A Study of Vehicular Noise Pollution at Notable Locations of Bhopal, Madhya Pradesh (India)

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Abstract: ***Noise*** **pollution has been recognized as one of the major hazards that impacts the quality of life all around the world. Because of the rapid increase in technology, industrialization, urbanization and other communication and transport systems, noise pollution has reached to a disturbing level over the years which needs to be studied and controlled to avoid different health effects like high blood pressure, sleeplessness, nausea, heart attack, depression, dizziness, headache, and induced hearing loss. In this paper road trafficnoise survey was conducted in Bhopal city at five sites viz.1. Rani Kamalapati railway station 2. Board office square 3.Bhopal railway station 4. Prabhat square 5. Bhopal talkies square. Based on this study broadconclusions are presented and suggestion made to reduce noise due to traffic.**

Keywords: **Noise, Bhopal, Vehicle, Pollution, Decibels**

I. INTRODUCTION

A sounds termed as noise when it becomes continuous and above the threshold limits of the ears . A vehicular noise is the resultant of the vibrating body of the vehicle plus its engine operating sound. Noise hasdifferent types including impulsive noise, continuous noise, intermittent noise and low frequency noise. All above mentioned types of noise are dangerous to human and animals if their limits are exceeded. Noise affects people so badly that at some places policy makers were compelled to said that there should be restrictions on noisy vehicles for reducing noise pollution as in New Delhi, India and Guangzhou district, China. Noise is a common problem in urban areas as compared to the villages because of the mechanization and more vehicles on the road. All types of noise altogether affect the same irrespective of the sources and cause headache to the high blood pressure and other heart diseases It is very harmful to human beings. In the new millennium, for protection of environmental degradation it is imperative to pay greater attention towards measuring noise pollution, enforcing regulation for noise emission limits elimination and control noise pollution. Taking a step in this direction a case study was under taken in JEC Jabalpur in post–graduate M.E. dissertation work. Noise pollution level was measured in Bhopal city and various parameters determined and the same are briefly presented in this paper.

Sources of noise pollution

Noise pollution has many sources of which the traffic noise could be a major source. Other types include community noise, household, industrial, aircraft and ships noise. (A) at the various intersections(locations).

Commercial and Industrial noise

Different commercial activities like transportation of goods from one place to other using ships and heavy trucks create considerable noise in the respective areas. Ocean noise levels are increasing as a result of major growth in global trading activities which shows that if this activity continued to grow, which is by 1.9% each year, the contribution of commercial shipping to ambient ocean noise levels will be expected to intensely increase.

Community noise

Community noise comprised of the noise during a match in the ground, traffic vehicle noise during waste collection, children playing in the streets, dogs barking, and noise during parties. Musical instruments being played can also be a source of noise for someone not interested in music.

Air craft noise

Airplanes such as army, navy and commercial aircraft are noise sources. Airplanes, including army, naval andcommercial aircraft, have become one of the most important environmental factors in terms of noise, and industry has identified much of their efforts and concerns. Noise abatement is the focus of modern research and development. Too much noise obviously damages our physical and mental health, so it makes sense to make a technical assessment of the noisy technology. Conflicts ofnterest in connection with aircraft noise are known. Propeller aircraft are the dominant noise.

II. METHOD AND METHODOLOGY

The steady traffic volume and equivalent noise levels L_{eq} were measured at different locations of Bhopal during day time (6:00am-10:00pm). Whole sampling durationwas divided into time slot of 2 hours each and for each time slot sampling was done for half an hour. Thus, each half an hour reading is representation of corresponding 2 hours' time slot noise level. All the reading are taken in recording mode where noise parameters like L_{eq}, L_{max}, L_{min} and SEL are recorded at 1-minute intervals. Thus altogether 30 readings for each parameter are taken during each time slot. Each study area covered a total of 4 hours measurement taken from

15th to 29th November 2022.
The instrument was kept almost to chest level (1.2m) in order to reduce errors due to reflection of sound from the body of investigator and the instrument was kept at 5m away from the roadside. The noise monitoring was done on working days i.e. excluding Sunday and local holidays in good climatic conditions in order to get consistent results. The individual type of traffic and total vehicle count and Leq were correlated and regression equations were interpreted.

III. RESULT&DISCUSSION

The Leq for each sampling time showed a minimum and maximum value of 66.4dB(A) and 71.1dB(A) during 2-4 pm and between 10-12 am time slot respectively at Bhopal railway station . Other 4th study location namely 1. Rani kamalapati railway station 2.Board office square 3. Prabhat Square 4.Bhopal talkies Square. According to Environment Protection Act, 1986 permissible value of noise level at day time at commercial area is 65 dB and that of silence zone is 50 db. Thus, our observations are above the prescribed limit.
Correlation between equivalent noise level (Leq) dB and total vehicles count for different study locationswas analyzed by linear regression. The Figure 1-4 shows the total vehicle count for each sampling timewas plotted with the respective Leq and regression equations were found using linear regression for all study locations.

