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Assessment of Noise Pollution at Busy Bus Stations in Lucknow City of Uttar Pradesh, India

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Abstract - *Noise is a phrase related to unwanted noise that disrupts the high-quality of lifestyles .Whilst the noise in the atmosphere exceeds a hard and fast limit is called noise .Maximum noise interferes with day by day activities which includes sleep, conversation. It's far a form of pollutants that turned into previously left out but as increase and development took place, excessive noise started to disrupt human interest. This leads to the identity, measurement and manipulate of noise through who. The paper provides a description of noise pollutants facts from lucknow metropolis bus stations in february 2021. Exposure to excessive noise ranges may want to motive serious damage to the noise and sensory-related machine. The noise stage is monitored in nahariya for 2 days with the help of sound strain (spl 1352). As these bus stations are placed inside the significant and internal bus station as they join lucknow to numerous neighboring regions so the noise produced right here could be very high. A excessive range of buses are used from those bus stations to cater for the demand. With the help of sound numerous sound parameters are calculated as l10, l90, l50, leq, nc, lnp and tni. For the purpose of proper studying and sound representation at the bus station. Leq price in nahariya levels from seventy seven.8-eighty four.4db. As loud noise at the bus station it reasons intellectual disturbance to passengers which desires to be taken into consideration whilst designing the bus depot and due care should be paid to reduce stress for passengers as the variety of buses increases so the noise level. As lucknow is still in the method of development it therefore identifies areas with a hot noise place and puts in place appropriate answers and strategies to manipulate the risk of noise pollution.*

Key Words*: *Noise pollution, CPCB Standards, Traffic Noise Index, Noise pollution level, Equivalent Noise Level

1. INTRODUCTION

Noise is a complex issue, emitted by various sources, which is a serious problem for the human environment. It is defined as unwanted sound. It negatively affects human health and is an important public health problem. Noise is the second most harmful factor after the polluted air, which affects the environment. One of the sources of noise that people fight with every day is the noise generated by means of transport.

Indian urban population is experiencing higher noise levels due to unprecedented vehicle growth and rapid infrastructure development. Increasing noise levels in dean cities can be related to sources like vehicular traffic, construction activities, industrial processes, spiritual cell abrasions and occasional fireworks. Noise propagation is dependent upon the urban structure viz. street profile, location of roads, distance of buildings from roads, construction sites, shape of the buildings and its orientation. Thus, it is evident that environmental noise varies spatially in urban area.

In recent years, public transport has been greatly advocated due to the desire of alleviating traffic congestion in metropolitan areas and the demand of reducing air emissions that induce climate change. Among various public transport modes, a tram is typically a light-rail public transport vehicle, which is faster than buses and much cheaper than rapid transit systems. The term “tram” is called in Europe and also known as “streetcar” or “trolley-car” in North America.

Transport plays a vital role in the economic and commercial development of countries and, consequently, in the well-being of their people. The transport system needs to be sustainable form an economic and social as well as an environmental aspect, to meet the demand of enlargement and sustainable development, but currently, the road transportation mode is being criticized more and more because of its major negative impact on the environment and the public health.

Where the road traffic accidents have been and are continuing to be a major contributor of human and economic costs (Soltani and Askari, 2014). Therefore, for the prospect of sustainable development, the attraction for the railway transport has increased. Effectively, this main of transport has been considered one of the safest modes of transport in the world. Risk comparisons show that railway and air travel are the safest modes of transport per travelled passenger-kilometer (Sill and Kullberg, 2012).

2. MATERIALS AND METHOD

A. Study area

Lucknow, which is the capital city of Uttar Pradesh, situated in northern India is chosen for study. Lucknow is a developing area .It has a developing inter and intra state bus

station with increasing number of buses every year. It has one major bus station namely Nahariya were selected for the purpose of study .Table 1 shows the latitude and longitude of the places.

B. Sampling sites

Table-1

S.No	Location	latitude	longitude
1	Nahariya	80.895042^{0}N	26.800437^{0}E

C. Data collection

At the chosen point Nahariya bus stop. Checking was conveyed at a tallness of 1.5 meter and 1 meter away from chest during hour long at time period seconds. The time table chose during the day time was as per the following which are diverse planning morning 10:00AM to 11:00AM, 11.00AM to 12:00PM, 01:00PM to 02:00PM, 02:00PM to 03:00PM.the observing was conveyed for two days at the one stations in month of February .The length has been chosen to cover the majority of the aspect of the day so commotion created for the duration of the day could be handily determined.

