International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Status of Noise Levels At Selected Traffic Junctions of Bengaluru City Karnataka

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Abstract
Noise is perhaps one of the most undesirable by products of modern mechanized lifestyle. It is a very effective alarm system. The Noise monitoring was conducted during May and June 2026 at six selected locations in Bengaluru City, namely Tin Factory Junction, Silk Board Junction, Hebbal Junction, Jalahalli Cross, Nayandahalli Junction, and Majestic. These sites were selected based on their high traffic density and represent some of the busiest traffic junctions in the city. The noise level measurements were recorded using a precision sound level meter-TES 1350 with a measuring range between 35-130dB. The noise levels were recorded during day time (9.00am to 11:00 am) and night time (10:00pm to 12:00pm). The noise monitoring results revealed that all six locations experience severe traffic-induced noise pollution during both daytime and night time. The monitored Leq values at every location exceeded the Central Pollution Control Board (CPCB) permissible limits of 60 dB during the day and 55 dB during the night, indicating that the acoustic environment at these major transport corridors is consistently above acceptable standards. At several locations, night time noise levels equaled or exceeded daytime values, highlighting the influence of continuous interstate transport, freight movement, airport traffic, and 24-hour urban activity. These findings highlight the need for effective mitigation measures, including restrictions on heavy vehicle movement during the night, strict enforcement against unnecessary honking, improved traffic flow management, installation of noise barriers where feasible, roadside green buffers, and continuous environmental noise monitoring.

Keywords: Traffic, Honking, Decibel, Standards, Mental health

1. INTRODUCTION

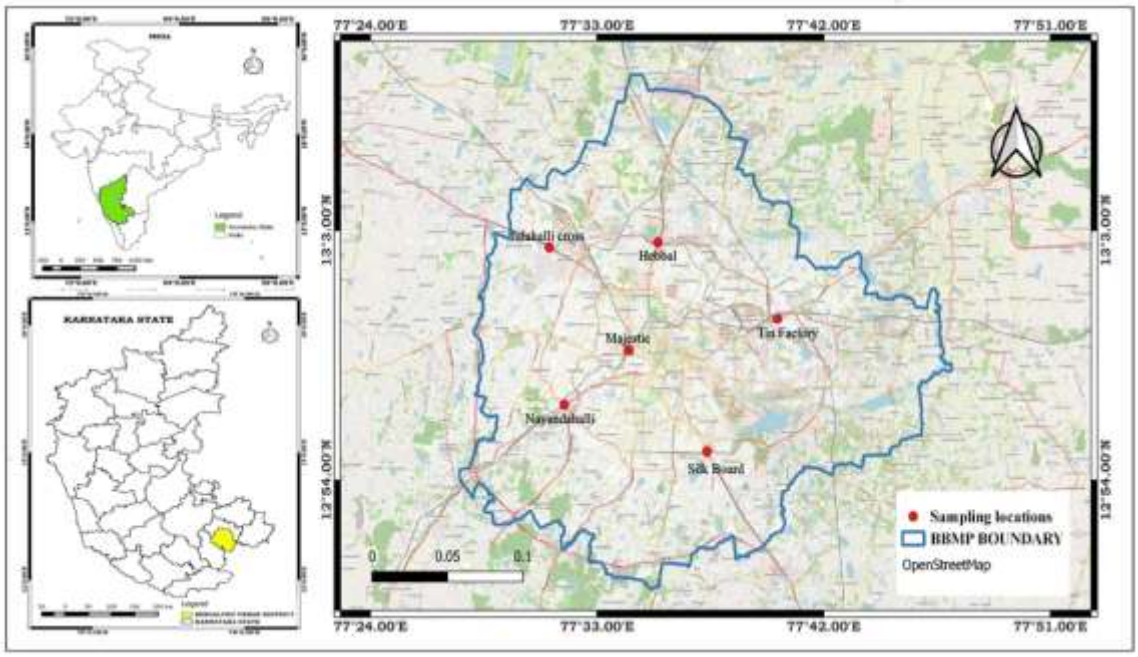
According to the World Health Organization (WHO 2019), noise is "sound that is perceived as harmful or annoying to the individual or the population exposed to it". Noise pollution is a substantial environmental problem in many urban regions. This trouble has not been properly recognized despite the fact that it is steadily growing in developing states (Davis and Masten, 2004). According to Central Pollution Control Board road traffic contributes around 55% of total noise contamination. Jain et al. (2012) asserted that poor traffic management systems are one of the causes of traffic congestion in most developing and third world countries, thus preventing the free flow of traffic along major roads and massive traffic jams for prolonged time periods. According to TomTom Traffic Index 2025 Bengaluru ranks as the most traffic-congested city in India and the second most congested globally. The problem of noise contamination in different urban corridors is due to the vehicular traffic and industrial areas (Zennin et al., 2002) Environmental noise contributes to a wide range of adverse health outcomes, including sleep disturbance,

cardiovascular disease, and premature death. Noise pollution induces stress, which can result in various stress-related disorders, such as anxiety, depression, and decreased overall mental well-being (Freedman et al., 2001).

