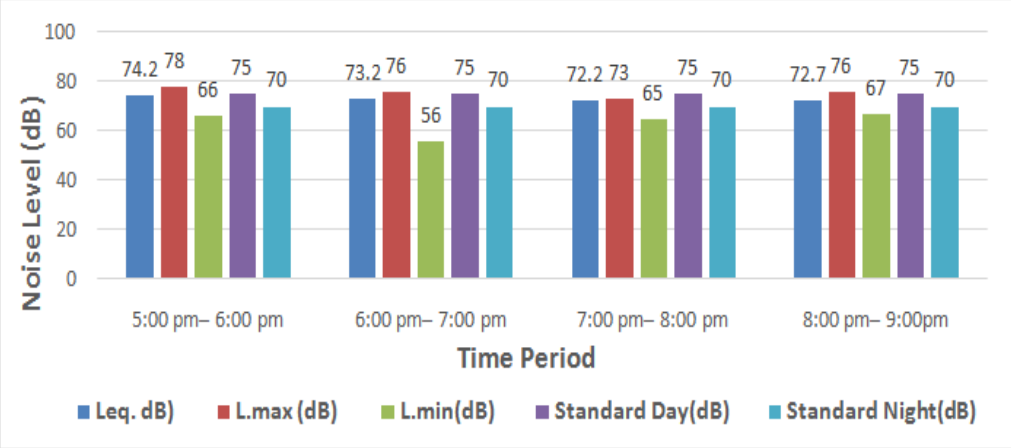

Fig-4 Comparative Noise level at Location 3 of Industrial Area

3.4. Results of Noise Level at Commercial Zone – Nehru Place (L1)

Noise reading was absorbed during morning hours (9:00 am– 1:00pm) L.max is 78 dBA and L.min 63 dBA and maximum is Leq recorded as 73.8 dBA as per standard for Commercial zone (Nehru Place) it should between 65-55 dBA. So, from our observation we have found that it is exceeding the prescribed Limit (graphical representations of monitored data of this location is shown below in Fig-5)

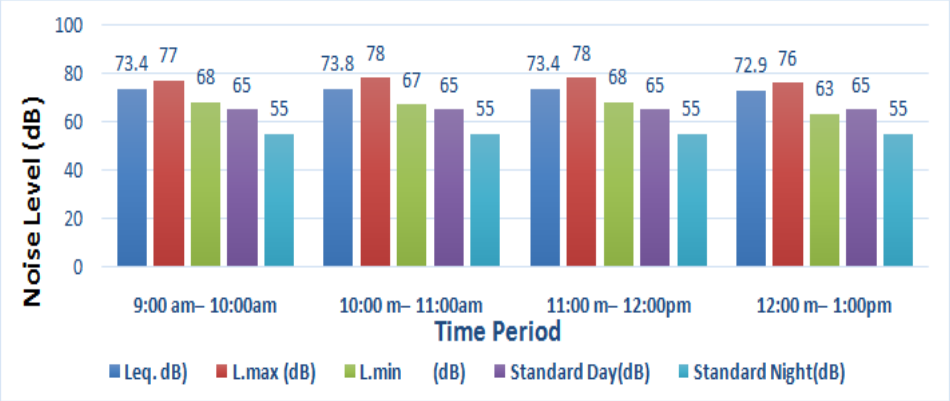

Fig-5 Comparative Noise level at Location 1 of Commercial Zone, Nehru Place

3.5 Results of Noise Level at Commercial Zone – Nehru Place (L2)

Noise reading was absorbed during morning hours (1:00 pm– 5:00pm) L.max is 79 dBA and L.min 68 dBA and maximum is Leq recorded as 75.7 dBA as per standard for Commercial zone (Nehru Place) it should between 65-55 dBA. So, from our observation we have found that it is exceeding the prescribed Limit (graphical representations of monitored data of this location is shown below in Fig-6)

