



## ASSESSMENT OF NOISE POLLUTION IN URBAN AREAS OF PRAYAGRAJ (ALLAHABAD) CITY, UTTAR PRADESH

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### ABSTRACT:

Noise is an unwanted sound which feels discomfort to the ears. Noise is also considered the most dangerous pollution like air and water pollution. Along with water and air pollution, noise pollution is also emerging as a new threat to the residents of the city. Noise pollution caused by vehicles which is affecting the environment and quality of life directly and indirectly. Noise pollution can be considered as one of the main concerns of the world, especially in urban areas. Vehicular traffic is one of the major sources of noise pollution in urban areas. In the present study, the monitoring of noise level was carried out for the assessment of noise pollution levels at selected sites Chowk, Jhonstonganj and Civil lines during January, 2017 in Prayagraj (Allahabad). The monitored data were used to calculate various noise parameters, namely percentile noise level  $L_{10}$  and  $L_{90}$ , equivalent constant level ( $L_{eq}$ ), noise pollution level ( $L_{np}$ ). The  $L_{10}$  were observed in the range between 78.00-90.68 dB, 73.40-91.70 dB, 78.24-89.74 dB and  $L_{90}$  60.80-72.82 dB, 54.94-75.54 dB, 63.06-74.66 dB with  $L_{eq}$  values 74.59-87.36 dB, 70.15-88.20 dB, 74.69-86.23 dB and  $L_{np}$  values 91.79-105.30 dB, 88.61-105.92 dB and 89.71-102.23dB respectively at Chowk, Jhonstonganj and Civil lines. The results of the study revealed that most of the times  $L_{eq}$  values were higher than the permissible limits as per CPCB standards. The higher values of  $L_{np}$  indicate the possibilities of physiological and psychological problems caused by noise pollutions at various places in Prayagraj (Allahabad) city. The higher noise levels are mainly due to movement of vehicles, vehicular jams and pressure horns.

Keywords: Noise, Pollution, Health, Urban pollution, Vehicles.

### INTRODUCTION:

The rapid growth of industrialization and urbanization has resulted in an increase in the noise levels in urban areas. Traffic noise is the most important factor for increasing in noise pollution. Noise pollution is the most dangerous pollution after water and air pollution (Nafees and Nath, 2018; Nafees et al., 2019). Traffic noise in cities is generally considered more dominant than other types of noise such as industrial noise, airport noise and community noise (Zanin et al., 2002; 2006; Nafees and Nath, 2019). Noise pollution has adverse short and long-term effects on human health. Traffic noise is associated with annoyance and sleep disturbance, hypertension (Bodin et al., 2009), hearing loss, speech interference,

cardiovascular and other physical effects as well as psychological effects (Nafees and Nath, 2021). On the roads, there are different traffic peaks in the morning and evening as people commute to and from their offices and workplaces, which often leads to traffic jams which contribute to the increase of noise pollution. Noise level varies greatly according to location, type of location, density of traffic, time of day. In other words, vehicular noise depends partly on the vehicles themselves and traffic conditions and surroundings atmospheric conditions. (Griffiths et al., 1980; Nafees and Nath, 2020). The present study carried out for the assessment of noise pollution levels at selected sites of Prayagraj (Allahabad) city.

### MATERIAL AND METHODS:

Prayagraj is a metropolis in the state of Uttar Pradesh, India. It is the administrative headquarters of Prayagraj district and is the most populous district in the state of Uttar Pradesh. The city is the judicial capital of Uttar Pradesh, with the Allahabad High Court being the state's highest judicial body. As of 2011, Allahabad is the state's seventh most populous city, thirteenth in northern India and thirty-sixth in India, with an estimated population of 1.53 million in the city.

### Measurement of noise levels:

The noise level monitoring was carried out for 12 hours (9:00 am to 9:00 pm) at selected sites Chowk, Jhonstonganj and Civil lines during January, 2017. The noise levels were recorded with the help of sound level meter at a height of 1.5 meter above from the ground surface and compared with the Noise standards prescribed by CPCB (Central Pollution Control Board), New Delhi.

$L_{10}$  and  $L_{90}$  were used for the calculation of  $L_{eq}$  and  $L_{np}$  using following equation (Kudesia and Tiwari, 1993).

$$L_{eq} = \frac{1}{2}(L_{10}+L_{90}) + \frac{1}{57}(L_{10}-L_{90})^2 \quad (1)$$

$$L_{np} = L_{eq} + (L_{10}-L_{90}) \quad (2)$$

### RESULT AND DISCUSSION:

The data had been collected for the present research at selected sites (Chowk, Jhonstonganj and Civil lines) of Prayagraj city and results of noise monitoring have been presented.