2. Materials and methods

2.1 Description of study area: Bengaluru was selected as the study area for noise monitoring. It is the capital city of Karnataka and one of India's major urban centers, renowned for its strong technological, economic, and industrial development. The city is a leading hub for information technology and IT exports and is recognized globally as a major technology Centre (Sudhira et al., 2007). Bengaluru's population is growing at an annual rate of approximately 3.7%, while the number of vehicles is increasing by nearly 10% annually. Bengaluru City Police oversees traffic movement for around 1.25 crore registered vehicles in the city.

Figure 1: Sampling locations of Noise monitoring



2.2 Site selection: The Noise monitoring was conducted at six selected locations in Bengaluru City, namely Tin Factory Junction, Silk Board Junction, Hebbal Junction, Jalahalli Cross, Nayandahalli Junction, and Majestic. These sites were selected based on their high traffic density and represent some of the busiest traffic junctions in the city recognized by Bengaluru Traffic Police (2016).

Table 1: Sampling Coordinates of noise monitoring in Bengaluru urban

Sl No.	Sampling Location	Latitude	Longitude
1	Tin Factory Junction	12.99659° N	77.669213° E
2	Silk Board Junction	12.917569° N	77.621842° E
3	Hebbala Juntion	13.049366° N	77.593028° E
4	Jalahalli Cross	13.039974° N	77.518138° E

5	Nayandhalli Junction	12.943413° N	77.526141° E
6	Majestic	12.977662° N	77.573208° E

2.3 Noise Monitoring and analysis

The Noise monitoring was conducted during May and June 2026. The noise level measurements were recorded using a precision sound level meter-TES 1350 with a measuring range between 35-130dB. The instrument was calibrated before the measurements were recorded. A distance of 3m from the source has been maintained during measurements. In each location, adequate number of samples was made with one-minute time interval between two subsequent readings.

The noise levels were recorded during day time (9.00am to 11:00 am) and night time (10:00pm to 12:00am). Sound levels were noted at every five (5)-minute interval during every peak hour. From these measurements, the minimum sound pressure level L min, the maximum sound pressure level L max was observed However, to quantify the variability of noise during each measurement, the percentiles L90, L50, L10 and Leq were also calculated. Mathematical formulas and calculations are one of the most important components of Noise monitoring methodology (Peirce et al., 1998).

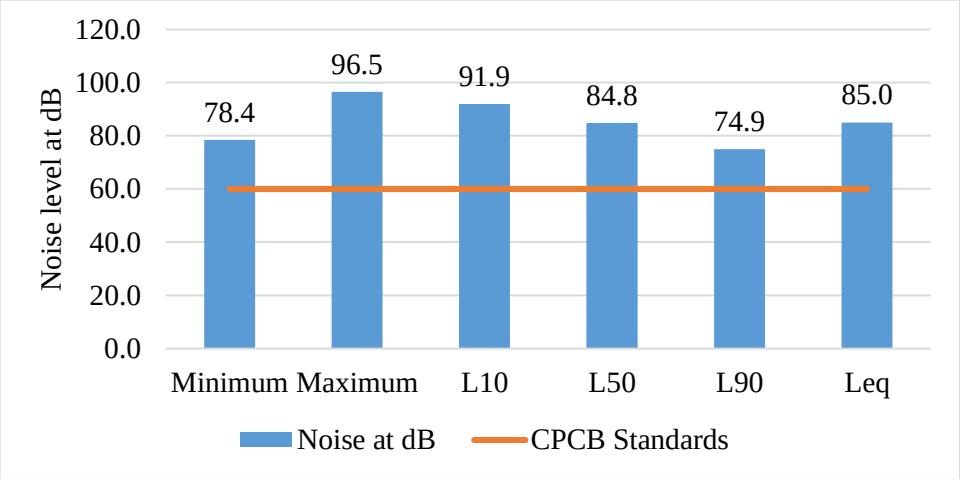
3. Results and Discussion

The noise levels data of six traffic zones was recorded in morning 9am to 11am and night 10pm to 12am and were compared to the noise pollution (Regulation and Control) Rules, (CPCB 2000).

1. Tin Factory Traffic Junction

The Tin Factory junction is a road junction in Bangalore located near Krishnarajapuram railway station on Old Madras Road, the junction witnesses high traffic congestion and is one of the worst traffic bottlenecks in the city. The ambient noise assessment at Tinfactory Junction reveals consistently elevated sound levels throughout both the day and night.