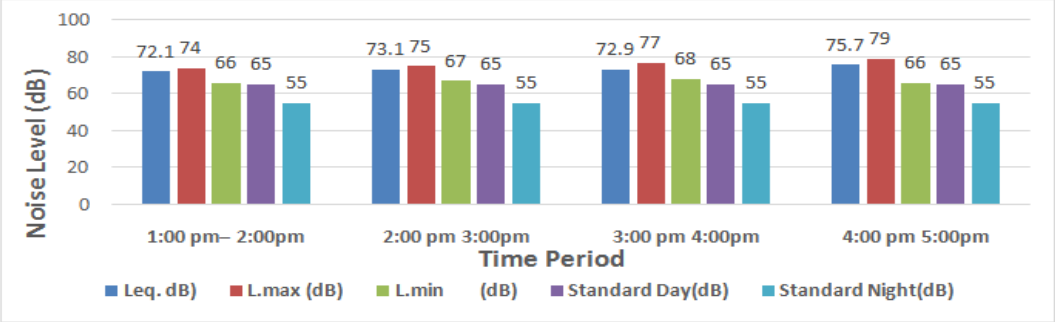

Fig-6 Comparative Noise level at Location 2 of Commercial Zone, Nehru Place

3.6 Results of Noise Level at Commercial Zone – Nehru Place (L3)

Noise reading was absorbed during morning hours (5:00 pm– 9:00pm) L.max is 79 dBA and L.min 68 dBA and maximum is Leq recorded as 75.6 dBA as per standard for Commercial zone (Nehru Place) it should between 65-55 dBA. So, from our observation we have found this zone is exeeding the prescribed Limit (graphical representations of monitored data of this location is shown below in Fig-7)

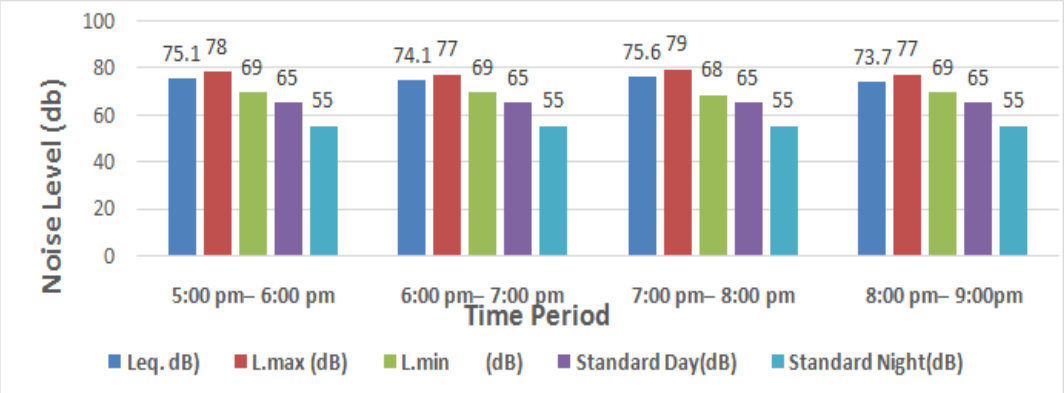

Fig-7 Comparative Noise level at Location 3 of Commercial Zone, Nehru Place

3.7 Results of Noise Level at Residential Zone – Shaheen Bagh (L1)

Noise reading was absorbed during morning hours (9:00 am– 1:00pm) L.max is 71 dBA and L.min 54 dBA and maximum is Leq recorded as 68.7 dBA as per standard for Residencial zone (Shaheen Bagh) it should between 55-45 dBA. So, from our observation we have found this location zone is exceeding the prescribed Limit (graphical representations of monitored data of this location is shown below in Fig-8)