D. Measurement characteristic of sound Diverse

commotion boundary like L10, L50 and L90 were processed from the examined data.L10 is the degree of sound surpassing for 10% of absolute season of estimation or Peak Noise Level, L50 is the degree of sound surpassing for half of all out season of estimation or Mean Sound Level, L90 is the degree of sound surpassing for 90% of complete season of estimation or Background or Residual Noise Level.L10 and L90 were determined in Microsoft Office Excel .These boundaries were utilized for the assessment of Noise Climate (NC), Equivalent Continuous Noise Level (Leq) and Noise Pollution Level (LNP), Traffic Noise Index(TNI). Following these conditions were utilized to figure the clamour contamination records:

NC = L10 –L90 ……..(1)

Leq= L50+ [(NC)2 /60]……..(2)

LNP= Leq+ NC ……..(3)

TNI= 4(L10 –L90) + (L90 -30)……(4)

Where,

NC is Noise Climate; L10 is the level of sound out performing for 10% of supreme period of assessment

Peak Noise Level; L50 is the level of sound outperforming for half of complete period of assessment

Mean Sound Level; L90 is the level of sound outperforming for 90% of hard and fast period of assessment

Leq is Equivalent consistent uproar level;

LNP is the Noise Pollution Level;

TNI is the traffic upheaval record;

Table-2

CPCB Noise standards

Types of ZONE	Day Time dB(A)	Night Time dB(A)
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence	50	40

3. RESULTS

The calculated values of the noise pollutants (L10, L90, L50, NC, Leq, LNP,TNI) for the one sampling stations in February month and the noise pollution level is exceeding the CPCB noise standards.

Table-3

Average noise parameters at study location (10:00AM-11:00AM)

TIME	(10:00AM-11:00AM)						
Parameters	L10	L90	L50	NC	Leq	LNP	TNI
Nahariya							
DAY-1	81.3	69	75.3	12.3	77.8	90.1	88.2
DAY-2	82.1	65.3	74.2	16.8	78.9	95.8	102.8

The maximum values of L10, L90, L50, NC, Leq, LNP and TNI are obtained as 82.1dB, 69dB, 75.3dB, 16.8dB, 78.9dB, 95.8dB and 102.8dB. The minimum values of L10, L90, L50, NC ,Leq, LNP and TNI are obtained as 81.3dB,65.3dB, 75.3dB, 12.3dB,77.8dB, 90.1dB and 88.2dB incorporating data of two day for the time10:00AM-11:00AM for both days.

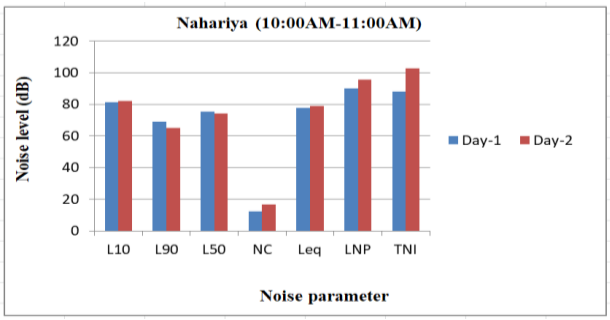

Figure 1-Average Noise Parameter for day 1 & day 2 (10:00AM-11:00AM)

TIME		(11:00AM-12:00PM)						
Parameters		L10	L90	L50	NC	Leq	LNP	TNI
Nahariya								
DAY-1	83.7	66	75.2	17.7	80.4	98.1	106.8	
DAY-2	85.9	70.3	77.3	15.6	81.4	97	102.8	

Table-4

Average noise parameters at study location

(11:00AM-12:00PM)

The maximum values of L10, L90, L50, NC, Leq, LNP and TNI are obtained as 85.9dB, 70.3dB, 77.3dB, 17.7dB, 81.4dB, 98.1dB and 106.8dB. The minimum values of L10, L90, L50, NC ,Leq, LNP and TNI are obtained as 83.7dB,66 dB, 75.2dB, 15.6dB,80.4dB,97dB and 102.8dB incorporating data of two day for the time11:00AM-12:00PM for both days.

