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Assessment of Traffic Noise In Hyderabad City, India

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ABSTRACT

Assessment of noise is carried out to study the noise pollution scenario of Hyderabad city at different zones, i.e. commercial zones, residential zones and silence zones comprising educational institutions and hospitals and nursing homes. In the present investigation, traffic volume data and noise level data are collected simultaneously at all the identified study zones. Sound Level Meter is used for assessment of noise and manual count and video recording is used for classified traffic survey. From the study, it is observed that noise level scenario of Hyderabad city is deteriorating and most of the zones are in the grip of higher noise level than the prescribed standards suggested by the by CPCB (Central Pollution Control Board) and Mo EF (Ministry of Environment and Forest, Govt. of India). It is due to all types of crowded vehicles (private and public), narrow roads and poor traffic management. Most of the hospitals, nursing homes and educational institution premises are in the grip of higher traffic noise levels than the prescribed noise standards of 50 dB (A) and they are not safe from noise induced disturbances.

KEY WORDS: Noise Level, dB (A) (A-weighted decibels), Sound Level meter (SLM), Commercial zone, Residential zone, Silence zone.

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INTRODUCTION

Noise is one of the most significant sources of environmental pollution in modern cities. It can be defined as an unpleasant and unwanted sound, which now becomes a serious threat to urban life. Noise is like a physical form of pollutants which does not harm directly to the life supporting system namely air, water and soil. But its effects are more directly on the receiver i.e. human being¹. The major cause of increasing noise is rapid urbanization, industrialization and population growth. Most of the Indian cities and towns like Visakhapatnam, Kolhapur, Asansole and Balasore have also been facing serious traffic noise pollution in last few decades due to substantial growth of new vehicles, low turnover of old vehicles, inadequate road network and urbanization^{2,3,4,5}. Assessment of traffic noise level is difficult in Indian cities due to the heterogeneity in traffic and environmental conditions e.g., mixed traffic, congestion, road conditions, frequent honking and lack of traffic sense^{6,7}. Therefore, it is important to consider such diverse factors in monitoring and assessment of traffic noise level in the Indian context. Various studies carried out in India have shown that most of the cities are under the grip of high noise level than the standards prescribed by CPCB and MoEF^{8,9}. The main objective of the present study is to assess the noise levels of Hyderabad city at various locations, i.e. commercial zones, residential zones and silence zones particularly educational institutions, hospitals and nursing homes, due to vehicular traffic under heterogenic traffic conditions. For this purpose, classified traffic volume and noise level are measured at different zones on roadways. In this study, traffic volume is categorized in 2-wheelers, 3- wheelers, 4-wheelers and 6-wheelers & above. Noise levels are measured for Leq, Lmin, Lmax, L10, L50 and L90. The terms Leq, Lmin, Lmax, L10, L50 and L90 are define as below.

Leq: Equivalent Continuous Sound Level

Lmin: Minimum Sound Level during a measurement period or a noise event

Lmax: Maximum Sound Level during a measurement period or a noise event

L10: the noise level just exceeded for 10% of the measurement period

L50: the noise level just exceeded for 50% of the measurement period

L90: the noise level just exceeded for 90% of the measurement period

STUDY AREA

Hyderabad is the capital city of the state Telangana and de jure capital of Andhra Pradesh. Occupying 650 square KM (250 sq mi) along the banks of the Musi River, it has a population of about 6.7 million and a metropolitan population of about 7.75 million, making it the fourth most populous city and sixth most populous urban agglomeration in India. At an average altitude of 542 m

(1,778 ft), much of Hyderabad is situated on hilly terrain around artificial lakes, including Hussain Sagar—predating the city's founding—north of the city centre. Hyderabad has a tropical wet and dry climate bordering on a hot semi-arid climate. The annual mean temperature is 26.6 °C (79.9 °F); monthly mean temperatures are 21–33 °C (70–91 °F). Summers (March–June) are hot and humid, with average highs in the mid-to-high 30s Celsius; maximum temperatures often exceed 40 °C (104 °F) between April and June. The coolest temperatures occur in December and January, when the lowest temperature occasionally dips to 10 °C (50 °F). May is the hottest month, when daily temperatures range from 26 to 39 °C (79–102 °F); December, the coldest, has temperatures varying from 14.5 to 28 °C (57–82 °F). The spatial growth of city has been accompanied by rapid industrialization, urbanization and population growth.

Hyderabad has seen a rapid rise in population in the past few years. People from other parts of the state and the region migrate to the city chiefly for education and occupation.