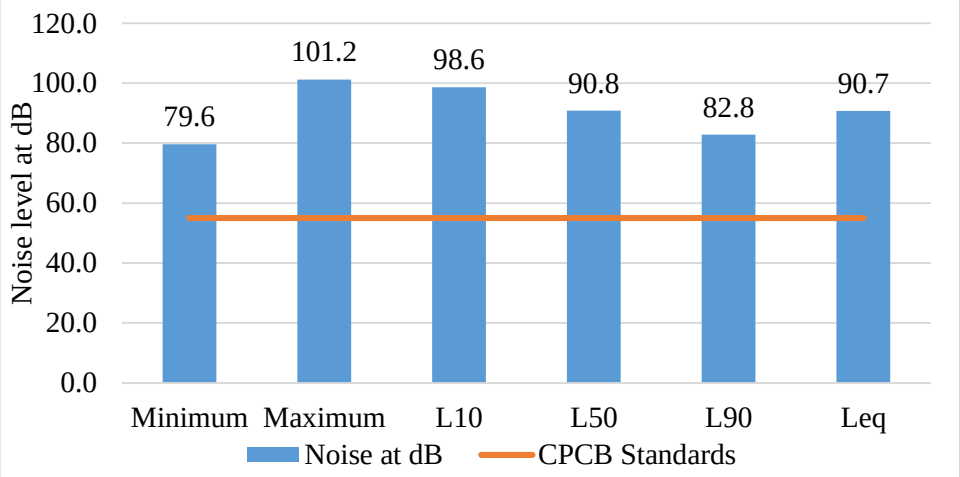
Figure 2: Status of Noise Levels in tin factory (Day time)



The noise monitoring conducted at Tinfactory Junction between 9:00 AM and 11:00 AM indicates that the area experiences very high traffic noise levels, with all measured parameters exceeding the prescribed 60 dB standard for commercial limits. The recorded noise levels show that the minimum noise level was 78.4 dB, which is within the permissible limit. However, the maximum noise level reached 96.5 dB,

significantly exceeding the standard. The measured Leq of 85.0 dB demonstrates that Tinfactory Junction experiences severe traffic noise during the Day peak hours (9:00–11:00 AM). This period coincides with office commuting, school transportation, public buses, commercial vehicles, and high traffic density, resulting in continuous vehicle movement and frequent horn usage. The maximum noise level of 96.5 dB indicates occasional intense noise events, most likely produced by heavy trucks, buses, motorcycles with modified exhaust systems, emergency vehicles, or prolonged honking at signalized intersections.

Figure 3: Status of Noise Levels at tin factory (Night time)



The night-time noise monitoring results at Tinfactory Junction indicate extremely high noise pollution, with all measured values substantially exceeding the prescribed 55 dB night-time standard. The findings suggest that traffic activity remains intense during the night, exposing nearby residents and commuters to excessive environmental noise. The Leq value of 90.7 dB demonstrates that Tinfactory Junction experiences severe night-time noise pollution. Under normal conditions, traffic noise is expected to decrease during the night; however, the recorded levels suggest that the junction continues to experience heavy traffic, including freight vehicles, interstate buses, and commercial transport operating during off-peak hours. The high Leq (90.7 dB) confirms prolonged exposure to harmful noise levels, posing potential risks to public health, particularly sleep disturbance, stress, reduced cognitive performance, and long-term cardiovascular effects (Kryter, 1985).

2. Silk Board Junction:

Silk Board Junction is one of the most important and busiest road intersections in Bengaluru. It is a critical transportation hub that connects the city's southern, eastern, and south eastern regions. It is a vital route for commuters traveling to major IT and business districts such as Electronic City, Bellandur, Marathahalli, and Whitefield.

The ambient noise assessment at Silk Board Junction reveals consistently elevated sound levels throughout both the day and night. The noise level data recorded at silk board junction between 9 AM and 11 AM, in comparison to the CPCB (Central Pollution Control Board) permissible noise limit for commercial zones, which is 60 dB. The minimum recorded noise level was 74.0dB, already above the acceptable limit, while the maximum noise level reached an alarming 97.7 dB, far exceeding the standard.

Figure 4: Status of Noise Levels at silk board junction (Day time)