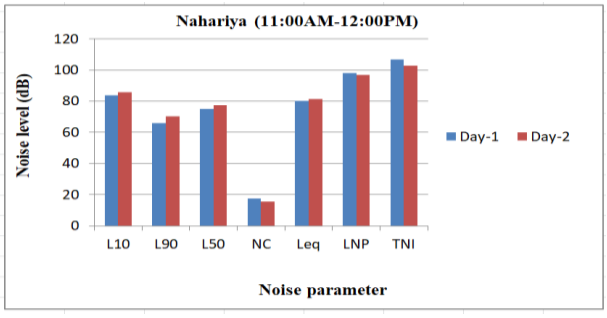

Figure 2-Average Noise Parameter for day 1& day 2 (11:00AM-12:00PM)

Table-5

TIME		(1:00PM-2:00PM)						
Parameters		L10	L90	L50	NC	Leq	LNP	TNI
Nahariya								
DAY-1	86.9	71.2	78.3	15.6	82.4	98	103.7	
DAY-2	87.3	70.3	78.9	17	83.7	100	108.5	

Average noise parameters at study location (1:00PM-2:00PM)

The maximum values of L10, L90, L50, NC, Leq, LNP and TNI are obtained as 87.3dB, 71.2dB, 78.9dB, 17dB, 83.7dB, 100dB and 108.5dB. The minimum values of L10, L90, L50, NC ,Leq, LNP and TNI are obtained as 86.9dB,70.3dB,78.9dB, 15.6dB,82.4dB, 98dB and 103.7dB incorporating data of two day for the time1:00PM-2:00PM for both days.

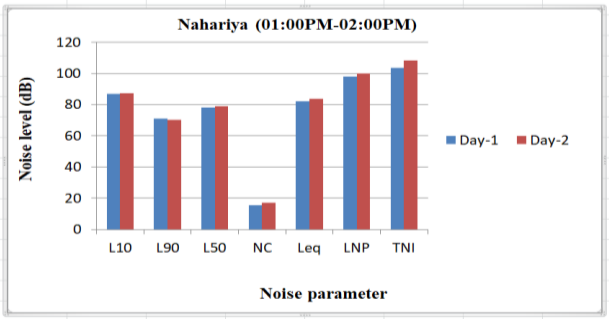

Figure 3 -Average Noise Parameter for day 1& day 2 (1:00PM-2:00PM)

Table-6

Average noise parameters at study location (2:00PM-3:00PM)

TIME		(2:00PM-3:00PM)						
Parameters		L10	L90	L50	NC	Leq	LNP	TNI
Nahariya								
DAY-1	88.7	72.3	79.3	16.4	83.7	100.1	107.9	
DAY-2	88	70.8	79.6	17.1	84.4	101.5	109.3	

The maximum values of L10, L90, L50, NC, Leq, LNP and TNI are obtained as 84.1dB, 68.2dB, 74.8dB, 17.2dB, 79.3dB, 95.9dB and 103.9dB. The minimum values of L10, L90, L50, NC ,Leq, LNP and TNI are obtained as 80.2dB,65.1 dB, 73.3dB, 13.2dB,76.2dB, 89.4dB and 90dB incorporating data of two day for the time2:00PM-3:00PM for both days.

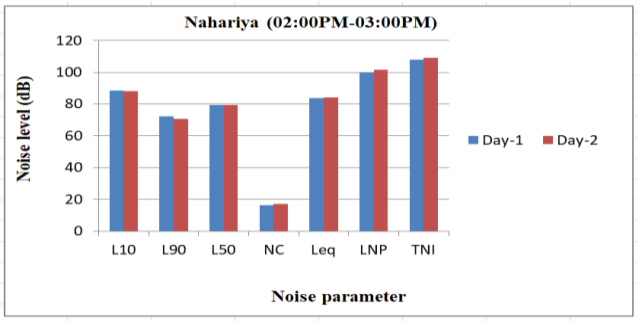

Figure 4 -Average Noise Parameter for day 1& day 2 (2:00PM-3:00PM)

4. CONCLUSIONS

The calculation of Noise pollution in the month of February such as L10, L90, L50, NC, Leq, LNP, and TNI for the assessment of noise pollution. The results revealed are as follows-

A. The value of **Leq** is higher than all the sampling stations and exceeds the CPCB Noise standards.

B. The highest Leq was 84.4 dB and lowest was 77.8 dB of these two bus station .These values are significant to cause the mental agony and stress. The menace of noise is growing day by day in developing cities.

C. Noise at bus station can be reduced by making structural designs such as noise reducing wall panel.

D. Overall study suggests that the level of noise pollution in bus stations of Lucknow city is higher than the CPCB Noise standards. This is causes stress, annoyance, cardiovascular disease, sleep disturbance, tinnitus and even cognitive impairment in children.

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