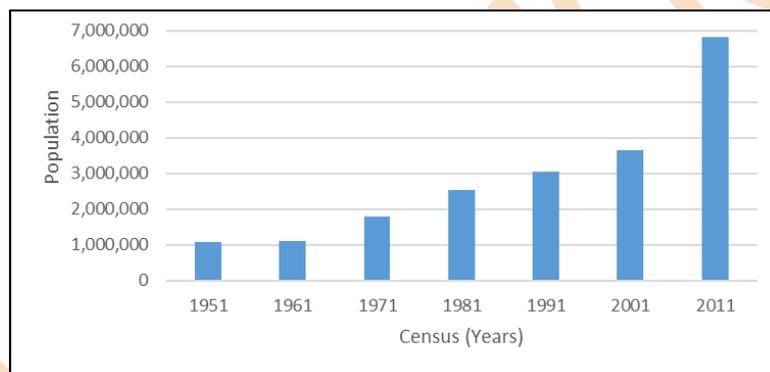


Figure -1: Decadal Population Growth of Hyderabad City

Source: Office of the Registrar General and Census Commission (web), Delimitation Commission of India (web).

The traffic scenario of Hyderabad city indicates an exponential increase of vehicles in the city road.

In 2013, due to a separate state movement, the vehicle registered were dropped and the shared capital of states Andhra Pradesh and Telangana had a vehicle population that amounted to approximately 2.2 million.

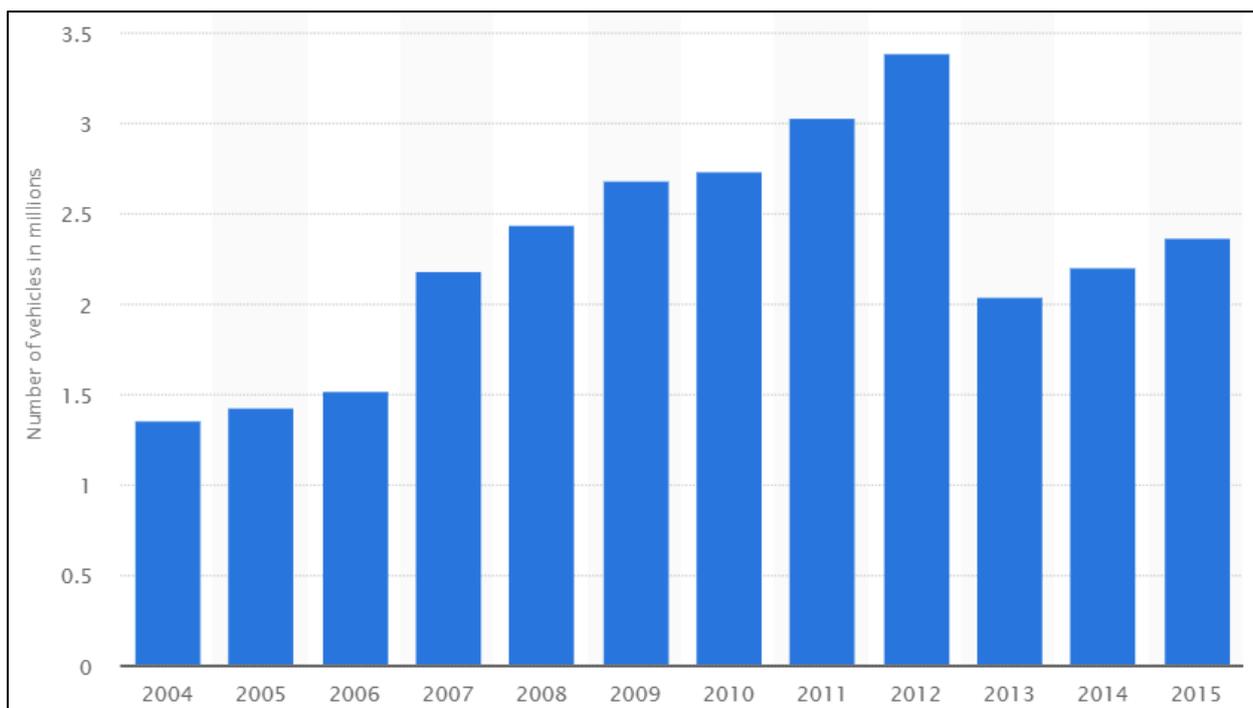


Figure -2: Vehicles Registered in Hyderabad City

Source: Office of the District Transport Officer, Hyderabad

MATERIALS AND METHODOLOGY

The present study is carried out to assess the Leq due to vehicular traffic in different zones like residential, commercial and silence zones in the Hyderabad city, state capital of Telangana, India. The methodology used for all study locations consists of

- Monitoring and assessment of Leq at different locations such as residential, commercial, silence zones.
- Measurement of classified traffic volume along with measurement of Leq for each study zone.
- Estimation and assessment of Noise Pollution Level (NPL) for all the study zones.