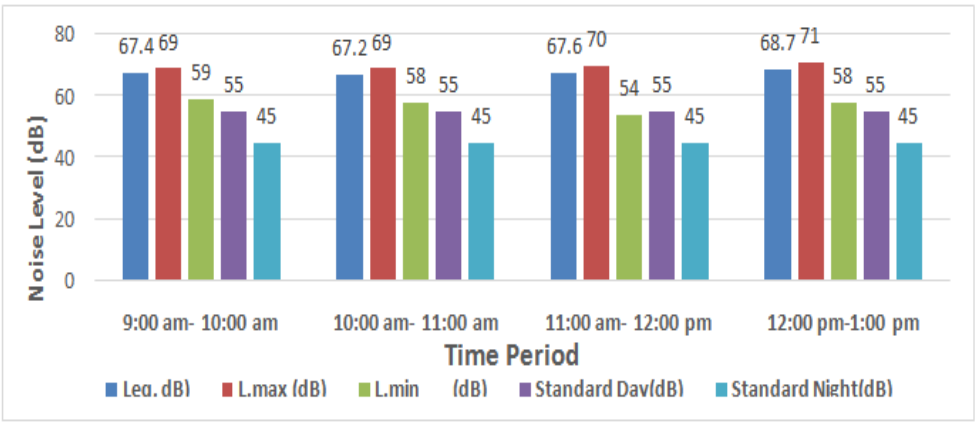

Fig-8 Comparative Noise level at Location 1 of Residential Zone, Shaheen Bagh

3.8 Results of Noise Level at Residential Zone – Shaheen Bagh (L2)

Noise reding was absorbed during morning hours (1:00 pm– 5:00pm) L.max is 72 dBA and L.min 61 dBA and maximum is Leq recorded as 69.3 dBA as per standard for Residencial zone (Shaheen bagh) it should between 55-45 dBA. So, from our observation we have found thislocation is exceeding the prescribed Limit (graphical representations of monitored data of this location is shown below in Fig-9)

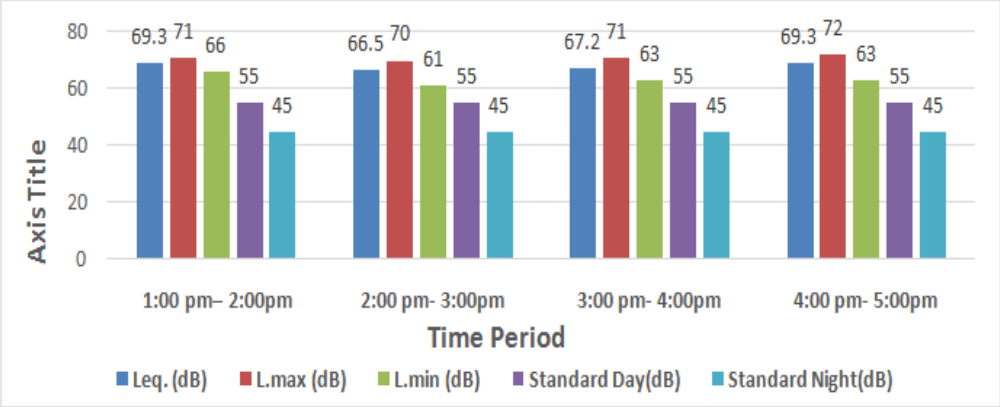

Fig-9 Comparative Noise level at Location 2 of Residential Zone, Shaheen Bagh

3.9 Results of Noise Level at Residential Zone – Shaheen Bagh (L3)

Noise reading was absorbed during morning hours (5:00 pm– 9:00pm) L.max is 73 dBA and L.min 61 dBA and maximum is Leq recorded as 68.4 dBA as per standard for Residencial zone (Shaheen bagh) it should between 55-45 dBA. So, from our observation we have found that this location is exceeding the prescribed Limit (graphical representations of monitored data of this location is shown below in figure-10)

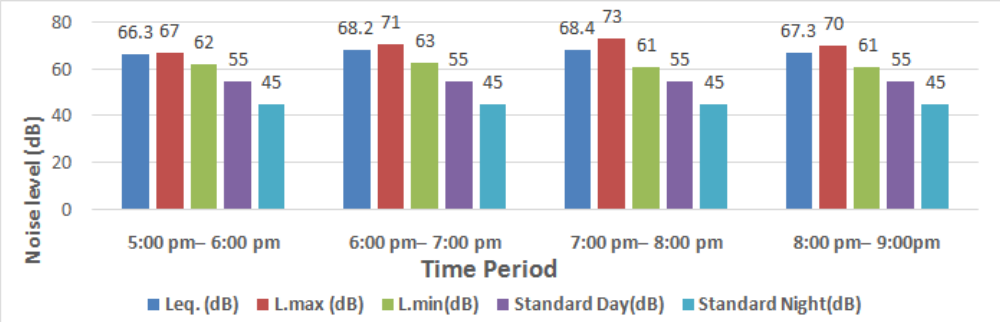

Fig-10 Comparative Noise level at Location 3 of Residential Zone, Shaheen Bagh

3.10 Results of Noise Level at Silence Zone – Apollo Hospital (L1)

Noise reading was absorbed during morning hours (9:00 am– 1:00pm) L.max is 67 dBA and L.min 53 dBA and maximum is Leq recorded as 64.7 dBA as per standard for Silence zone (Apollo Hospital) it should between 50-40 dBA. So, from our observation we have found that this zone is exceeding the prescribed Limit (graphical representations of monitored data of this location is shown below in figure-11)