The  $L_{10}$  and  $L_{90}$ ,  $L_{eq}$  and  $L_{np}$  values at Chowk site were observed in the range between 78.00 – 90.68 dB and 60.80-72.82 dB, 74.59 – 87.36 dB and 91.79 - 105.30 with the average values of 86.43 dB and 68.89 dB, 83.08 and 100.62

dB, which is presented in Table and figure 1. The minimum values of  $L_{10}$ ,  $L_{90}$ ,  $L_{eq}$  and  $L_{np}$  were recorded at 8:00-9:00 pm and maximum at 5:00 – 6:00 pm except  $L_{90}$  values.  $L_{90}$  value was recorded at 4:00 – 5:00 pm. The  $L_{eq}$  values indicates that most of the times during monitoring period at Chowk site noise levels were higher than the standard limit of noise (75.00 dB) prescribed by CPCB, New Delhi.

The variations of  $L_{10}$  and  $L_{90}$ ,  $L_{eq}$  and  $L_{np}$  values at Jhonstonganj site were ranges between 73.40 – 91.70 dB, 54.94 – 75.54 dB, 70.15 – 88.20 dB and 88.61 – 105.92 dB with the average values of 86.21 dB and 69.29 dB, 82.88 dB and 99.80 dB which is presented in Table and figure 2. The minimum values of  $L_{10}$ ,  $L_{90}$ ,  $L_{eq}$  and  $L_{np}$  were observed at 8:00-9:00 pm and maximum at 4:00 – 5:00 pm except  $L_{np}$ .  $L_{np}$  was observed at 9:00 – 10:00 am. The  $L_{eq}$  values indicate that noise levels at Jhonstonganj site were higher at all the time than the standard limit of noise (75.00 dB) prescribed by CPCB, New Delhi except 8:00 – 9:00 pm.

The variations of  $L_{10}$  and  $L_{90}$ ,  $L_{eq}$  and  $L_{np}$  values at Civil lines site was presented in Table and figure 3.  $L_{10}$  and  $L_{90}$ ,  $L_{eq}$  and  $L_{np}$  values was varied between 78.24 – 89.74 dB, 63.06 – 74.66 dB, 74.69 – 86.23 dB and 89.71 – 102.23 dB with the average values of 85.29 dB and 70.49 dB, 82.00 dB and 96.99 dB. The minimum values of  $L_{10}$ ,  $L_{90}$ ,  $L_{eq}$  and  $L_{np}$  were observed at 8:00-9:00 pm except  $L_{90}$  and maximum at 1:00 – 2:00 pm except  $L_{np}$ . The minimum  $L_{90}$  was observed at 9:00 – 10 am and  $L_{np}$  was observed at 3:00 – 4:00 pm. The  $L_{eq}$  values indicate that most of the times, the noise levels at Civil lines site were higher than the standard limit of noise (75.00 dB) prescribed by CPCB, New Delhi.

### CONCLUSION:

The results of the present study revealed that the noise levels were higher than the noise standard prescribed by CBCP, New Delhi at all the time of monitoring at each site except 8:00-9:00 pm. The higher noise may due to increase in the number of the vehicles and their movements, pressure horns. It was also observed that the higher noise levels was found at site Chowk followed by Jhonstonganj and Civil lines. Noise pollution cannot be eliminated completely but it can be reduced in the following ways:

- 1- The road should be properly repaired and the encroachment should be removed from road side.
- 2- Parking should be arranged in densely populated places.
- 3- Vehicles should have proper maintenance