MEASUREMENT OF TRAFFIC NOISE LEVEL AND CLASSIFIED TRAFFIC VOLUME

In the present investigation, traffic volume data and noise level data are collected simultaneously at all the identified study zones. Both manual count method and video footings are adopted for traffic volume survey. Along with the noise level survey, the traffic volume (the no of vehicles passing a point in both directions) is also counted. Traffic volume is recorded under different grouping of 2- wheelers (motor cycle. Scooter etc), 3-wheelers (Auto/Auto van), 4-wheelers (car, jeep, van etc. and 6-wheelers (Bus/Truck, Tractor etc.) and above. The sources of noise in all the above cases are vehicular traffic from nearby roads. The 10 minutes of observation are made at

selected locations during 7:00am – 10:00 am, 12:00 noon – 3:00 pm and 4:00 pm – 8:00 pm. The noise level data are recorded with Data Logging Sound Level Meter (Model 407764, EXTECH Instruments) at the interval of 2 second intervals during the 10 minutes' exposure time for assessment of Noise Levels due to vehicular traffic flow peak (7:00am – 10:00 am and 4:00 pm – 8:00 pm) and non-peak hours (12:00 noon – 3:00 pm). This sound level meter measures the sound pressure level in dB (A) i.e. decibels in A-weighted scale which denotes the time weighted average of the sound pressure level on scale 'A' which is Ambient sound levels are being compared with the prescribed standards of CPCB, India. The National Ambient Air Quality Standard in respect of Noise as specified under the Noise Pollution (Regulation and Control) Rules, 2000 is being referred for the present study. The sound level meter is placed at a height of 1.5 m above the ground level and at a distance of approximately 10 m from the centre line of the road. For each zone, one set of reading is taken during the stated three different periods of the day. Three sets of reading are taken at each zone on different week days for each time interval. Sound level meter is calibrated before taking reading in every day.

Table 1: Ambient Air Quality Standards in respect of Noise in India

Type of Area	Category of Area/Zone	Limits in dB (A)(A) Leq	
		Day Time*	Night Time**
A	Industrial zone	75	70
B	Commercial zone	65	55
C	Residential zone	55	45
D	Silence zone	50	40

(Source: The Noise Pollution (Regulation and Control) Rules, 2000) * Day Time-6:00am to 10:00pm, ** Night Time-10:00pm to 6:00am

PARAMETERS MEASURED

In this study, assessment of noise level is carried out in different zones of the study area including commercial, residential, silence area particularly educational institutions, hospitals and nursing homes.

RESULT AND DISCUSSION

Present study reveals that the noise levels of Hyderabad city in most of the places are higher than the standard prescribed by CPCB and BIS "The Noise Pollution (Regulation and Control) Rules,2000" (Table-1). The noise scenario of the city is deteriorating with population growth, exponential increase of vehicles, lack of parking space, poor and narrow condition of roads and in appropriate traffic management.

COMMERCIAL ZONE (ABIDS)

From the noise survey, It has been observed that the variations of noise level, Leq in commercial zone of the city is ranged from 84.5 dB (A) to 88.2 dB (A) in 1st May 2011; 83.5 dB (A) to 88 dB (A) in 1st May 20112; 83 dB (A) to 87.4 dB (A) in 1st May 2013; 81.9 dB (A) to 87.6 dB (A) in 1st May 2014; 84.5 dB (A) to 89.4 dB (A) in 1st May 2015; 85 dB (A) to 89.3 dB (A) in 1st May 2016 and 85.4 dB (A) to 90.9 dB (A) in 1st May 2017 during 7:00 am, 10:00 am, 12:00 pm, 3:00 pm and 8:00 pm respectively. The noise levels of all times are above permissible limit 65 dB (A). This due to all types of crowded vehicles mostly commercial, narrow roads and poor traffic management.