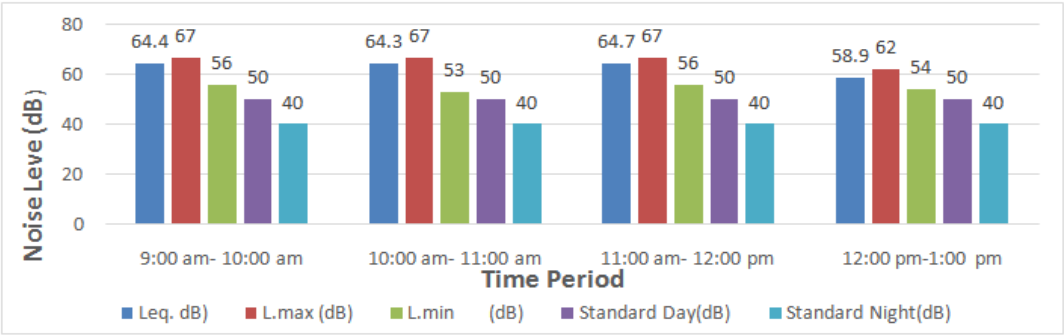

Fig-11 Comparative Noise level at Location 1 of Silence Zone, Apollo Hospital

3.11 Results of Noise Level at Silence Zone – Apollo Hospital (L2)

Noise reading was absorbed during morning hours (1:00 pm– 5:00 pm) L.max is 67 dBA and L.min 52 dBA and maximum is Leq

recorded as 64.2 dBA as per standard for Silence zone (Apollo Hospital) it should between 50-40 dBA. So, from our observation we have found that this zone is exceeding the prescribed Limit (graphical representations of monitored data of this location is shown below in Fig-12)

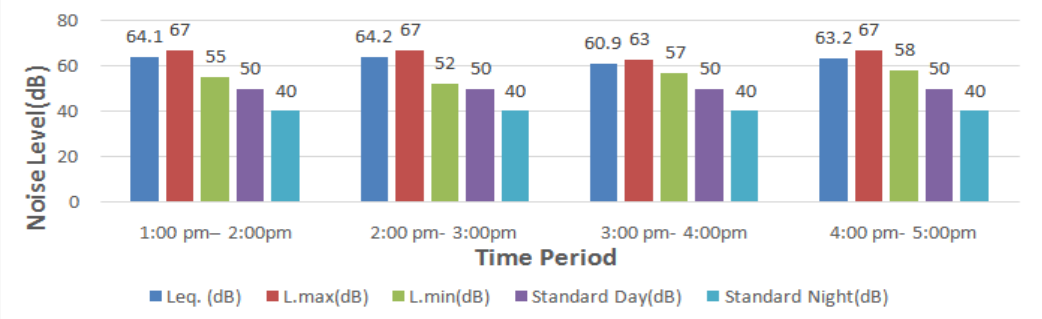

Fig-12 Comparative Noise level at Location 2 of Silence Zone, Apollo Hospital

3.12 Results of Noise Level at Silence Zone – Apollo Hospital (L3)

Noise reading was absorbed during morning hours (5:00 pm– 9:00 pm) L.max is 64 dBA and L.min 51 dBA and maximum is Leq recorded as 64.2 dBA as per standard for Silence zone (Apollo Hospital) it should between 50-40 dBA. So, from our observation we have found that this zone is exceeding the prescribed Limit (graphical representations of monitored data of this location is shown below in Fig-13)

