

EVALUATION OF NOISE POLLUTION LEVEL IN RESIDENTIAL AREA CAUSED BY VEHICLE TRAFFIC AT PEAK HOURS IN BANNERUGHATTA ROAD, BANGALORE CITY

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ABSTRACT: Noise pollution influences the environment and quality of human life in residential area and may be considered as important topic in scientific research. There are no sufficient studies carried out on noise pollution level in Bannerughatta road which effect the surrounding residential areas. This study carried out to determine the influence of noise level on human life in residential area like Arakere Mico layout, Panduranganagar, Venkatadhri layout and Dollars colony which runs parallel to Bannerughatta road within 250 meters distance over 2Km stretch. Noise measurements were taken in the above areas during peak hours of morning traffic (9AM to 11AM) on alternative days over a period of one year (from June 2016 to May 2017). The equivalent or average noise level ($L_{eq}dB$) have been measured at four points in the above area using noise measuring instruments SL 4001 and HT-80A. It is observed that in all places in this area there is an increase in L_{eq} above the set limit ($L_{limit} = 55dB$) and it varies in the range of 10% to 28%. This paper aims at finding the reasons for increase in the noise pollution level in this area and also gives preventive measures.

Key Words: Environment, Noise, Noise pollution, equivalent noise level ($L_{eq}dB(A)$), traffic, pollution level.

1.0 INTRODUCTION

In addition to air and water pollution, road traffic noise pollution has become a new threat to the human life residing in the cities of developing countries. Bangalore being the world class cosmopolitan city has no exception from this. Bangalore urban environment quality has been destroyed by unlimited increase in population, vehicles and infrastructure. In recent years road traffic has played a major role in environment noise pollution in all areas of Bangalore city(1). Long range high level noise pollution can produce severs stress on the auditory and non-auditory nerves system of human beings in the city(2, 3). Traffic noise can produce psychological and physiological effects on human life. The well-known adverse psychological effect of traffic noise are annoyance and sleep disturbances(4-6). Psychological response to noise is known as annoyance which causes anger, disappointment, depression and anxiety. Resent noise studies reveal that high noise pollution can lead to physiological risk factor such as permanent hearing loss, headache, hypertension, myocardial infarction, cardio-vascular disease, dizziness and fatigue (7-10). This indicates the importance of research in noise levels to find the sources of noise pollution and to suggest preventive measures.

The present work analyse the noise pollution level created due to merely peak traffic in the residential areas such as Arakere Mico layout, Panduranganagar, Venkatadhri layout and Dollars colony which are situated within 200meters distance parallel to Bannerughatta main road over a stretch of 2Km.

2.0 MATERIAL AND METHODS

2.1 DETAILS OF STUDY AREA

Bengaluru is the fastest growing city in the world. Due to urbanisation and industrialisation Bengaluru become the headquarters for commercial and industrial centre. This city has wonderful climate, developed residential layouts, commercial complexes, industrial areas, beautiful infrastructure and hence people prefer to settle in this city to lead safe, comfortable and luxurious life. This lead to the abnormal increase in population and vehicle traffic causes' heavy noise pollution in this city.

Bannerughatta main road in Bangalore city is composed of large number of multinational companies, commercial complexes, corporate hospitals and educational institutes of higher learning. Due to this the residential area attached to Bannerughatta has become thickly populated zone. The study area

surrounded by four residential areas such as Arakere Mico layout, Panduranganagar, Venkatadhri layout and Dollars colony.

Noise level measurements have been made in these residential layouts at four locations namely

- i. Arakere Mico layout: First main road, near Vijaya children clinic.
- ii. Panduranganagar: Adigas, Hotel surrounding area.
- iii. Venkatadhri layout: Back gate of Apollo hospital. and
- iv. Dollars colony: Near Florenceschool.

2.2 MATERIALS

Noise pollution level measurements have been done using microprocessor based digital sound level meter type SL – 4001 and HT – 80A with a capacity of 30 dB to 130 dB as shown in figure:1 The meter has been calibrated to high sensitivity using standard instruction manual. This device is installed or held 1.5 meters above ground level to record noise level measurements.