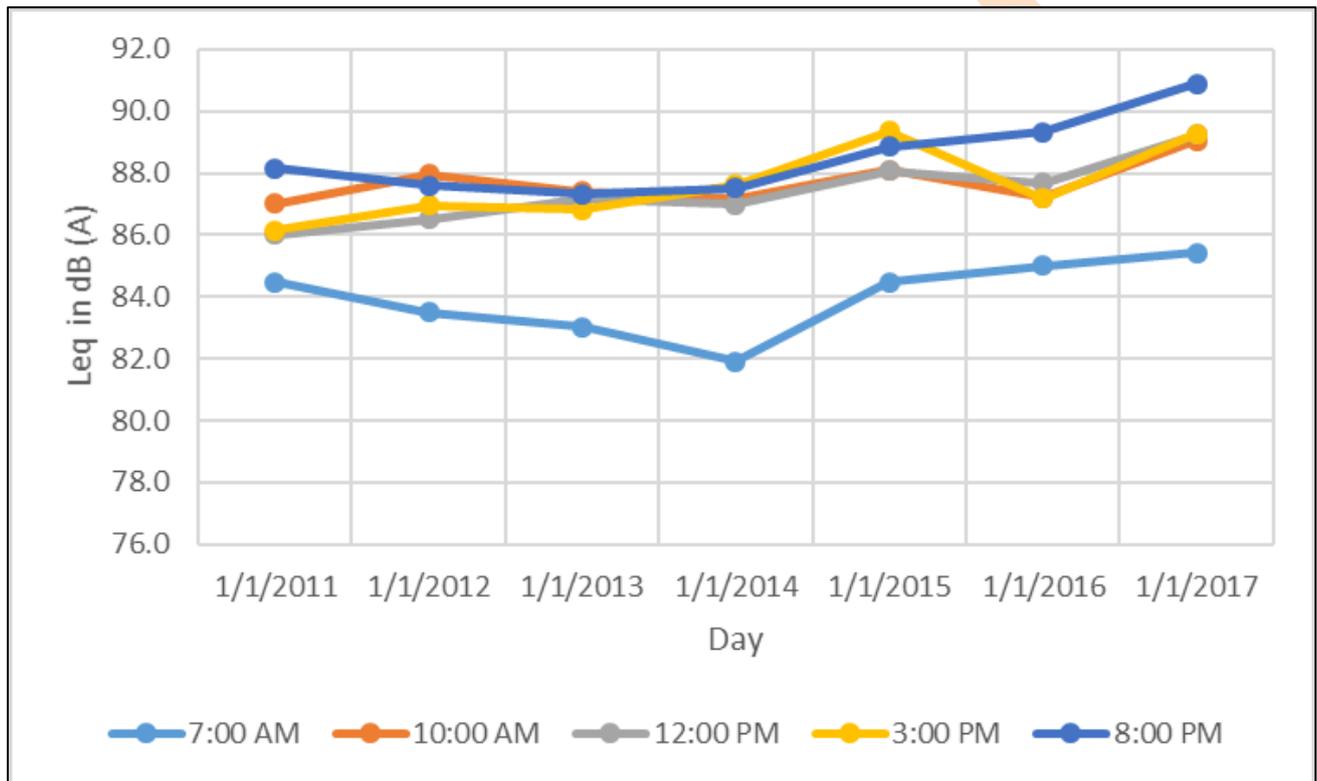


Figure - 3: Noise Levels (Leq) in Commercial Zone (Abids) in the Hyderabad city

Noise Pollution Level (NPL) gives an idea of noise pollution caused by fluctuating noise level. The average Noise Pollution Level (NPL) varies from 74.2 dB (A) to 77.9 dB (A) in 1st May 2011; 72.45 dB (A) to 76.9 dB (A) in 1st May 20112; 71.4 dB (A) to 75.8 dB (A) in 1st May 2013; 66.4 dB (A) to 72 dB (A) in 1st May 2014; 74 dB (A) to 78.9 dB (A) in 1st May 2015; 79.8 dB (A) to 84.1 dB (A) in 1st May 2016 and 76.1 dB (A) to 81.5 dB (A) in 1st May 2017 during 7:00 am, 10:00 am, 12:00 pm, 3:00 pm and 8:00 pm respectively.

RESIDENTIAL ZONE (JUBILEE HILLS)

Similarly, residential zone (Jubilee Hills) of Hyderabad city have shown higher noise levels than the prescribed noise standard 55 dB (A). It has been observed that the variations of noise level, Leq in residential zone of the city is ranged from 72.5 dB (A) to 76.1 dB (A) in 1st May 2011; 75.3 dB (A) to 76.1 dB (A) in 1st May 2012; 74.6 dB (A) to 76.4 dB (A) in 1st May 2013; 71.8 dB (A) to 77 dB (A) in 1st May 2014; 77.6 dB (A) to 80.9 dB (A) in 1st May 2015; 76.4 dB (A) to 78.4 dB (A) in 1st May 2016 and 76.3 dB (A) to 88.2 dB (A) in 1st May 2017 during 7:00 am, 10:00 am, 12:00 pm, 3:00 pm and 8:00 pm respectively. The noise levels of all times are above permissible limit 65 dB (A). This due to all types of crowded vehicle, narrow roads and poor traffic management.

Noise Pollution Level (NPL) gives an idea of noise pollution caused by fluctuating noise level. The average Noise Pollution Level (NPL) varies from 67.3 dB (A) to 70.8 dB (A) in 1st May 2011; 69.5 dB (A) to 70.3 dB (A) in 1st May 20112; 68.1 dB (A) to 69.9 dB (A) in 1st May 2013; 61.4 dB (A) to 66.5 dB (A) in 1st May 2014; 76.2 dB (A) to 79.5 dB (A) in 1st May 2015; 68.9 dB (A) to 71 dB (A) in 1st May 2016 and 65.7 dB (A) to 77.7 dB (A) in 1st May 2017 during 7:00 am, 10:00 am, 12:00 pm, 3:00 pm and 8:00 pm respectively.

