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Review on a Research Analysis on Noise Pollution due to Road Traffic in Kanpur

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Abstract - This research paper studied the background noise level of Kanpur region. Numerous stresses on the neurological system and auditory system may result from exposure to excessive levels of noise pollution. The main causes of noise pollution in Kanpur City include huge electrical generators, NH-91 transportation, traffic on several state highways, and numerous industrial areas. Urbanization, industrialization, the expansion of the building sector, and the infrastructure of road transportation in India have all contributed to excessive noise pollution in recent years, which is extremely harmful to both human and animal life. According to this study, residents who live next to a highway are subjected to high levels of traffic noise, which can cause headaches, insomnia, difficulty concentrating, heart pain, a decline in colour, perception, melancholy, and fatigue issues. There is a higher risk to the exposed population's health when the noise levels continue to rise above the established acceptable limits, so some crucial control measures must be put in place in order of priority. In order to determine the daytime and nighttime sound levels in Kanpur City, a study of traffic noise along National Highways (NH-91) corridors passing close to the city was conducted at four distinct zones (Silence Zone, Commercial Zone, Industrial Zone, and Residential Zone) with five specific locations using a Noise Level Meter. It was discovered that the noise level met the CPCB's recommended noise standard level. Utilizing traffic volume and speed data, the Federal Highway Administration (FHWA) model is used to estimate traffic noise.

Key Words: *Kanpur City, Sound Level Meter, Noise Pollution, Road Traffic Noise Pollution.*

1.INTRODUCTION

Unwanted sounds are referred to as noise. The Latin word nausea is the source of the English term noise. "Off-base sound in the wrong spot, at some unacceptable time" is one way to describe noise. Noise pollution has numerous, unavoidable, diligent, restorative, and socially significant possible effects on wellbeing. Noise has direct and compounded negative effects that impair well-being and taint private, social, professional, and educational environments with regard to real (money) and intangible (prosperity) calamities. It interferes with sleep, concentration, communication, distraction, plants, animals, and birds. Despite the fact that noise pollution is a "moderate and unobtrusive executioner," almost any attempts have been made to enhance something like. Along with various forms of pollution, it poses a risk to one's own fulfilment. This ambient noise standards has been taken from central pollution control board (CPCB) as -

Table 1: Ambient Noise Standards

S.NO.	Category of Area / Zone.	Limits in dB*	
		Day Time	Night Time
1.	Silence Zone	50	40
2.	Commercial Zone	65	55
3.	Industrial Zone	75	70
4.	Residential Zone	55	45

Where;

db*= The full form of dB is Decibel. The decibel (dB) is a logarithmic number for expressing the ratio of a physical quantity, usually power or intensity, to a specified or implied reference level. Decibel is the unit of sound. Its symbol is 'dB'.

2. IMPORTANCE

2.1 Historical

This city was founded by Raja Hindu Singh of Sankandi state.Kanpur was once known as Kanhpur. The city is located in the ancient Kanpur, Patkapura, Kuraswam, Juhi, and Seemamau villages during the last time of Awadh's dominion, regardless of whether it is supposed to be related to the heroic Karna of the Mahabharata period or the city's genuine originator, King Hindusi. It was decided at a meeting.With the adjacent state, the rulers of Kannauj and Kalpi, and then the rulers of the Muslim overlords, stayed in control of the town. From 1773 to 1801, Nawab Alamas Ali of Awadh had a decent government here. After the Treaty of 1773, the city came under the rule of the British, resulting in an English camp here in 1778 AD.

It had the convenience of industry and transportation because it was situated on the banks of the Ganges. As a

result, the British established the industry, which marked the beginning of the city's growth. The East India Company first established Neel's operations here. The town was connected to Allahabad in 1832 with the building of the Grand Trunk Road. Roads were added to the major locations in 1864 AD, including Kalpi, Lucknow, and others. Additionally, the Upper Ganges canal has been built. The city's business reaccelerated as a result of this traffic development.