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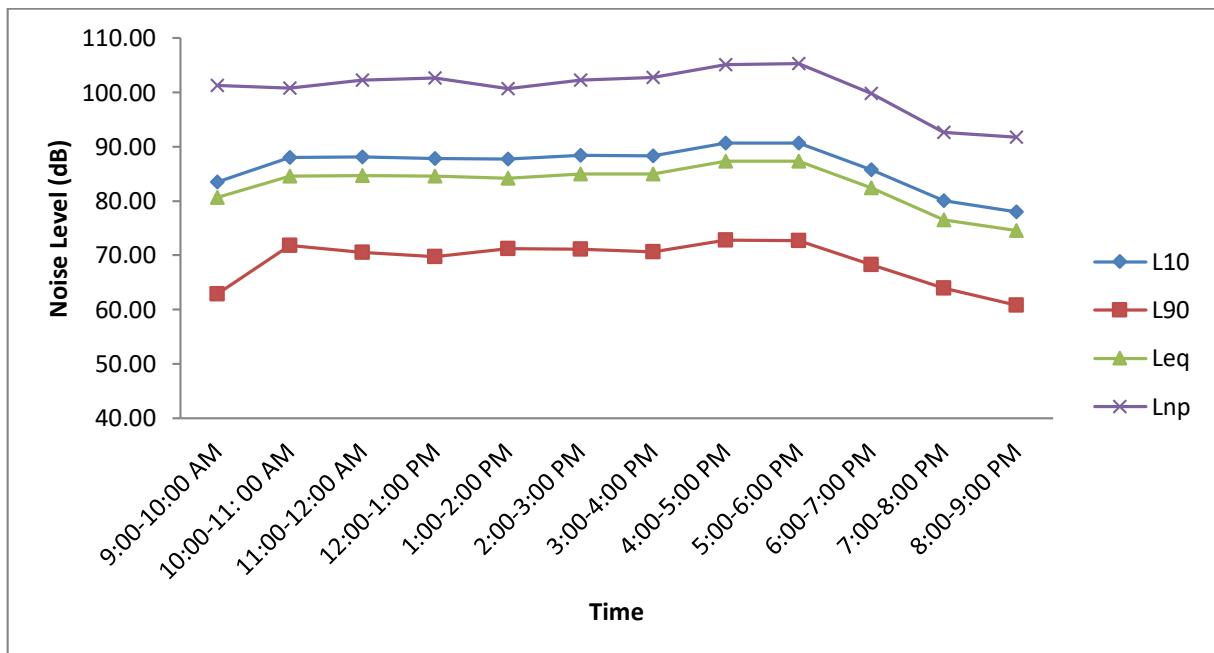
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**Table: 1 Noise levels at Chowk site**

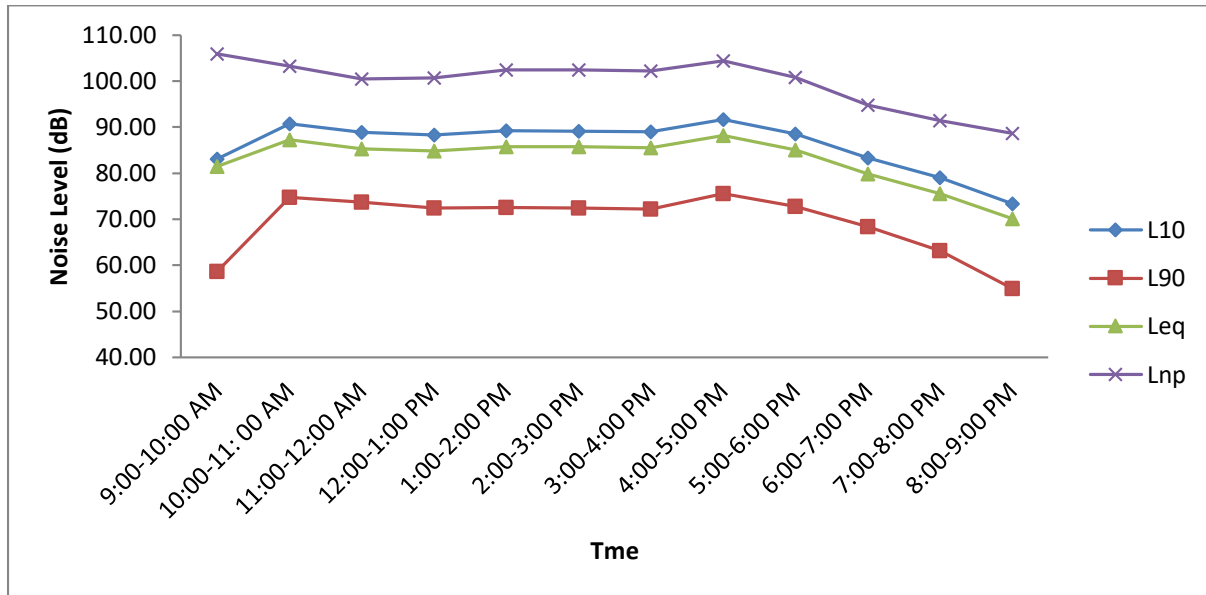
	<b>L<sub>10</sub> (dB)</b>	<b>L<sub>90</sub>(dB)</b>	<b>L<sub>eq</sub>(dB)</b>	Noise Pollution Level (L <sub>np</sub> ) (dB)
<b>Min</b>	78.00	60.80	74.59	91.79
<b>Max</b>	90.68	72.82	87.36	105.30
<b>Average</b>	86.43	68.89	83.08	100.62



