A Systematic Evaluation of Transport Noise Interventions And Their Impact on Health In Pimpri Chinchwad Municipal Corporation Area

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Abstract- *Any undesired or irritating sound that has an adverse effect on human or animal behavior as well as the health of individuals and communities is referred to as noise pollution. Noise pollution causes the environment to deteriorate, which then leads to communication and health issues. The second factor contributing to the rise in noise pollution after industrialization is the number of vehicles on the road or the volume of traffic. The study's goal is to assess and analyze the degree of noise pollution in PCMC wards and its detrimental impact on residents' health. Every day, millions of individuals are impacted by noise pollution. The risk of IHD, sleep disturbance, cardiovascular consequences, hypertension, hearing damage, etc. is increased by excessive noise. Using sound meter data that is gathered from the PCMC wards three times a day—in the morning (8–10 a.m.), afternoon (12–2 p.m.) and evening (7-9 p.m.). The PCMC ward wise traffic intensity measurements from August 2022 to February 2023 Comparing ward data, which are gathered from selected zones or parts of the PCMC wards, allows for the determination of the noisiest ward.*

Keywords- Noise pollution; Traffic noise intensity; Effects of noise; Public health.

I. INTRODUCTION

Noise is a loud, unwelcomed, or unpleasant sound that exceeds levels. One of the different types of pollution is noise pollution. The environment, people, and daily human and animal activities are all negatively impacted by excessive noise. When compared to rural regions, noise pollution is currently one of the most significant issues in cities, and it has a significant negative impact on the urban environment. To regulate and control sources that produce and generate noise, the government passed various laws (Regulation and Control, Rules 2000).

As metropolitan regions evolve, factors including industrialization, transportation, population growth, and communication systems have contributed to an unstable technological environment, which has increased noise pollution. Humans who are exposed to noise pollution may experience chronic health issues as well as physiologic ones. As a result of its negative effects being hypertension, sleep disturbance, hearing loss, cognitive decline, cardiovascular issues, and unstable mood, excessive noise substantially impairs human health.

The local government of Pune, one of India's fastest-growing cities, is called the Pimpri Chinchwad Municipal Corporation (PCMC) region. Pune is situated in the northwest of the Maharashtra state. Pimpri Chinchwad is an industrial suburb located at an altitude of roughly 590 meters above sea level, about 15 kilometers northwest of the heart of Pune. The manufacturing, IT, and automotive industries in this city are expanding quickly. The bulk of people in Pune, one of Asia's major industrial cities, are from the PCMC neighborhoods. Numerous industries, including the majority of automakers and their corporate headquarters, are based in this region. Between 2001 and 2017, the city's population doubled as a result of rapid urbanization, which also saw an increase in the number of automobiles and other man-made activities. Urbanization is expanding quickly, and the area has an extensive public transportation system. However, the city has begun to experience significant noise pollution. Therefore, it is essential to conduct this study to assess a systematic transport noise from a futuristic standpoint. The current study concentrated on the impact of noise pollution levels in a few chosen PCMC wards.

II. STUDY AREA

PCMC is the fifth largest city in Maharashtra and the nineteenth largest city in India. It is one of the most rapidly developing suburban areas in India and has emerged as the third fastest growing city in the country. Noise pollution is one of the key issues brought on by the city's rapid growth. Due to increased vehicle traffic in this metropolis brought on by industrialization, PCMC's health is negatively impacted.

The current study was conducted at PCMC from August 2022 to February 2023 to examine the effects of ambient noise pollution. Data has been gathered from 16 of the 32 wards in PCMC. Three times a day, in the morning (8 am to 10 am), the afternoon (12 pm to 3 pm), and the evening (7 pm to 9 pm), it was collected.

Table 1: Details of selected study locations

SR. NO.	PCMC Wards	Locations
1	Ward 3	Moshi
2	Ward 5	Sant Tukaram Nagar
3	Ward 7	Bhosari Gaothan
4	Ward 8	Balaji Nagar
5	Ward 9	Nehru Nagar, Ajmera Society
6	Ward 19	Pimpri camp
7	Ward 20	HA Colony, Sant Tukaram Nagar, YCM
8	Ward 21	Pimpri Gaothan
9	Ward 22	Pavan Nagar
10	Ward 24	Tathewade
11	Ward 27	Rahatani
12	Ward 28	Pimple Saudagar
13	Ward 29	Kasarwadi
14	Ward 30	Dapodi, Phugewadi
15	Ward 31	Rajiv Gandhi Nagar
16	Ward 32	ST Colony

