Evaluation and Analysis of Traffic Noise Pollution at Charbagh Railway Station and Alambagh Bus Terminal in Lucknow city

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ABSTRACT

The noise level has exceeded the prescribed limits in many Indian cities due to increased motorization, flyover construction and growth in the transport network. The health effects of high levels of noise are characterised as hypertension, sleeplessness, mental stress, etc. Because of this detrimental effect on the level of noise, the effects of traffic noise on residents and road users must be measured. The acceptability of traffic noise for people living along the arterial road is greater than that of the collector road at 57.5 dB and 56.2 dB for the daytime respectively. For arterial and collector roads, respectively, it is 2.5 dB and 1.2 Db above the prescribed day limit [55 dB]. The average level of acceptability of resident traffic noise at night is 46.0 dB, which is 1 dB higher than the 45 dB traffic noise maximum set by MoEF and WHO at night. This study is an attempt to measure and evaluate the emissions of traffic noise across the various locations of the city of Allahabad. In order to understand and analyse different aspects of the effect of traffic on the land use and social life of residents and road users, field measurements were performed. The present analysis presents the comparison between observed and predicted noise level at selected places and also describes the migratory measures to overcome such type of traffic noise pollution through design of noise barrier along the road and motivate people towards the use of public transport system.

Keywords – *Traffic noise, Lucknow city, WHO, CPCB*

1. INTRODUCTION

In general, a noise is characterised as an unwelcome sound and is entirely subject to personal tastes and levels of tolerance. Furthermore, the human ear's sensitivity to noise depends on a variety of contextual factors, usually including wind, temperature, traffic intensity, etc. It is widely accepted, however, that a 55 dB (A) sound will be distracting, whereas a noise level of 65 dB (A) will be considered unbearable, causing extreme sleep disturbance. A great deal of this is due to traffic-related noise coming from all modes of transport. In particular, road traffic noise is caused by the combination of rolling noise (caused by the contact of tyres with roads) and propulsion noise (consisting of engine noise, exhaust systems and transmission intake). Tyre-road contact is typically calculated to be the primary cause of noise above 55 kmph for most cars and above 70 kmph for trucks, depending on the vehicles' age, weight and driving conditions. In all noise sources, substantial improvement was made through the new Tyre architecture (such as randomised run pattern, narrow lateral grooves, etc.) and quieter engines (through acoustic engine shielding and multiple muffler systems). There is still a lot of potential for improvement, however, particularly because quieter cars can never eradicate erroneous driving conduct, technological faults or even traffic density, which together can have a multiplying impact on noise emissions. There is a strong need for the public to take a leading position in encouraging targeted regulation, exchanging strategies, and gaining a shared awareness of the potential for improvement for the public suffering from intolerable noise levels, most of it exacerbated by the transport sector as a whole. Public concern about noise problems has never been so strong, in part because the overall rise in road traffic has helped to outweigh the real progress made in the last decade by all segments of the road transport industry. Vehicle noise is caused by a vehicle's engine and exhaust system, aerodynamic friction, vehicle-road system interaction,

and vehicle interaction. Although components of road traffic noise are primarily found in propulsion noise and tier-level interaction, the vast array of preventive and remedial measures extends to quieter level technology, systems for noise reduction, traffic management techniques and solutions for long-term mobility and land use planning. In this work the result of traffic assessment based on the experimental data collected by systematic noise measurement in the lucknow city.

1.1 IMPORTANCE OF STUDY

Lucknow City is widely referred to as the 'Nawabs City.' It dates back to the Suryavanshi dynasty period on the banks of the Gomti River. Lucknow, the capital of Uttar Pradesh, was founded by Nawab Asaf-ud-Daula. It acted in the old days as the capital of the nawabs of Awadh and is one of the reasons why it is now called the town of the Nawabs. The Nawabs era brought the courteous culture to Lucknow, as well as the mouth-watering delicacies for which it is famous today. Travel to Lucknow with us to find outt more on this interesting place! Lucknow, the capital of Uttar Pradesh province, in northern India. It is located about 72 km (45 miles) northeast of Kanpur, on the Gomati River in the centre of the state. The city receives a huge amount of traffic due to its importance and road network. This will contribute to a high degree of traffic noise that needs to be taken care of.

1.2 Sources of noise

The engines and exhaust systems of vehicles are the primary sources of road noise. In addition, industrial operation, building, religious events, ceremonials, festivals, etc. produce noise from the roadway. Noise levels and their impact depend on facilities, number of automobiles, road condition, weather and environment, for example. Factories such as Hindustan Aeronautical Limited, Scooter India, Eveready, TELCO, railway stations, diesel shades, motor garages and workshops are additional sources.