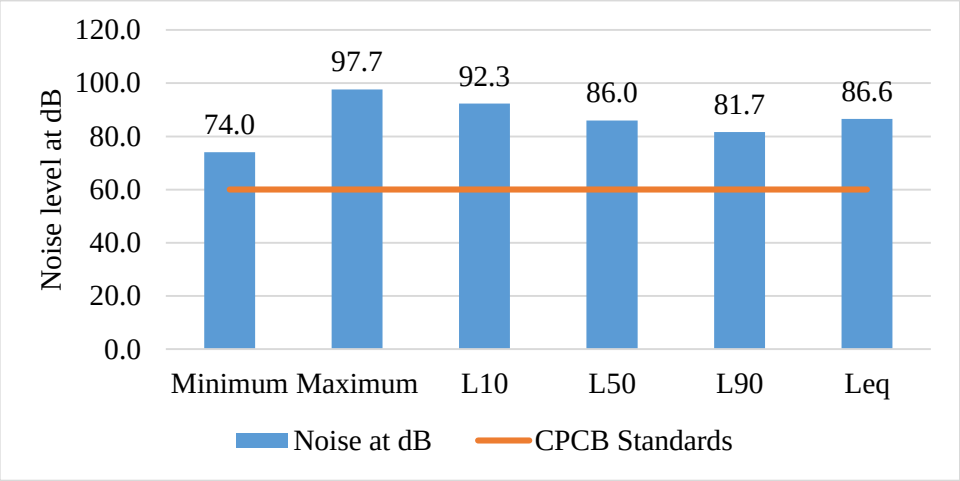
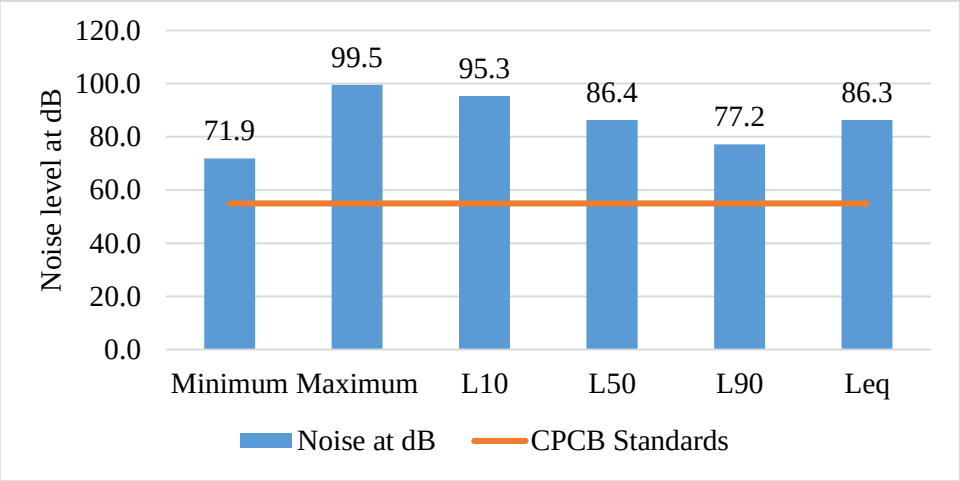


Figure 5: Status of Noise Levels at silk board junction (Night time)



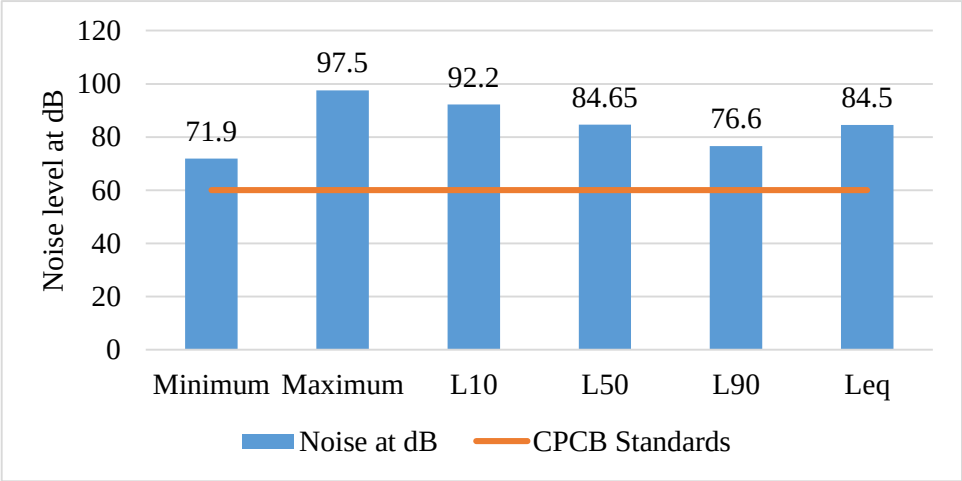
The noise level data for silk board junction recorded between 9 AM and 11 AM, in comparison to the CPCB permissible noise limit of 65 dB for commercial zones. The minimum noise level observed during this period was 71.9 dB, already above the standard, while the maximum reached 99.5 dB, indicating a significant exceedance. Based on the noise monitoring data for Silk Board Junction, the results indicate that ambient noise levels are substantially higher than the CPCB permissible limits for both daytime and night time, suggesting severe noise pollution primarily due to intense traffic activity. The equivalent continuous noise level (Leq), which represents the average noise exposure over the monitoring period, was 86.6 dB during the day and 86.3 dB at night. The minimum noise levels of 74.0 dB (day) and 71.9 dB (night) are already well above the permissible limits, indicating that the junction experiences persistently high background noise with virtually no quiet periods. This reflects continuous vehicular movement even during nighttime hours. The maximum noise levels reached 97.7 dB during the day and 99.5 dB at night, suggesting the occurrence of intermittent high-intensity noise events. These peaks are likely associated with heavy vehicles, frequent horn usage, acceleration at traffic signals, braking, and congestion.