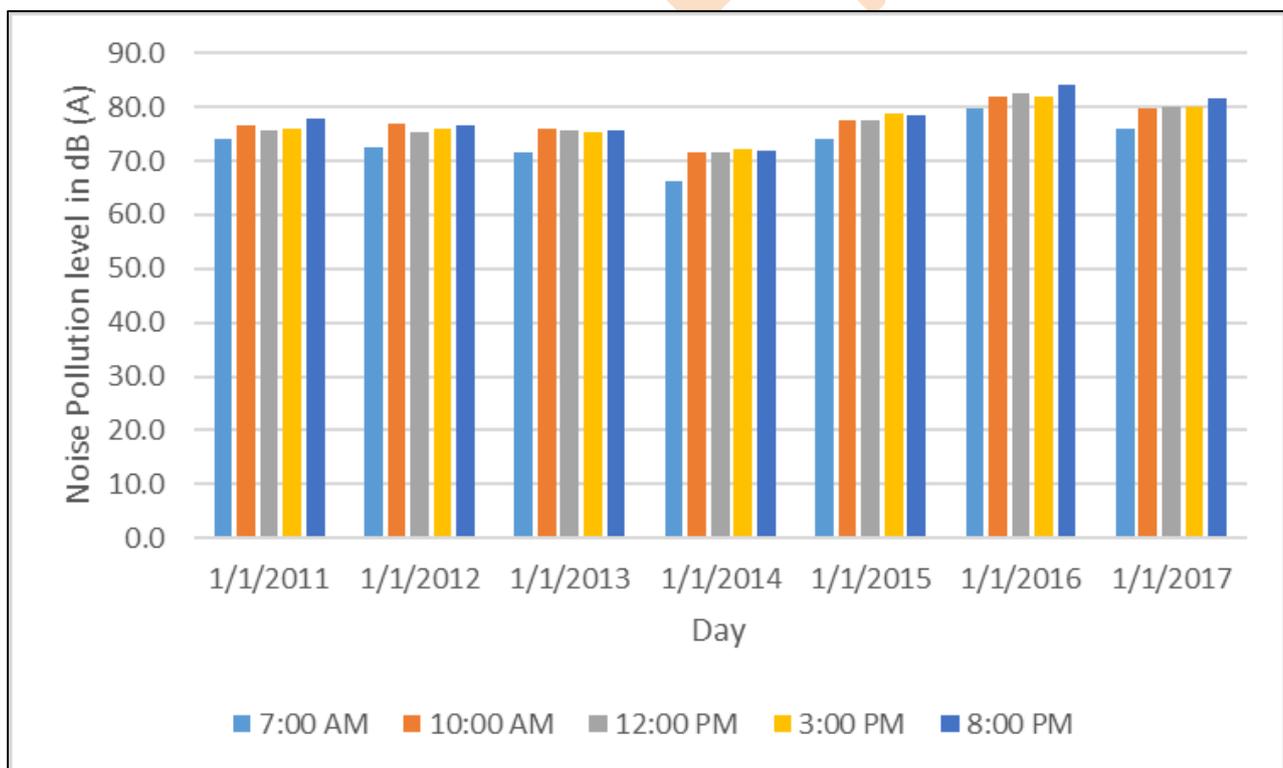


Figure - 4: Noise Pollution Level (NPL) in some Commercial Zone (Abids) in the Hyderabad city