2. Materials and Methods

During the summer season (June to July), the latest survey on ambient noise pollution assessment and review was conducted in the city of Lucknow. In the sense of demography, geographic locations and meteorological aspects during the course of the analysis, Table 1 presents the data on Lucknow city. Table 2 and Figure 2 display the five sampling locations / zones of Lucknow City selected for the study of noise pollution.

Noise levels were measured using the Sound Level SL-1352 IEC61672-1CLASS2 in the 'A' weighting network. The meter was placed 1.3 to 1.5 m above the surface of the earth and 3.0 to 3.5 m away, if any, from the reflecting surface. Noise measurements were carried out

continuously for each sampling site over a period of six days, with eight hours of observation every day, with a break of one hour. The readings continusoly taken with a gap of fifteen second to obtain peak value and choose the top eight readings from the peak hours to find readings.

The schedule selected during the day time was as follows: morning 8.00-9.00 a.m., 9.00-10.00 a.m., 10.00-12.00 a.m., afternoon 2.00-3.00 p.m., 3.00-4.00 p.m., 4.00-5.00 p.m., 5.00-6.00 and night 6.00-7.00 p.m., 7.00-8.00. For each hour, the noise levels were recorded after every one minutes. The data collected from each location was processed for statistical analysis.

Table 1. During the study period, the demographic, geographic locations and meteorological aspects of LUCKNOW city

Sr. No.	Parameters	Documented Values
1	Population	3,677,000

2	Geographical area (km2)	349
3	Latitude	26.8467° N
4	Longitude	80.9462° E
5	Mean sea level (m)	123 metres
7	Max. temperature	33
8	Min. temperature	19
9	Humidity (%)	26
10	Wind speed (km/h)	5km\h
11	Population density (No. of persons/km2)	1,815

3. MEASURING INSTRUMENT

3.1. Sound level meter:

Noise measurements were carried out using an integrated SL-1352 Average Sound Level Meter, which is designed to measure sound levels in compliance with the IEC standard. It facilitates diffuse measurements of the sound field and also meets standard specifications when installing the supplied windscreen.

3.2. Specifications:

SL-1352 IEC 61672-1CLASS2

Main processing (Main channel)

Instantaneous sound pressure level- *Lp*

Equivalent continuous sound pressure level *L*eq

Sound exposure level - *L*E

Maximum sound pressure level – *L*max

Minimum sound pressure level – *L*min

Fig-1(SOUND LEVEL METER)

4. Sampling sites for the control of Noise emissions in Lucknow

S NO	LOCATION	POSITION
1	Alambagh Bus stand	3 m away from the Road
2	Charbagh Railway station	3 m away from the Road

Table-2 (sampling sites)

4.1. Alambagh Bus stand:

Alambagh is a settlement near Kanpur Road in India, situated in Lucknow. It is one of Lucknow's most important residential and commercial areas and also one of the city's heavily populated regions. In the constituency of Lucknow Cantonment, Alambagh falls.

4.2. Charbagh Railway station:

One of the two major railway stations in Lucknow City for standard gauge trains is Lucknow Junction (officially Lucknow NER, station code: LJN). It is located right next to the railway station at Lucknow Charbagh.

Area code	Category of area	Limits in dB(A) Day	Night
A	Industrial	75	70
B	commercial	65	60
C	Residential	55	50
D	Silence zone	45	40

Table 3. Noise standards for Ambient Noise Level according to CPCB

Time	9AM-12PM						
PARAMETERS/ LOCATION	**L10**	**L90**	**L50**	**NC**	**Leq**	**LNP**	**TNI**
Alambagh bus Terminal	81.1	63.2	69.3	18.1	73.6	91.5	101.7
Charbagh Railway station	88.1	72.5	77.2	14.2	80.2	96.5	103.6

Table 4. Lequivalent value of noise level of three shifts and whole day (9 am – 7pm) in working days