3. Hebbala Junction

Hebbal Junction is one of the Bengaluru's busiest and most strategically important intersections. It serves

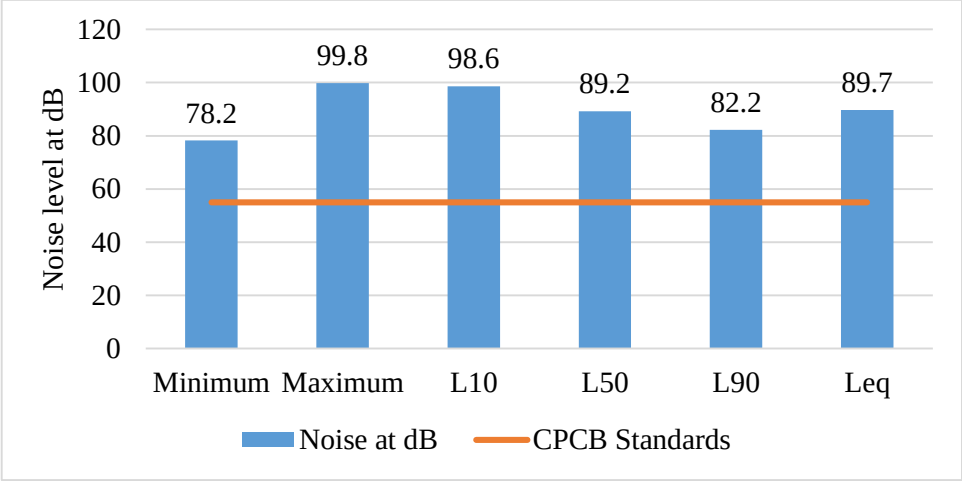
as the main gateway to the city's northern suburbs and provides access to major destinations, including the Kempegowda International Airport. Hebbal Junction is a critical component of Bengaluru's road network. The ambient noise monitoring results at Hebbal Junction indicate that the location experiences very high noise pollution during both daytime and night time.

Figure 6: Status of Noise Levels at Hebbala junction (Day time)



The noise level data recorded in the Hebbala traffic signal Area between 9 AM and 11 AM, compared to the CPCB permissible noise limit 60 dB. The minimum noise level during this period was slightly above the standard at around 71.9 dB, while the maximum noise level reached 97.5 Significantly exceeding limit.

Figure 7: Status of Noise Levels at Hebbala junction (Night time)



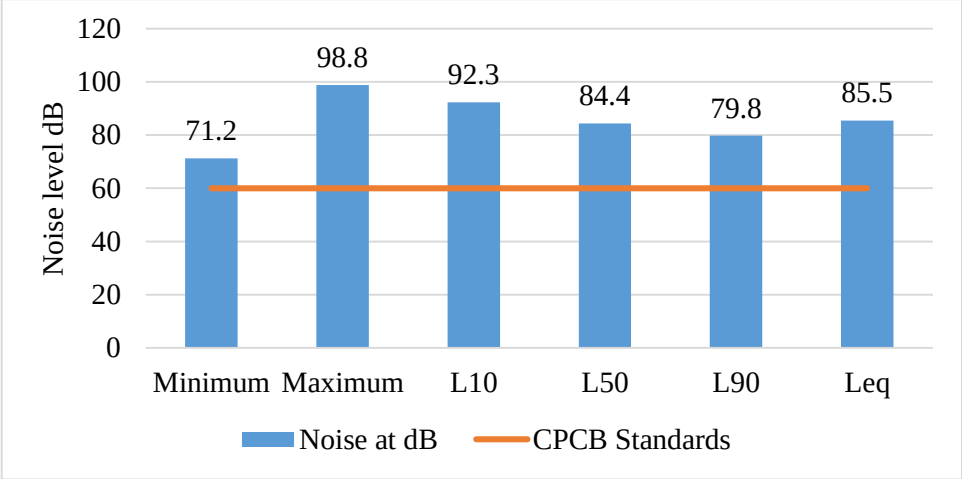
The noise levels recorded in the Hebbala traffic Area between 10 PM and 12 AM, compared to the CPCB permissible noise limit which is 55 dB during nighttime, as indicated by the Standards. The minimum noise level recorded was 78.2 dB, already exceeding the permissible limit, while the maximum reached 99.8 dB significantly above the standard. The equivalent continuous noise level (Leq) was 84.5 dB during the day and 89.7 dB at night, exceeding the CPCB permissible limits by 24.5 dB and 34.7 dB, respectively. The higher night time Leq indicates that noise pollution remains severe after sunset and is likely influenced by continuous airport-bound traffic and the movement of interstate buses and heavy commercial vehicles,

which are more common during night time hours. An important observation is that all night time noise indices are higher than the corresponding daytime values, which is unusual for most urban locations. This trend can be attributed to Hebbal Junction's strategic role as the principal access route to the airport and interstate highways, where nighttime traffic includes a large proportion of heavy commercial vehicles, airport taxis, buses, and freight transport. Reduced urban congestion at night also allows these vehicles to travel at higher speeds, increasing tyre-road interaction noise and engine noise.