2.2 BUSINESS

The leather and textile industries are well-known in Kanpur, a significant industrial city in Uttar Pradesh. Additionally, manufacturing, pharmaceutical, and other businesses call it home. Known as India's leather capital, Kanpur is well-known for producing high-end leather items that are exported, such as jackets, purses, belts, and shoes. Because of its garment production, Kanpur was formerly referred to as the Manchester of Asia. Kanpur is now home to several pharmaceutical businesses.

In the table no. 2, there is a general information about Kanpur such as total area, total population, urban population, rural population, literacy.

Table 2: General Information About Kanpur	
Total Area	10863 sq.km
Total Population	4581000
Urban Population	34.14% (2011)
Rural Population	1565623
Literacy	84.2%

2.3 THE FEDERAL HIGHWAY ADMINISTRATIVE (FHWA) MODEL

Highway traffic noise has been recognized as a federal, state, and municipal problem since the United States' first noise barrier was built in 1963. Over the years, community concerns have spurred the need to improve noise monitoring and modeling technology to assist transportation authorities in addressing the problem of highway traffic noise. One such instrument is the Federal Highway Administration Traffic Noise Model (FHWA TNM), a recently developed, state-of-the-art computational model for assessing the impacts of noise on highways. It takes advantage of developments in acoustics and computer technology to improve the accuracy and practicality of modeling highway traffic noise, including the development of affordable and efficient highway noise barriers. To decrease noise effects and enhance the surrounding noise environment to the greatest extent practicable, the Federal Highway Administration (FHWA) and Environmental Policy Statement commit to including all practical mitigation strategies into projects

.The proper execution of FHWA is considered to meet the purpose of reducing noise effects and improving the noise environment.Generally speaking, the algorithms are based on the concept of a succession of sound level reference adjustments. For a single vehicle traveling along an endlessly long straight level road without a source shield, this reference sound level should be kept at a distance of 15.2 meters. Total traffic flow, the receiver's real distance from the road, the length of the road segment under consideration, the kind of ground cover between the source and the receiver, the source's shielding, and the road's gradient are all taken into account.

The vehicle population is divided into three groups which are given as follows-

1) Automobiles
2) Medium trucks
3) Heavy trucks

To use the FHWA model one needs for-

1) The hourly flow rates for each vehicle type.
2) The average operating speed of each vehicle type.
3) Distance of the receiver from the road edge.

3. Literature REVIEW

Walihabib Hemmat BT. et al. (2023)

The study's primary purpose is to investigate the sources, impacts, and mitigation measures for noise pollution. Noise pollution is a widespread and growing issue that has a significant influence on both the environment and individuals. In the midst of more obvious environmental challenges, it is frequently dismissed as a silent threat. This thorough overview research examines the complex problem of noise pollution, including its diverse causes, vast implications, and several ways for alleviating its negative impacts. In this study, we begin by delving deeply into the complex network of noise pollution sources.

Ramesh B Ranpise BT. et al. (2022)

This article examines recent research on urban traffic noise. A total of 67 relevant works on urban road traffic noise and its reduction measures were chosen for critical review. Only 5.97% of items explain how to track and record noise measurements for urban roadways, despite 7.46% of articles mentioning exposure to urban traffic noise pollution. 29.85% of the papers proposed a methodology for predicting noise levels and evaluating noise reduction efforts. Finally, it is established that metropolitan areas in impoverished nations urgently require low-cost, cost-effective noise pollution reduction measures such as strategically placed plants, landscaping, and noise barriers.

Hira Lal Yadav BT. et al. (2022)

This review of the literature is based on a detailed overview of studies on traffic noise and its impacts on Indian people conducted over the previous 30 years. Only urban locations across the country were studied for road traffic noise. The noise level study has only developed monitoring, recording, analysis, modeling, and mapping to a limited degree and in connection to topics. The exposure-effect sense in the physiological and sleep study areas produces little outcomes. Almost every noise pollution research has a specific link to behavioral surveys and disruptions.