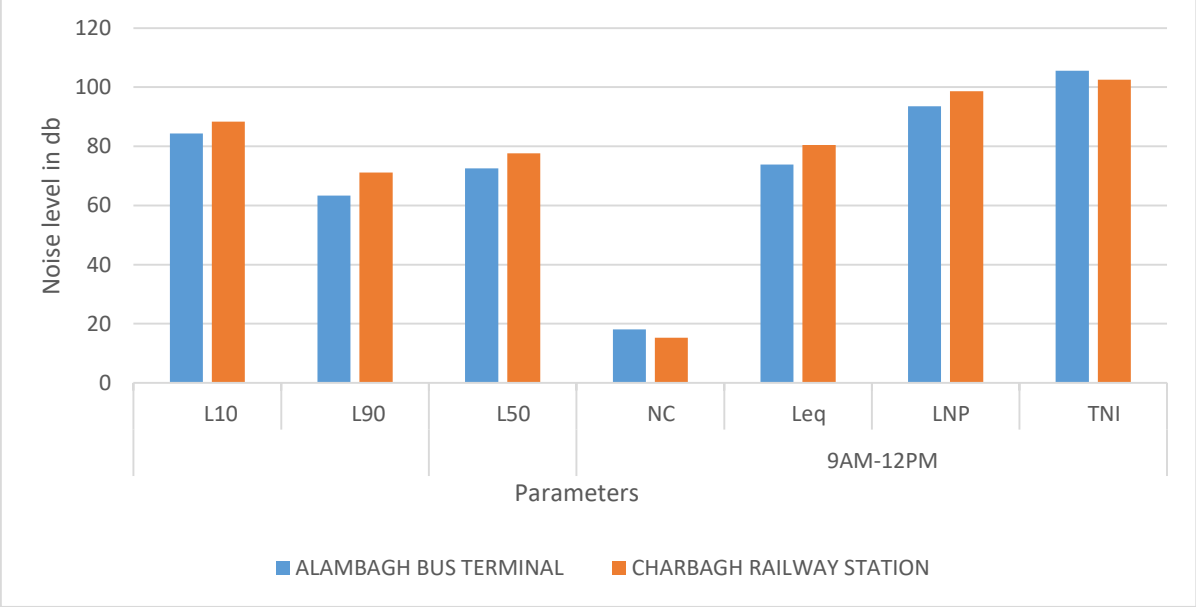

Chart -1 (noise level 9am-12pm)

TIME	**1PM-4PM**						
PARAMETERS/LOCATION	**L10**	**L90**	**L50**	**NC**	**Leq**	**LNP**	**TNI**

Alambagh bus terminal	88.6	62.2	70.9	16.6	71.9	92.6	102.2
Charbagh railway station	87.6	68.6	77.3	14.8	79.3	97.8	104.8

Table 5. Lequivalent value of noise level from 1pm-4pm

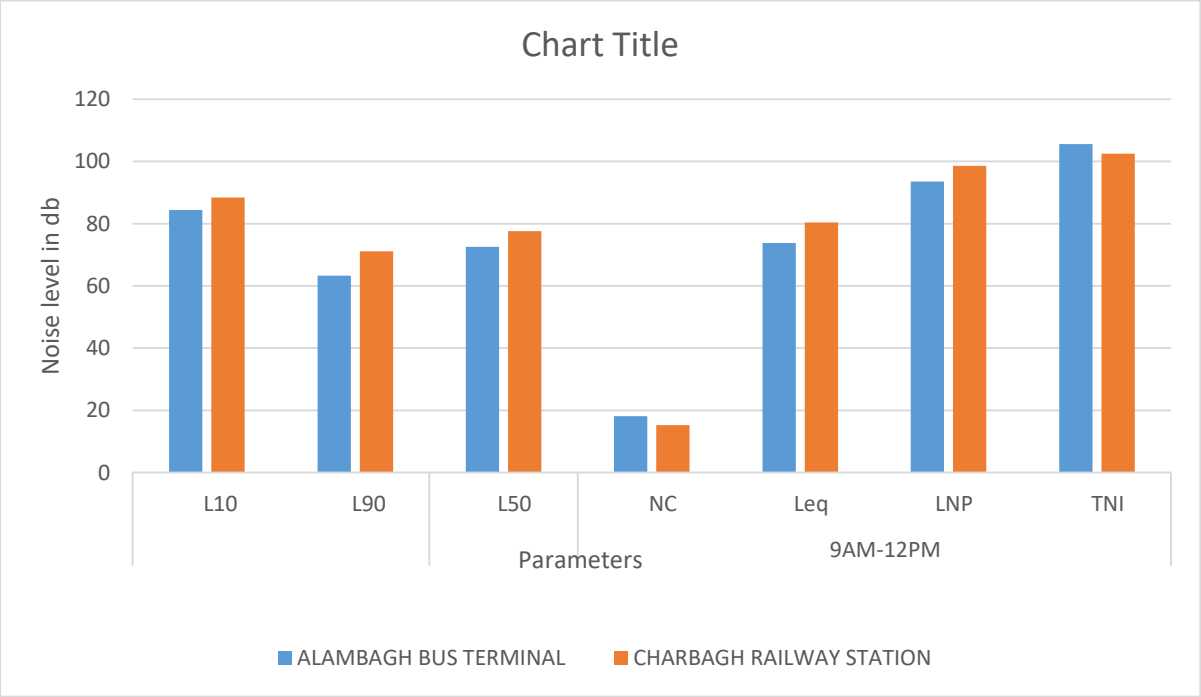

Chart -2 (noise level from 1pm-4pm**)**

TIME	**5PM-8PM**						
PARAMETERS/LOCATION	**L10**	**L90**	**L50**	**NC**	**Leq**	**LNP**	**TNI**
Alambagh bus terminal	84.4	63.3	72.6	18.1	73.8	93.6	105.6