4. Jalahalli Cross

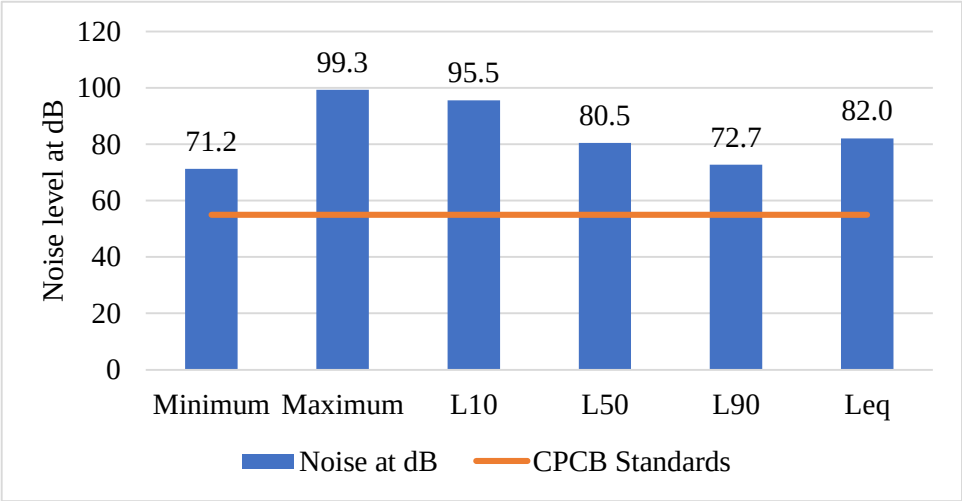
The ambient noise monitoring conducted at Jalahalli Cross, located along National Highway 4 (NH-4), indicates that the junction is subjected to high levels of traffic noise during both daytime and night time.

Figure 8: Status of Noise Levels at Jalahalli cross (Day time)



The noise level measurements taken at Jalahalli cross, traffic between 9 AM and 11 AM, compared to the CPCB permissible noise limit of 60 dB as indicated by the orange line. The minimum recorded noise level was 71.2, already exceeding the standard, while the maximum noise level spiked significantly to 98.8 dB.

Figure 9: Status of Noise Levels at Jalahalli cross (Night time)

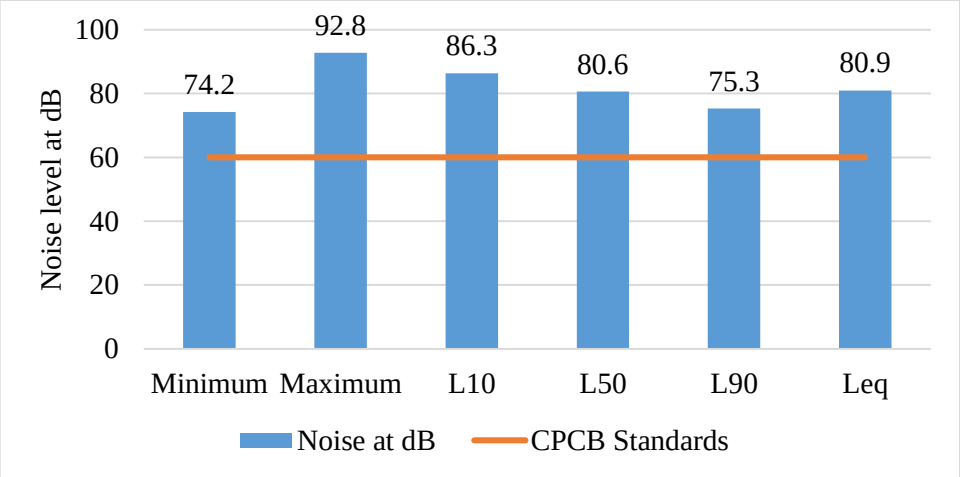


The noise levels measured at Jalahalli cross, traffic signal between 10 PM and 12 AM, compared against the CPCB standard noise limit of 55 dB. The minimum noise level recorded during this time was 71.2 dB, which already exceeds the permissible limit by a significant margin. The maximum noise level peaked at 99.3 dB, indicating a high level of noise pollution. The equivalent continuous noise level (Leq) was 85.5 dB during the day and 82.0 dB at night, exceeding the CPCB standards by 25.5 dB and 27.0 dB, respectively. These values indicate that the average environmental noise remains consistently high throughout the day and continues to exceed acceptable limits during the night. The slightly higher daytime Leq reflects increased traffic congestion, frequent stopping and starting of vehicles at the intersection, and extensive horn usage during peak commuting hours. As an important intersection on NH-4 (part of the Bengaluru–Pune corridor), Jalahalli Cross experiences continuous movement of passenger vehicles, public transport buses, heavy goods vehicles, and interstate traffic. Daytime traffic congestion results in a higher average noise level, while night time traffic consists of a larger proportion of heavy commercial vehicles that generate high peak noise levels despite reduced traffic volume. The findings suggest that people living or working near Jalahalli Cross including residents, commuters, roadside vendors, and traffic police personnel may be exposed to adverse health effects such as sleep disturbance, stress, reduced concentration, cardiovascular impacts, and potential hearing damage with prolonged exposure.