III. METHODOLOGY AND MATERIALS:

The different noise levels, measured in decibels (db), were gathered using a sound level meter (Model MASTECH, MS 6708). A linear or weighted scale is used to evaluate the sound pressure in a sound level meter. This equipment is primarily used for noise surveys in public areas. The maximum 'A' weighted RMS (root mean square) sound pressure level measured during the previous second is displayed as a single value on a sizable digital display. The microphone, amplifier, weighting network, and display meter reading in db s are the basic components of a sound level meter. The decibel (db) scale, which ranges from 0 dB (threshold of audibility) to 140 dB (threshold of discomfort), is used to characterize sound in all applications. The manufacturer-supplied phone calibrator, which can generate known sound pressure levels, was used to calibrate the device.

According to this measure, doubling sound pressure corresponds to an increase in sound intensity of six decibels. In general, the human ear can perceive frequencies between 20 and 20,000 Hertz. High frequency noises are more perceptible to the ear than low frequency ones. In order to imitate the ear's variable sensitivity to frequency, the A-weighting network was created and applied to measured noise levels. The resulting noise levels are given in db(A).

1.1 Flowchart of the methodology

IV. RESULT AND DISCUSSION

The primary causes of pollution in PCMC area are vehicles. Noise pollution is a result of both rapid urbanization and increased mobility. In the vicinity of PCMC, it is a significant source of noise pollution. Data is gathered for this research from 16 PCMC wards in specific areas. The sites where data is gathered are mostly concentrated in areas where traffic is created. Leq (equivalent sound pressure level) varies differently depending on the area. Leq ranges between a value of 95 to a value of 55 db. Road traffic noise is a highly fluctuating noise, and Robinson (1969) of the British National Physical Laboratory claims that Leq alone is an inadequate descriptor of the discomfort caused by fluctuating noise.

In these wards educational area, industrial-cum-residential, commercial-cum- residential and silent zone are involved. The Central Pollution Control Board (CPCB) and Ministry of Environment and Forests (MoEF) have established the following environmental noise standard:

Table NO. 2: Ambient noise level standards

SR. NO.	Typeofthe area	Standardsin(Leq)ind B(A)	
		DayTime	Night Time
1	Industrial Area	75	65
2	CommercialArea	65	55
3	Residential area	55	45
4	SilenceZones	50	40

The traffic noise measurements made at these particular PCMC locations are shown in Table No.

1. The lowest and highest levels of noise (Leq) that can be heard on the road range from 55 db to 90 db. The measurements are conducted from August 2022 to February 2023 to determine which ward in this area is the noisiest. According to ongoing noise observations, days or times when noise levels are higher than usual, such as during festival seasons. During Ganeshotsav, Navratri, and Diwali, the noise level is very high. Due to the holidays, there were more cars on the road, which led to more traffic congestion during the day. However, at night, the noise level exceeds permissible limit.

We can compare the level of noise in various wards for various months using readings. In order to determine which time of day has a higher noise level, the noise levels from two categories— morning v/s. afternoon and morning v/s. night— were also looked at.

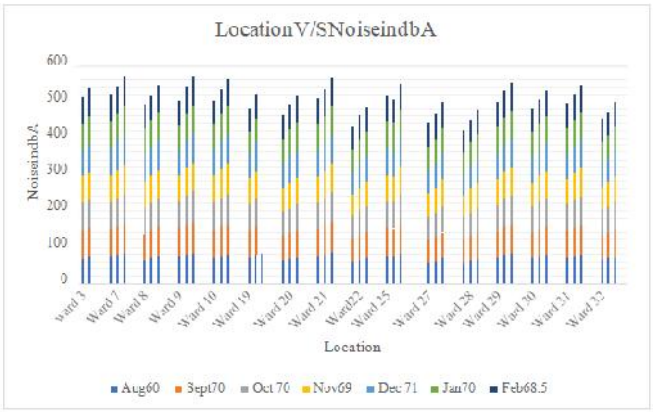

Figure 1: Location V/S Noise in dbA

The noise level rises from morning to evening, as seen in Fig. 1. As individuals leave their jobs at the office in the evening, noise levels are at them highest. There are some locations where the noise exceeds its permissible level at evening. Leq varies in the morning between 57, 62.8, etc. The noise level in wards 7, 9, 10, 19, 21, 25, 29, and 32 is above the allowable level. Commercial-cum- residential, industrial, and industrial-cum- residential buildings can be found in some of these wards. Both the environment and the health of the population are impacted by excessive noise.