Figure 1: microprocessor based digital sound level meter (SL – 4001)

2.3 METHODS

Morning 9am to 11am is treated as peak hours, in this duration crowded vehicle movement causes heavy noise pollution. Noise level measurements have been made during morning peak hours of traffic at Banneraghatta main road on every alternate day for the period of one year from June 2016 to May 2017 with the time lap of 5 Minutes for two hours. The average value of noise level also called equivalent noise level is calculated in this duration for analysis. Maximum noise level (L_{max}), minimum noise level(L_{min}) and equivalent noise level (L_{eq}) were recorded as shown on the data sheets. This study is made to determine the variation in the noise level created in the same place at same time and to know how much the area is affected by heavy noise pollution. Measurements have taken in four places in different time periods which are a) Arakere Mico layout: First main road, near Vijaya children clinic (from June 16 to Aug 16), b) Panduranganagar: Adigas Hotel surrounding area (from Sep 16 to Nov 16), c) Venkatadhri layout: Back gate of Apollo hospital. (from Dec 16 to Feb 17) and d) Dollars colony: Near Florence school (from March 17 to May 17).

3.0 RESULTS AND ANALYSIS

Noise level data collected on every alternative day from June 2016 to May 2017 over a period of one year during traffic hours (9 am -11 am) in Banneragatta road has been divided into four zones which are represented with codes as shown in table:1.

Table 1: Zones code and location with data time period

Zone code	Zone location	Time period of data collection
Z1	Ist Main, ArekereMicolayout	June 16 to August 16
Z2	Ist cross Panduranganagar	September 16 to November16

Z3	Back side Apollo hospital gate,Venkatadri layout.	December 16 To February 17
Z4	Flouresce school road, Dollars colony	March 17 to May 17

Figure 2 shows the day wise variation Leq for the data collected in Z1 zone.

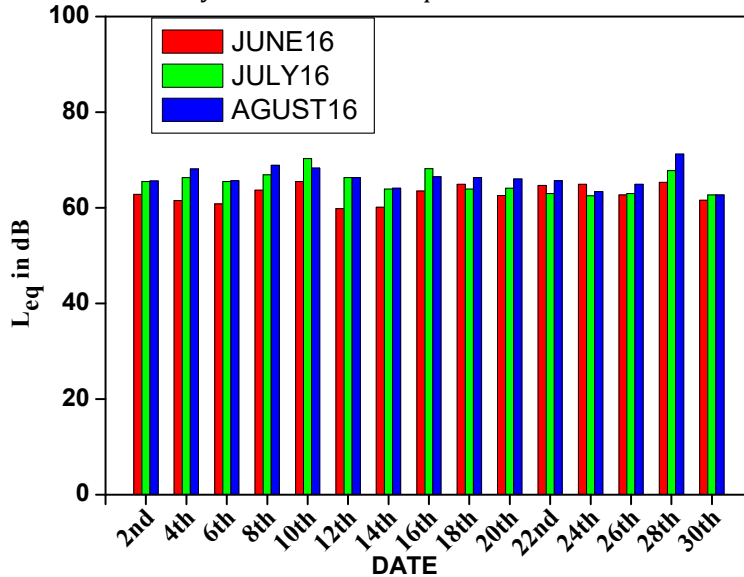


Fig: 2 Day wise variation of Leq in June, July and Agust - 2016

The set standards of noise level for residential area in day time by central pollution control board (CPCB) is (L_{limit}) 55 dB. From the figure it is obvious that Leq in Z1 zone is well above L_{limit} (55 dB.). In this zone Leq varies from the set standards in the range 9.3% to 27.8%. Minimum Leq of 60.1 dB is recorded on 12th June 16 and Maximum Leq of 70.3 dB is recorded on 10th July 16. This clearly shows that there is rise in noise levels in the range 5dB to 15dB above the set limit.

Figure 3 shows the day wise variation Leq for the data collected in Z2 zone.