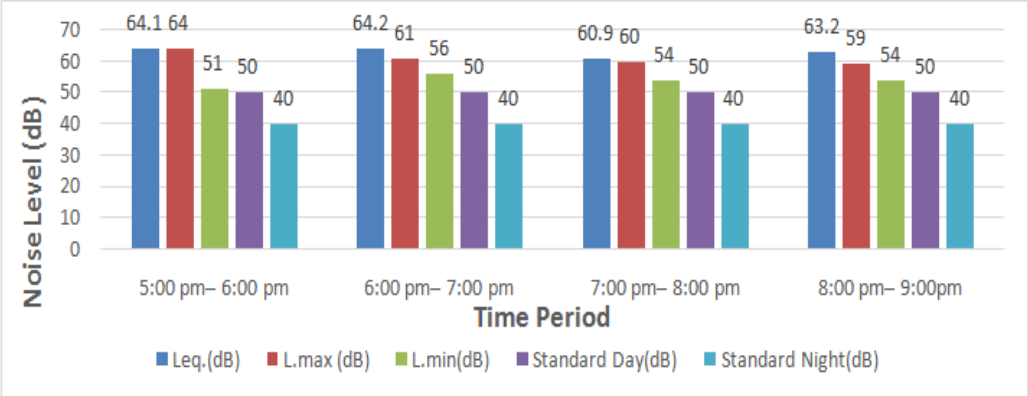

Fig-13 Comparative Noise level at Location 3 of Silence Zone, Apollo Hospital

3.13 Overall Results of Noise Level at all four Zones combined

Noise reading was absorbed overall (9:00 am– 9:00 pm) at Industrial zone highest Leq recorded as 75.4 dBA at day time and at night it is 70.6 wereas permissible limits is 75-70- dB which is touching the permissible limits may be due to vehicle movement for industrial purpose., In commercial zone noise level recorded as 73.4 in day time as well as 71.1 dB at night time where as permissible limits are 65-55 so this location is exceeding the noise limit as it is due to heavy traffic in this area,In residencial zone the noise level is recorded as 69.3 at day time and 67.2 as per standard which is also exceeding influenced with the trafiic movement in compare to permissible limits which is 55-45 dB. In Silence zone (Apollo Hospital) the noise level is recorded as 65.9-59.6 dB were as it should between 50-40 dBA as per permissible limits. So, from our observation we have found that this zone is exceeding the prescribed Limit and which is alarming in compare to the other zones (graphical representations of monitored data of all selected zones are given in figure-14)

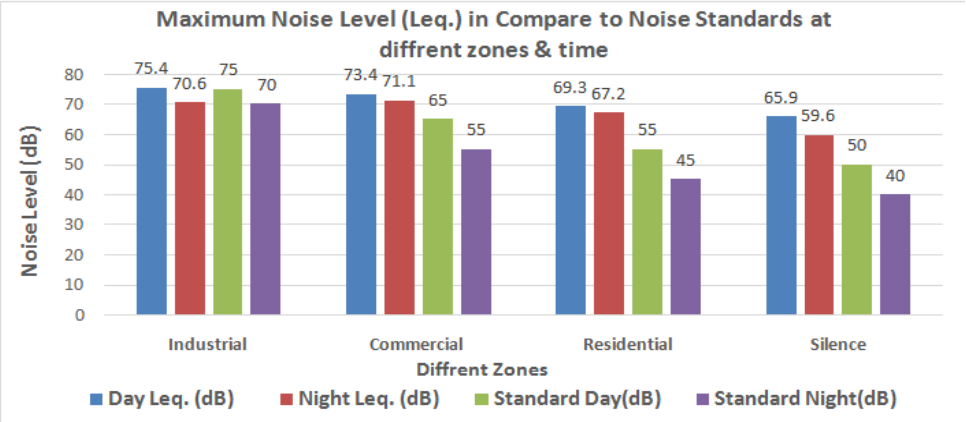

Figure-14 Showing graphical representation of the noise level at all four Locations

IV. CONCLUSIONS

Over all the study were done and concluded that the monitored noise levels from diffrent locations of sensitive zonewere observed to be more than prescribed permissible limits. Similarly at Industrial locations, the monitored noise levels were found to be close to prescribed limits for day time. Noise levels in commercial zone and residential zones were observed as more than prescribed limits for day time.In other hand noise levels in silence zone wereobserved to be alarming situation in compare to the prescribed limits for day time by CPCB. The general preventive measures to metigate and control the noise levels are as follows:

1. All the identified industrial zone should be restricted to outside the city.
2. Noise suppression sources need to be installed in industrial processes shall improved for reducing noise levels.
3. Oxyzone or green belt shall be created between residential and industrial and commercial zones.
4. In silence zones there should be strict restrictions and control measues to be implimented for avoiding alarming situations.
5. Insulation of Acoustic shall be regrously adopted to reduce the noise levels between source and receptor.
6. Administrative regulations and restriction in view to limit the intensity of background noise in urban environment shall be implimented strongly.
7. The traffic movement should be limited in silece zone area by implimenting and inforsing noise regulations by the authority to control such alarming situations.
8. Alternet sources (soundless) need to be develop against noise creating sources like machine, Vehicle and other sound producing equipments, to cater the noisse load and its impact and long term exposer dseaseases on people.

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