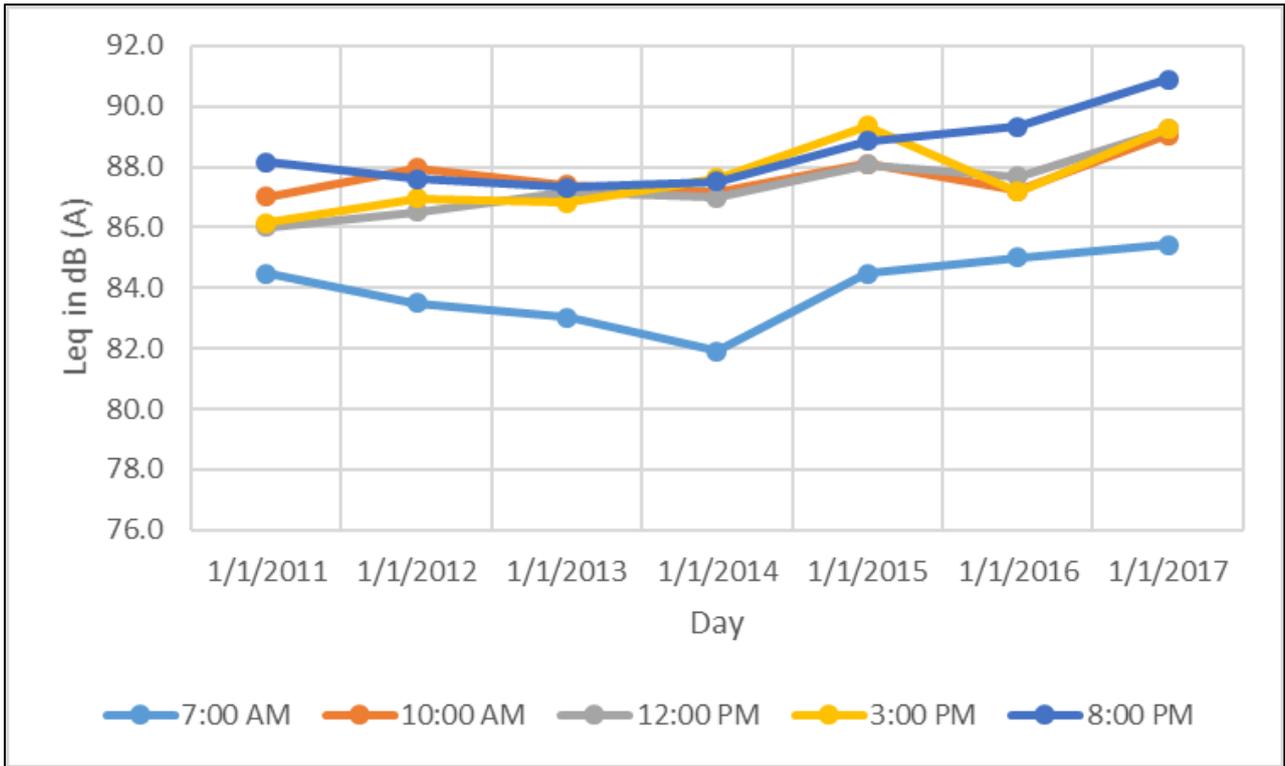


Figure - 5: Noise Levels in Residential Zone (Jubilee Hills) in the Hyderabad city

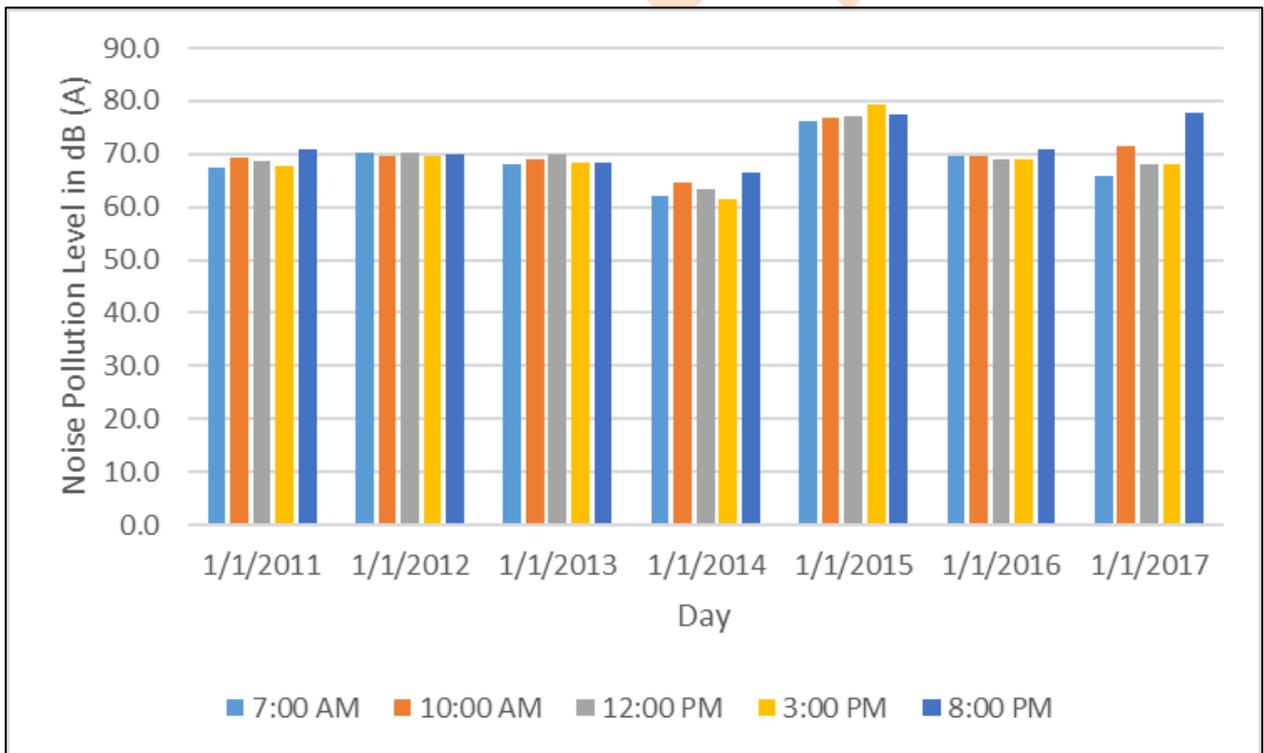


Figure - 6: Noise Pollution Level (NPL) in residential Zone (Jubilee Hills) in the Hyderabad city