Charbagh railway station	88.4	71.1	77.6	15.3	80.4	98.6	102.5

Table 6. Lequivalent value of noise level from 5pm-8pm

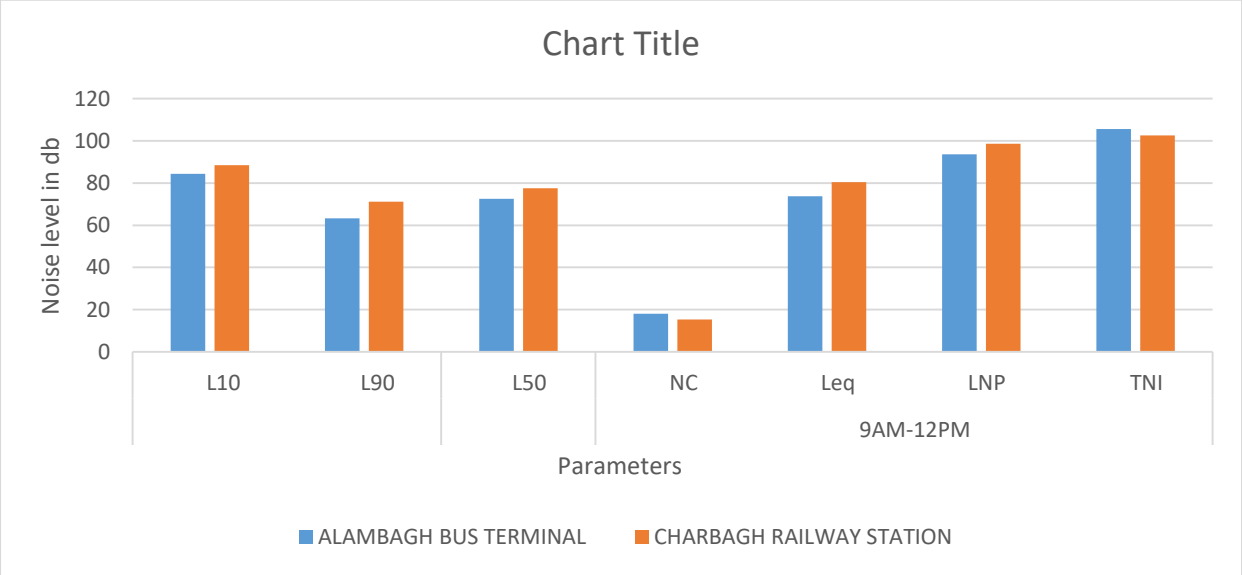

Chart -3 (noise level from 5pm-8pm)

5. Result and discussion

Alambagh bus terminal and charbagh railway station covers mostly covers some commercial type of area. According to standard limit of sound for commercial area is 70 db but the lowest actual value is 73.8 and 80.4 respectively at charbagh and alambagh. Commercial area where have of noise is 95.5 a lav is 71db. Situation of this zone also in dangerous zone as compared to the norms of CPCB. But the average leq day time exceeds the standard limit. So the inhabitants of these area are in vulnerable situation.

The outcome suggests that the socio-environment associated with these noisy impact areas is greatly contaminated and has become very vulnerable to inhabitants.

6. Conclusions

The study showed that the noise level in Lucknow City had reached an alarming level. In much of the city, there is a greater noise level than the defined limits. Of the total individuals interviewed, about 85% were found to be impaired by traffic noise. Around 90 percent of individuals suggested that traffic noise is the primary cause of headache, elevated BP issue, dizziness and fatigue. Individuals of higher education and income levels are very conscious of the health consequences related to road noise.

The goal of the development of an ecologically sustainable transport system is to reduce the environmental damage caused by transport-related noise and pollution. Increased awareness of the risks of harmful pollution and noise resulting from the amount of traffic caused by rapid growth in motorization. Therefore, it is important

to supplement the total cost of transport operations with the external cost of negative environmental effects when planning the growth of the transport system.

7. References

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