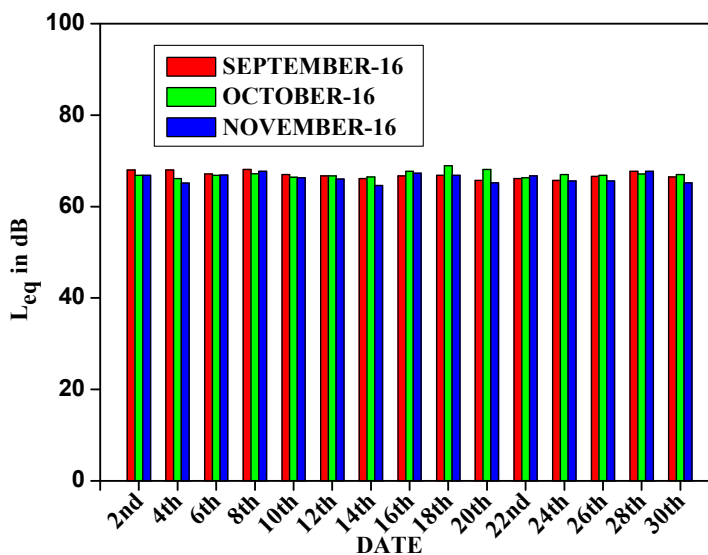


Fig: 3 Day wise variation of Leq in Sepytember, October and November - 2016

From the figure 3 it is obvious that Leq in Z2 zone is well above L_{limit} (55 dB.). In this zone Leq varies from the set standards in the range 17.4% to 25.3%. Minimum Leq of 64.6dB is recorded on 14th November 16

and Maximum Leq of 68.9 dB is recorded on 8th October 16. This clearly shows that there is rise in noise levels in the range 9.6 dB to 13.9 dB above the set limit of 55dB.

Figure 4 shows the day wise variation Leq for the data collected in Z3 zone.

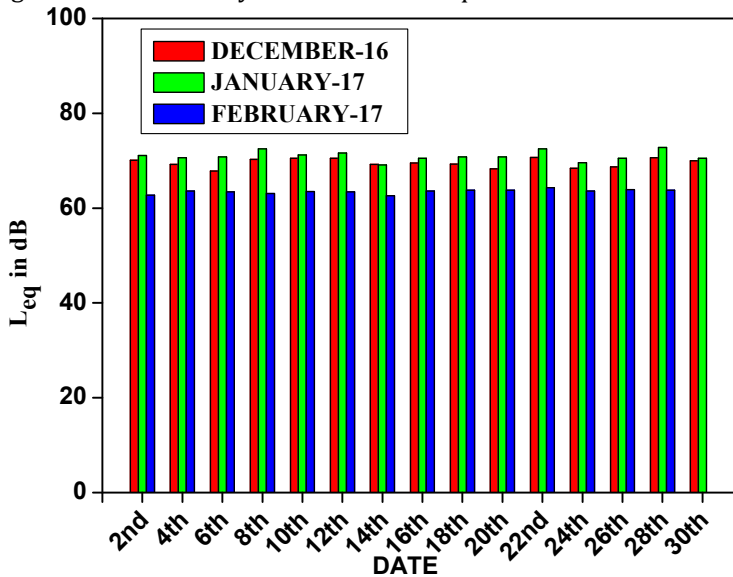


Fig: 4 Day wise variation of Leq in December-16, January and February -2017

From the figure 4 it is clear that Leq in Z3 zone is well above L_{limit} (55 dB.). In this zone Leq varies from the set standards in the range 13.8% to 32.4%. Minimum Leq of 64.6 dB is recorded on 14th February 17 and Maximum Leq of 72.8 dB is recorded on 26th January 17. This clearly shows that there is rise in noise levels in the range 14.6 dB to 17.8 dB above the set limit of 55dB.

Figure 5 shows the day wise variation Leq for the data collected in Z4 zone.