**Figure 1:** Variations of L<sub>10</sub>, L<sub>90</sub>, L<sub>eq</sub> and L<sub>np</sub> values at Chowk

**Table: 2 Noise levels at Jhonstonganj site**

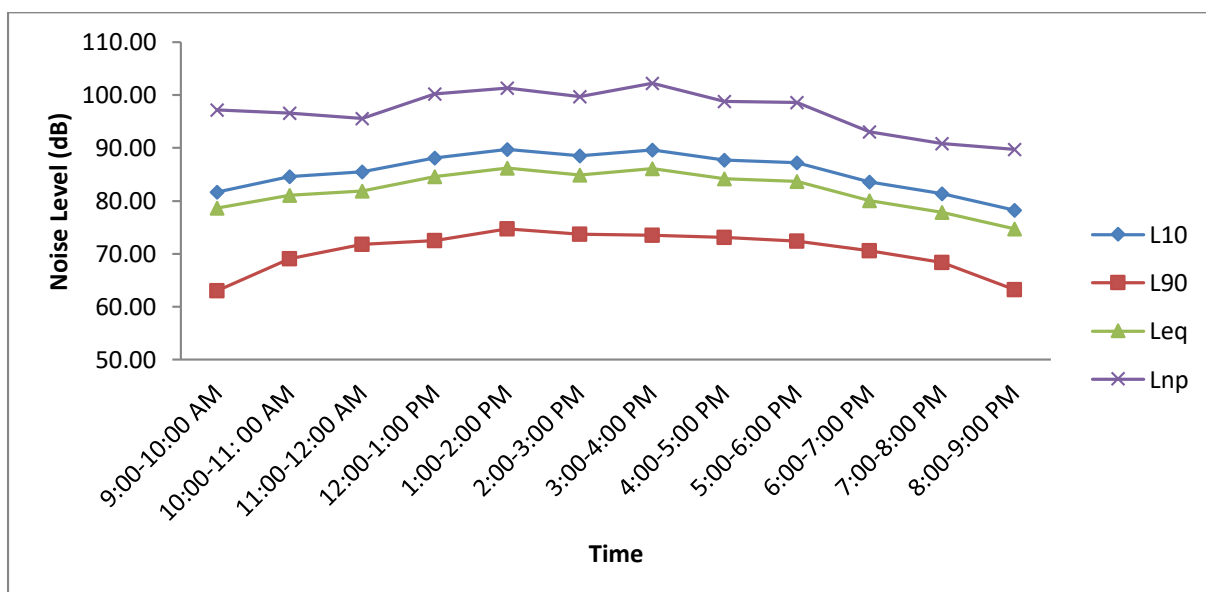
	<b>L<sub>10</sub> (dB)</b>	<b>L<sub>90</sub>(dB)</b>	<b>L<sub>eq</sub>(dB)</b>	Noise Pollution Level (L <sub>np</sub> ) (dB)
<b>Min</b>	73.40	54.94	70.15	88.61
<b>Max</b>	91.70	75.54	88.20	105.92
<b>Average</b>	86.21	69.29	82.88	99.80



**Figure 2: Variations of L<sub>10</sub>, L<sub>90</sub>, L<sub>eq</sub> and L<sub>np</sub> values at Jhonstonganj**

**Table: 3 Noise levels at Civil lines site**

	L <sub>10</sub> (dB)	L <sub>90</sub> (dB)	L <sub>eq</sub> (dB)	Noise Pollution Level (L <sub>np</sub> ) (dB)
<b>Min</b>	78.24	63.06	74.69	89.71
<b>Max</b>	89.74	74.66	86.23	102.23
<b>Average</b>	85.49	70.49	82.00	96.99



**Figure 3: Variations of L<sub>10</sub>, L<sub>90</sub>, L<sub>eq</sub> and L<sub>np</sub> values at Civil lines**