Akif Yavuz BT. et al. (2023)

This comprehensive analysis investigates the wide and nuanced consequences of vehicle noise on human health, as well as experimental investigations using animal models, especially rats, to better understand the impact of low-frequency vehicle noise. Furthermore, the impacts of engine type and size, vehicle speed, air conditions, and traffic density on vehicle noise levels are discussed. Vehicle noise can cause sleep disruptions, anxiety, mental disorders, cardiovascular risks, noise-induced hearing loss, and gastrointestinal difficulties. To mitigate these dangers, numerous recommendations and laws (WHO Environmental Noise Guidelines for the European Region) are implemented, emphasizing the importance of noise reduction in mobility and the appropriate use of sound-emitting devices. This research provides a comprehensive resource for understanding the intricate relationships between vehicle noise and human and animal health, emphasizing the need of tackling vehicle noise pollution for general well-being and public health.

4. METHODOLOGY

Decibel Meter, RISEPRO Digital Sound Level Meter 30 -130 dB Audio Noise Measure Device Dual Ranges HT-80A. A sound level meter's basic components are an amplifier, intensifier, weighting organizations, and a decibel presentation (one-tenth of a "bel" or unit of sound). Data was gathered at the designated places for around ten hours on a separate day.

The earlier times—roughly 5 to 6 a.m., 8 to 9 a.m., and 9 to 10 a.m.—were selected.10 to 11 a.m., 2 to 3 p.m., 3 to 4 p.m., 5 to 6 p.m., 7 to 8 p.m., and moreover, 10 to 11 p.m. Since they should be unique, the time has been selected to encompass the majority of the day, including peaceful mornings, periods of high traffic, attractive nights, and tranquil evenings. It's possible that the readings were obtained from a height of 1.5 meters above the ground during certain times for a duration of 10 minutes. This means that each perception hour has about 40 readings.

The calculations have been done using the formula of L_{eq}.

$$L_{eq} = 10log \sum_{i=1}^{i=n} 10^{L_i/10} \times t_i$$

Where;

n= total number of sound samples.

L_i= noise level of any i sample.

t_i= total time duration of I sample expressed as fraction of total sample time.

5. INSTRUMENT

Decibel Meter, RISEPRO Digital Sound Level Meter 30 130 dB Audio Noise Measure Device Dual Ranges HT-80A.

- Large LCD, easy to read.
- A & C weighting networks conform to standards.
- Time weighting (Fast and Slow processing) dynamic characteristic modes.
- Condenser is used in microphone for high accuracy & long-term stability.
- Low battery indicator.
- LCD for low power consumption & clear read-out even in bright ambient light condition.
- Used the durable material, long-lasting useful components, including a strong
- Suitable for carrying in our pocket and lightweight design allow one-hand operation.

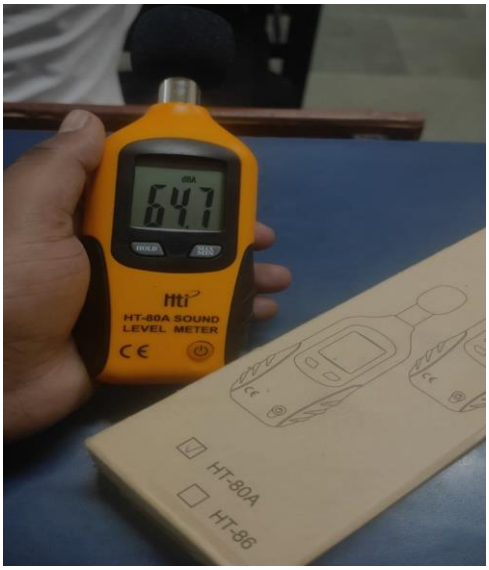

Figure 1: Sound Level Meter.

6. CONCLUSION

- Noise pollution is a serious issue that degrades overall quality of life. This issue is most obvious in cities, where transportation contributes significantly to noise pollution.
- Given the harmful repercussions of long-term noise exposure, it is vital to install some noise-reduction measures.
- Furthermore, it may be argued that education and some type of encouragement are required to increase public participation in the "fight" against noise and its detrimental impact. As a result, pressure would be generated to establish the required civic infrastructure (sensor networks), and inhabitants would benefit from a much-needed increase in the quality of life in their communities.

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