SILENT ZONE (ZOO PARK)

Similarly, silent zone (Zoo Park) of Hyderabad city have shown higher noise levels than the prescribed noise standard 50 dB (A). It has been observed that the variations of noise level, Leq in silent location of the city is ranged from 67.7 dB (A) to 70.2 dB (A) in 1st May 2011; 67.5 dB (A) to 69.6 dB (A) in 1st May 2012; 69.9 dB (A) to 71.4 dB (A) in 1st May 2013; 70.5 dB (A) to 77.8 dB (A) in 1st May 2014; 73.2 dB (A) to 74.9 dB (A) in 1st May 2015; 72.0 dB (A) to 75.6 dB (A) in 1st May 2016 and 73.1 dB (A) to 87.4 dB (A) in 1st May 2017 during 7:00 am, 10:00 am, 12:00 pm, 3:00 pm and 8:00 pm respectively. The noise levels of all times are above permissible limit 50 dB (A). This due to all types of crowded vehicle, narrow roads and poor traffic management.

Noise Pollution Level (NPL) gives an idea of noise pollution caused by fluctuating noise level. The average Noise Pollution Level (NPL) varies from 62.6 dB (A) to 65.1 dB (A) in 1st May 2011; 62.1 dB (A) to 64.3 dB (A) in 1st May 2012; 64.6 dB (A) to 66.1 dB (A) in 1st May 2013; 63 dB (A) to 70.2 dB (A) in 1st May 2014; 71.9 dB (A) to 73.6 dB (A) in 1st May 2015; 69.8 dB (A) to 73.4 dB (A) in 1st May 2016 and 65.8 dB (A) to 80.1 dB (A) in 1st May 2017 during 7:00 am, 10:00 am, 12:00 pm, 3:00 pm and 8:00 pm respectively.

Most alarming situation is with high noise levels in the silence zone of the city. According to “The Noise Pollution (Regulation and Control) Rules, 2000, the silence zone is an area comprising not less than 100 meters around Zoo Park. But from this study, it has been found that most of the area around Zoo Park is established in either commercial places or nearby heavy traffic plying roads. Consequently, most of Zoo premises are in the grip of higher traffic noise levels than the prescribed noise standards of 50 dB (A) and they are not safe from noise induced disturbances.