5. Nayandahalli Junction

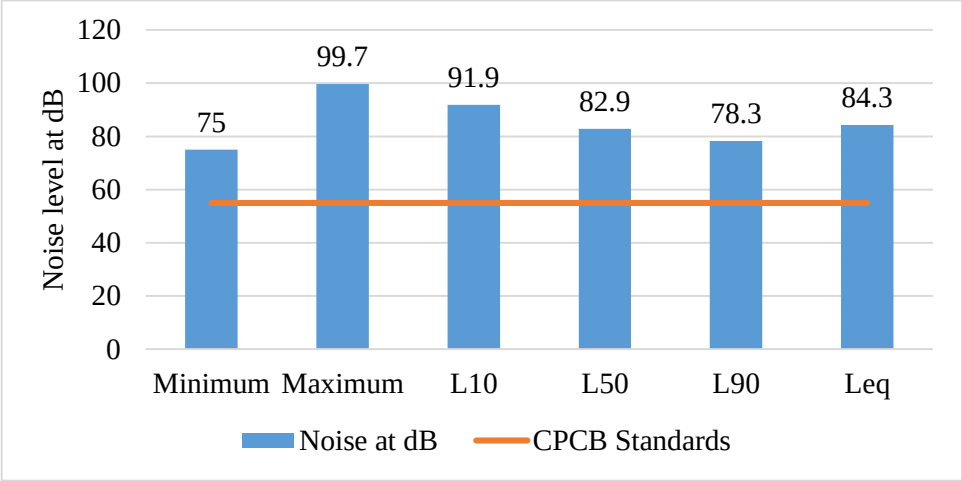
Nayandahalli Junction is one of the busiest and most complex traffic intersections in Bengaluru. It is located on Mysuru Road and serves as a key gateway connecting the city centre with Kengeri, Rajarajeshwari Nagar, the Outer Ring Road (ORR), and NICE Road. The ambient noise monitoring results at Nayandahalli Junction indicate that the junction experiences significant traffic-induced noise pollution.

Figure 10: Status of Noise Levels at Nayandahalli Junction (Day time)



The noise levels measured at Nayandahalli Junction, between 9 AM and 11 AM, compared against the CPCB (Central Pollution Control Board) standard noise limit of 55 dB, represented by the orange line. The minimum noise level recorded during this time was 74.2 dB, which already exceeds the permissible limit by a significant margin. The maximum noise level peaked at 92.8 dB, indicating a high level of noise pollution.

Figure 11: Status of Noise Levels at Nayandahalli Junction (Night time)

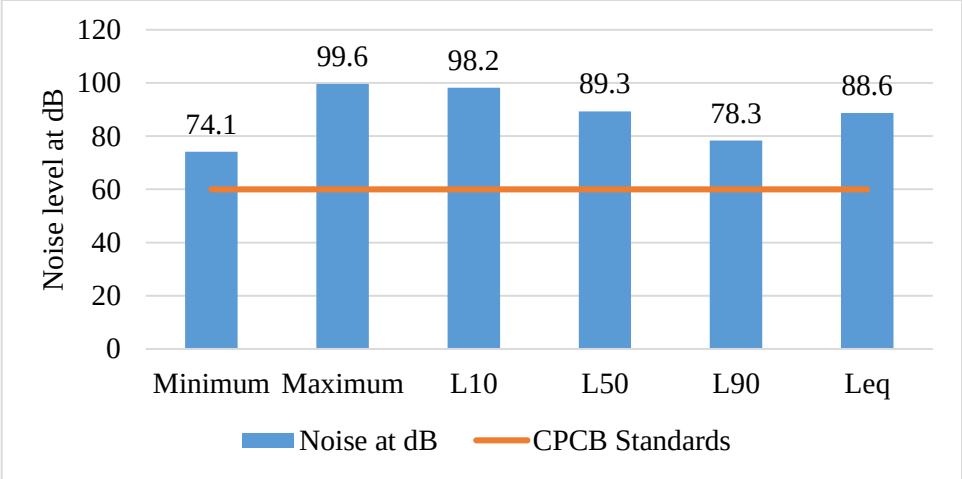


The noise levels measured at Nayandahalli Junction, traffic signal between 10 PM and 12 AM, compared against the CPCB standard noise limit of 55 dB. The minimum noise level recorded during this time was 75.0 dB, which already exceeds the permissible limit by a significant margin. The maximum noise level peaked at 99.7 dB, indicating a high level of noise pollution. The equivalent continuous noise level (Leq) was 80.9 dB during the day and 84.4 dB at night, exceeding the CPCB standards by 20.9 dB and 29.4 dB, respectively. These values indicate that the junction is exposed to consistently high traffic noise throughout the 24-hour period. The higher nighttime Leq suggests that noise pollution remains severe even after normal business hours, likely due to the movement of interstate buses, freight vehicles, and long-distance transport using the Mysore Road corridor.