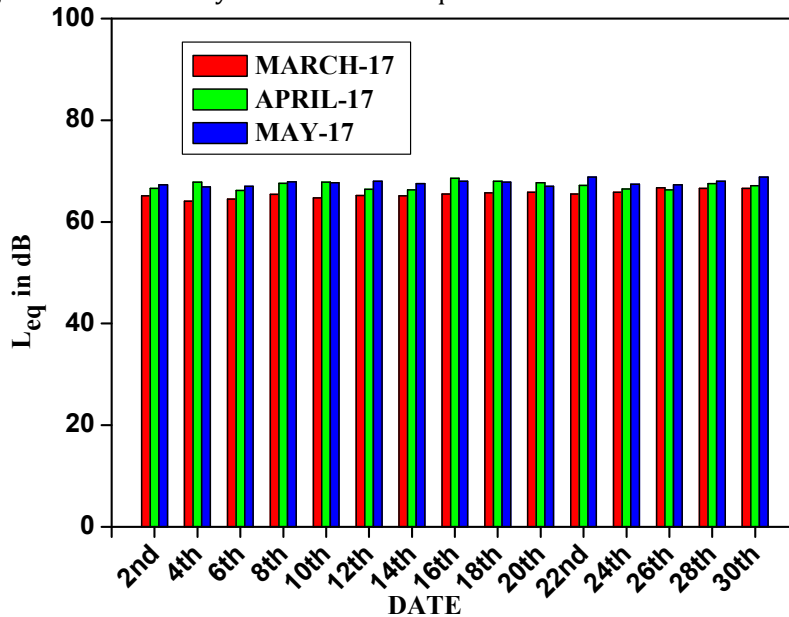


Fig: 5 Day wise variation of Leq in March, April and May -2017

From the figure 5 it is clear that Leq in Z4 zone is well above L_{limit} (55 dB.). In this zone Leq varies from the set standards in the range 16.5% to 25.1%. Minimum Leq of 64.1dB is recorded on 4th March 17 and Maximum Leq of 68.8 dB is recorded on 20th May 17. This clearly shows that there is rise in noise levels in the range 9.9dB to 13.8dB above the set limit of 55dB.

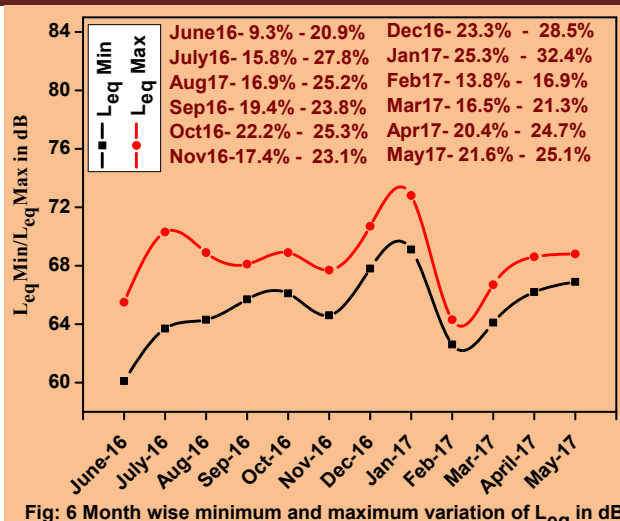


Fig: 6 Month wise minimum and maximum variation of L_{eq} in dB

Figure 6 shows the month wise L_{min} and L_{max} variations in all the four zones. It is obvious from figure 6 that the consistency in minimum and maximum noise level variation is observed in zone 2 compared to all other zones. The consistent variations in noise level in this area are due to small forest area attached to this zone which will give better lungs space in the area. In zone 3 the rise in noise level above set standards (55dB) is from 14.6 dB to 17.8 dB. This clearly suggests the noise level in this zone in traffic hours (9 am to 11am) is consistently from 69.6dB to 72.8dB. When compared other zones, the rise in noise levels above set standards are quite high in zone 3. This is clearly due to large number of high rise building in the zone with very poor lungs space. L_{eq} noise levels recorded during June 2016 to May 2017 shows minimum of 64 dB to maximum of 72dB. If noise level exceeds 75dB for more than eight hours daily can cause hearing loss, deafness, mental disorder, heart problem, high BP, dizziness for the people who are living in this residential area. All the four zones under study are exempted completely from the above mentioned potential threats of noise pollution.

4.0 CONCLUSIONS

The observed noise levels over a period of one year in all the four zones under study clearly reveal that there is a high level rise in noise pollution during peak hours of traffic in Bannerghatta Road, The only way to reduce traffic congestion in peak hours is the movement of heavy vehicles should be banned. Strict rule should implement such that all vehicles are required to maintain stringent noise emission standard. Educate the people to use public transport facility as much as possible. Need to bring awareness among people about noise pollution and its hazardous effects. Noise can be controlled to the maximum extent by providing Metro train facility in these zones.

5.0 References

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