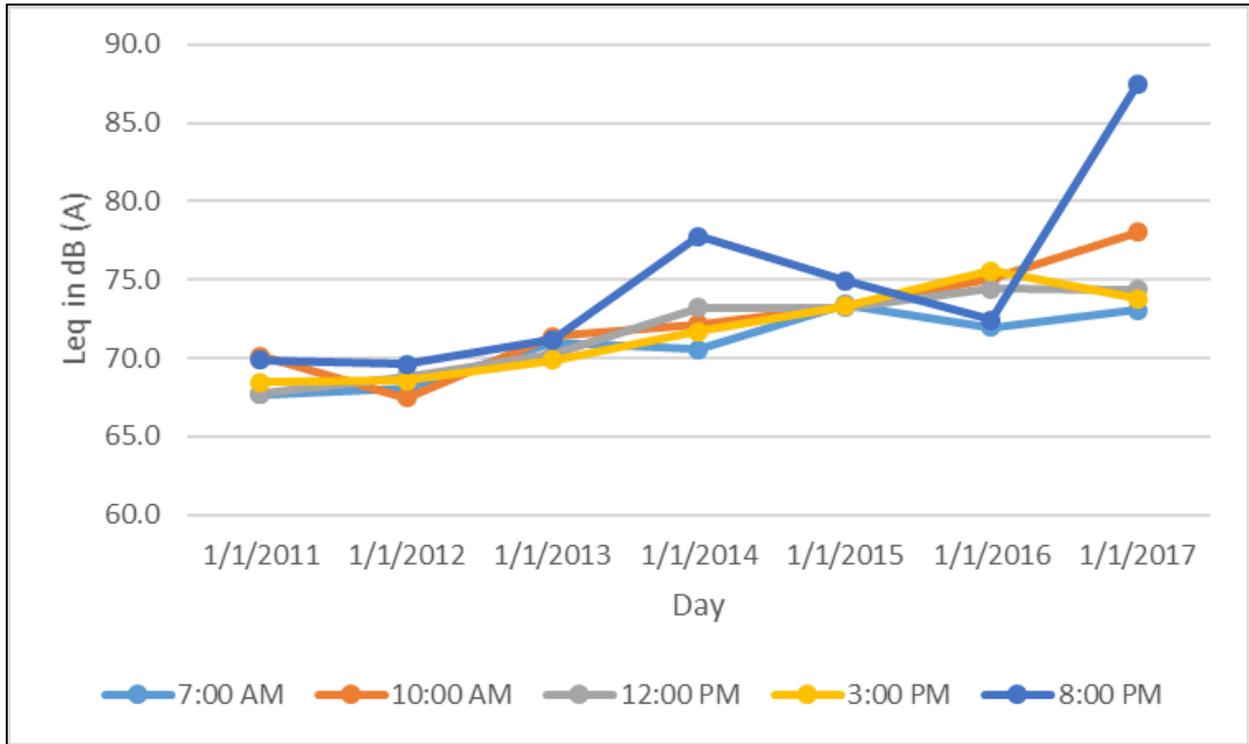


Figure -7: Noise Levels in Silent Zone (Zoo Park) in the Hyderabad city

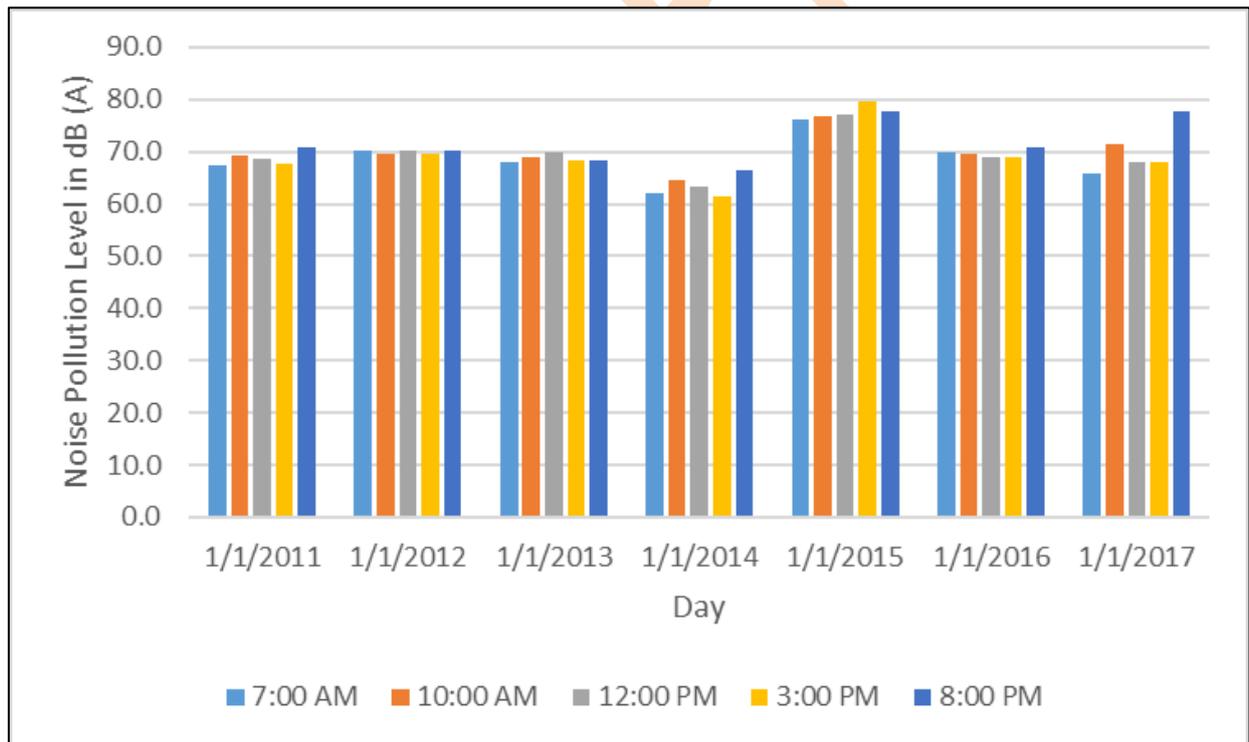


Figure -8: Noise Pollution Level (NPL) in Silent Zone (Zoo Park) in the Hyderabad city

CONCLUSIONS

The noise level assessment of the Hyderabad city has explicitly revealed that the noise levels are more than the permissible limits in all the investigated sites. Moreover, it is clearly indicating that the vehicular traffic is one of the major contributors to noise in the city. It is due to exponential growth of vehicles, growing populations, lack of sufficient parking spaces, narrow roads and inappropriate traffic management. The health of city dwellers may be at high risk in the long run due to noise related diseases. However, some remedial and preventive measures must be considered for betterment and improvement of noise environment of city. Creating more parking spaces, broadening of linking roads, constructing noise barriers where is necessary, constructing flyovers and overbridges, strict enforcement of law and planting more trees in roadside for sound cushioning are a few of them.

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