6. Majestic

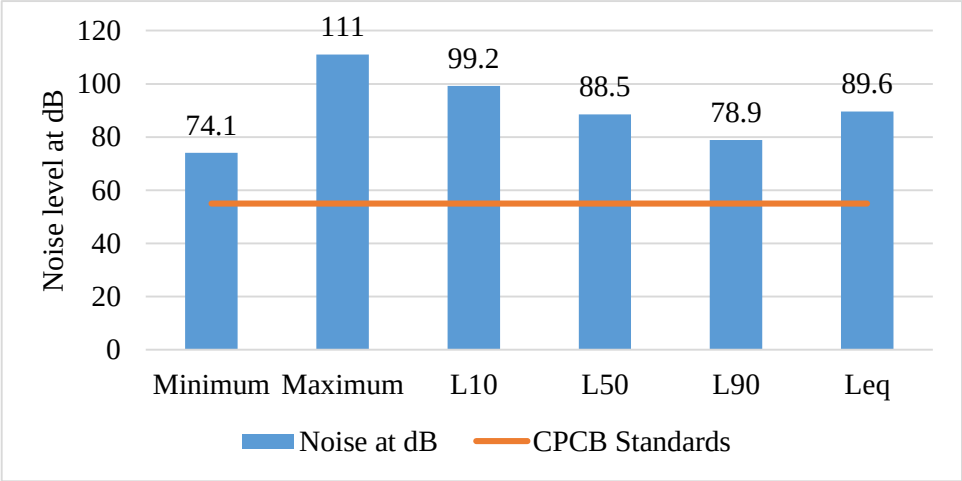
Majestic junction located in the centre of the Bangalore urban. It is a major commercial and transportation hub in Bangalore. It serves both intercity and interstate buses, making it a crucial point for travelers. The ambient noise monitoring conducted at Majestic junction indicates extremely high levels of environmental noise during both daytime and night time.

Figure 12: Status of Noise Levels at Majestic (Day time)



The noise levels measured at Majestic, traffic signal between 9 AM and 11 AM, compared against the CPCB standard noise limit of 55 dB. The minimum noise level recorded during this time was 74.1 dB, which already exceeds the permissible limit by a significant margin. The maximum noise level peaked at 99.6 dB, indicating a high level of noise pollution.

Figure 13: Status of Noise Levels at Majestic (Night time)



The noise levels measured at Majestic, traffic signal between 10 PM and 12 AM, compared against the CPCB standard noise limit of 55 dB, represented by the orange line. The minimum noise level recorded during this time was 74.1 dB, which already exceeds the permissible limit by a significant margin. The day time Leq of 88.6 dB and night time Leq of 89.6 dB indicate continuous exposure to hazardous noise levels, while the maximum night time level of 111 dB reflects the occurrence of intense noise events associated with heavy transport operations. The monitoring results clearly demonstrate that Majestic experiences extremely severe noise pollution during both daytime and night time, with every measured parameter significantly exceeding CPCB permissible limits. Majestic accommodates the city's largest concentration of public transport facilities, including the Kempegowda Bus Station, the Krantivira Sangolli Rayanna Bengaluru City Railway Station, and the Namma Metro interchange. Continuous movement of city buses, interstate buses, taxis, auto-rickshaws, private vehicles, delivery vehicles, and pedestrians, together with frequent horn usage and commercial activities, contributes to an exceptionally noisy environment.

Conclusion

The results indicate that traffic is the dominant source of urban noise pollution. High traffic density, prolonged congestion, mixed traffic composition, frequent horn use, heavy commercial vehicles, interstate buses, and continuous public transport operations contribute to elevated noise exposure across all locations. Major transport hubs such as Majestic, Hebbal, and Silk Board showed particularly severe and persistent noise pollution because of their strategic roles in Bengaluru's transportation network. Prolonged exposure to such levels may lead to stress, sleep disturbance for nearby residents, reduce work efficiency, cardiovascular effects, and hearing impairment among traffic personnel and roadside vendors. These findings highlight the need for effective mitigation measures, including restrictions on heavy vehicle movement during the night, strict enforcement against unnecessary honking, improved traffic flow

management, installation of noise barriers where feasible, roadside green buffers, and continuous environmental noise monitoring.

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