There is an industrial sector were automotive firms are situated in ward number seven (Bhosari Gaothan). Additionally, the industrial-cum- residential area is in Ward No. 9. Noise levels in the residential sector is within acceptable ranges. It has been noted that noise pollution in these business areas is caused by motorbikes, auto rickshaws, scooters, buses, trucks, cars, and people of city.

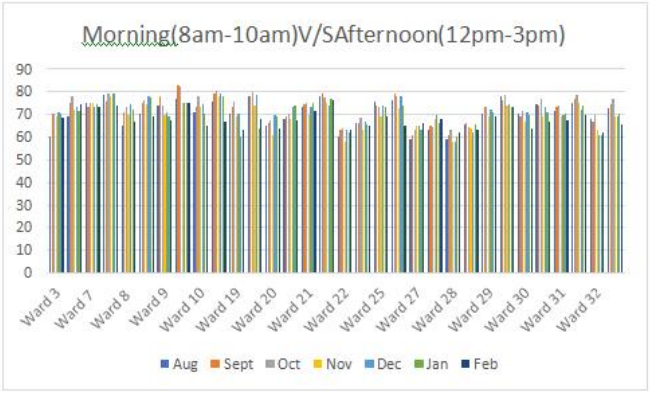

Figure 2: Morning(8am-10am) V/S Afternoon(12pm-3pm)

In Figure 2, a noise level graph for morning and afternoon is shown. During the afternoon, noise levels rise in certain regions while remaining almost constant in others.

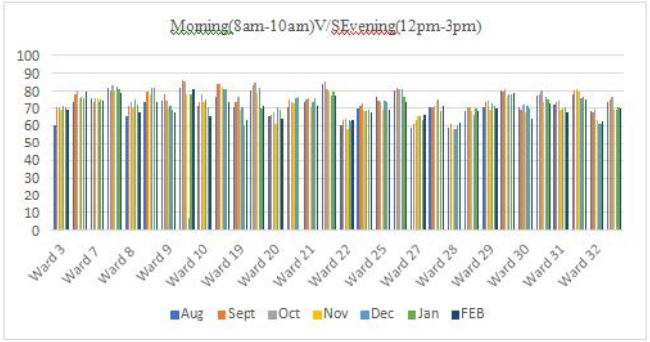

Figure No.3: Morning(8am-10am) V/S Evening(7pm-9pm)

In figure no. 3 a noise level graph for morning and evening is shown. The end of office hours means there is more

noise in the evening. The road is now being used by a large number of transport vehicles.

V. CONCLUSION

Sound level meters are used to record the noise level characteristics. Therefore, it is found that in certain areas of city noise is higher than the norms. The readings collected show higher levels of noise in the morning and evening but normal significance in middle of the day. Environmental noise pollution is not a recent occurrence; rather, it is an issue that has gotten worse through time.

PCMC is one of the most rapidly developing cities in Maharashtra; therefore, the noise level also increases day by day. The study's findings make it abundantly clear that the city suffers from severe noise pollution as a result of automobile traffic, with industry also playing a role in the rise in noise pollution. Congested traffic areas, an unplanned road network, reduced one-way traffic, the creation of a quiet zone in the center of the city, unplanned urban sprawl, etc. are the main causes of this.

When traffic is at its busiest, the noise level in most areas of the city averages more than 80 db. Many schools and hospitals located in the city's center are also negatively impacted by the noise pollution. To controlled the noise level government should be take some strict action under the laws of the noise pollution (Regulation and control) rules 2000. Vehicles should be checked for excessive noise as part of the pollution under control certificate (PUC) and vehicle inspection programs.

VI. SUGGESTIONS

It is essential for the government and local authorities to take the required steps or actions to protect people from the threat of noise pollution in light of the current trend and future prospects of PCMC. The government or regulatory agency may implement some of the following PCMC prevention measures:

1. Improving and properly maintaining road conditions will improve traffic flow.
2. Implementation of laws prohibiting the use of horns in quiet areas or zones and limiting the use of horns by vehicles when passing by neighborhoods.
3. To reduce noise pollution, prohibit the use of heavy trucks in commercial and residential areas during the day or divert traffic.

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