TIME SLOT	SAMPLING TIME	RANI KAMALAPAT I RAILWAY STATION (Leq)	BOARD OFFICE SQUARE (Leq)	PRAPHAT SQUARE (Leq)	BHOPAL RAILWAY STATION (Leq)	BHOPAL TALKIES SQUARE (Leq)
6-8 AM	6:46-7:15	56.2	59.1	58.4	69.3	65.1
8-10 AM	8:46-9:15	57.1	59.2	58.9	70.2	68.5
10-12 AM	10:46-11:15	57.5	58.7	57.5	71.1	66.2
12-2 PM	12:46-13:15	57.9	58	56.6	70.1	65.1
2-4 PM	14:46-15:15	60.3	58.6	56.7	66.4	65.3
4-6 PM	16:46-17:15	60.6	57	56.6	66.6	65.4
6-8 PM	18:46-19:15	60.2	59	56.9	67	64.8
8-10 PM	20:46-21:15	59.4	56.8	56.1	66.7	63.6
MAXIMUM VALUE		60.6	59.2	58.9	71.1	68.5
MINIMUMVALUE		56.2	56.8	56.1	66.4	65.1

Table1: Values of (Leq) dB(A) During Different Sampling Time at Selected Squares in Bhopal

There is a strong correlation between total vehicles and Leq at Bhopal railway station were regression coefficient (R^2) was found to be very good and its value was found as 0.831. Bhopal talkies Square also showed good correlation having regression coefficients (R^2) value of 0.734 while the Board office Square which comes under silent zone also showed good correlation of 0. 612. Prabhat square showed the least correlation having a value of R^2=0.524. It is also satisfactory correlation. Generally, correlation coefficient R^2 value of 1.0 is considered to be the best fit, whereas values above 0.6 is considered to be good.So, we can say there is overall good correlation between total vehicles and Leq at all study locations.
It can be well correlated that the minimum value of Leq at all may be squares are due to the presence of very less traffic. In case of maximum traffic, it is obvious that it will produce more noise. But it may not have exactly linear relation. An unregulated traffic will result in greater noise pollution. Furthermore, unnecessary use of horn is a psychological tendency of driver. Old vehicles and inferior engine design which do not consider produced noise as a major factor for consideration also contributes to that. Reflection of noise from nearby wall, building or any other structure other factor. Size of the squares also affects measured noise pollution level at any square as the proximity from the source of noise pollution i.e., vehicle and noise level measuring instrument decreases or increases accordingly.

III. CONCLUSION

The study revealed that noise level had exceeded permissible limit stall the four locations due to excessive traffic and due to too much use of horn by the drivers. From the above observations we can concluded that there is a need to applyguidelines to control the noise level by relevant authorities. Hence, controlling the noise pollution is impossible withoutmaking people aware about its impacts. So, there is a need to educate people about the hazards of loud sound. This can be done by communication means of entertainment like radio, theater group etc. Proper spacing near the study sites anddense tree plantation can reduce the sound pressure level effectively. Our government and we must bring this noise pollution to an end for our own peace

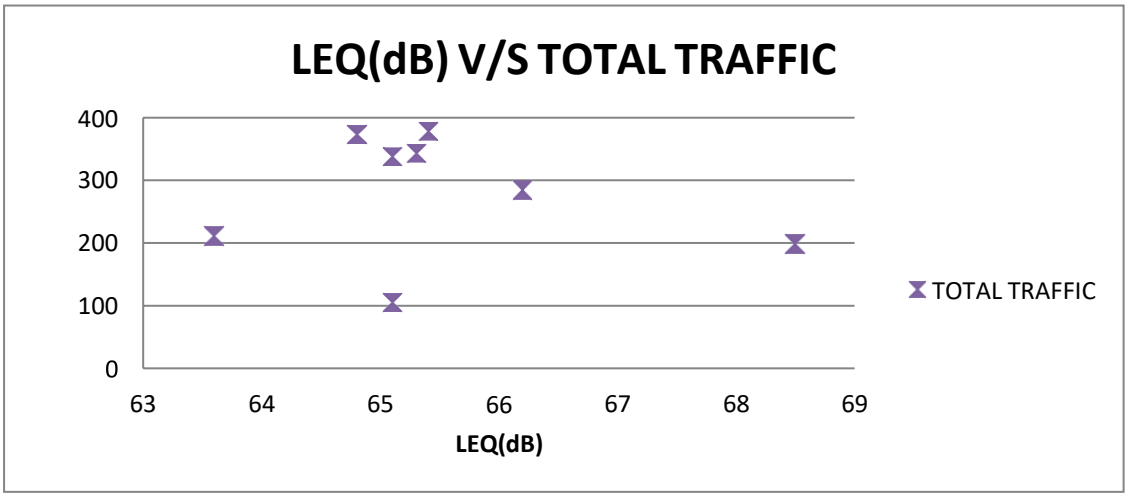

Fig 1: Variation LEQ in dB(A)with no. of total traffic at Rani Kamalapati Railway station

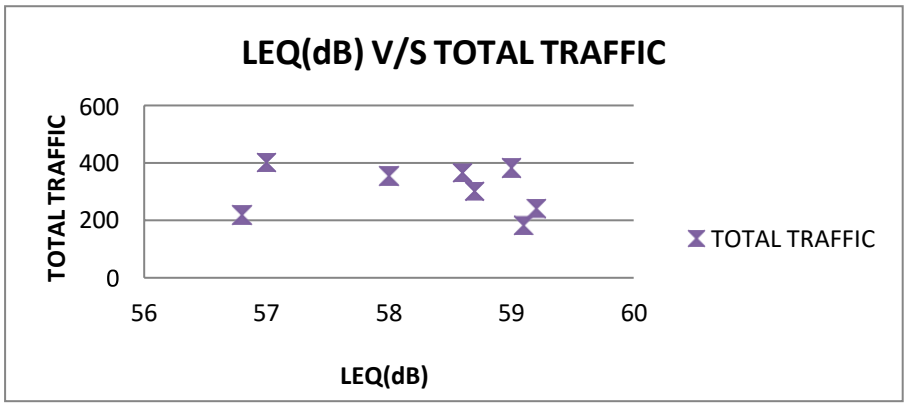

Fig 2: Variation LEQ in dB(A) with no. of total traffic at Board office square

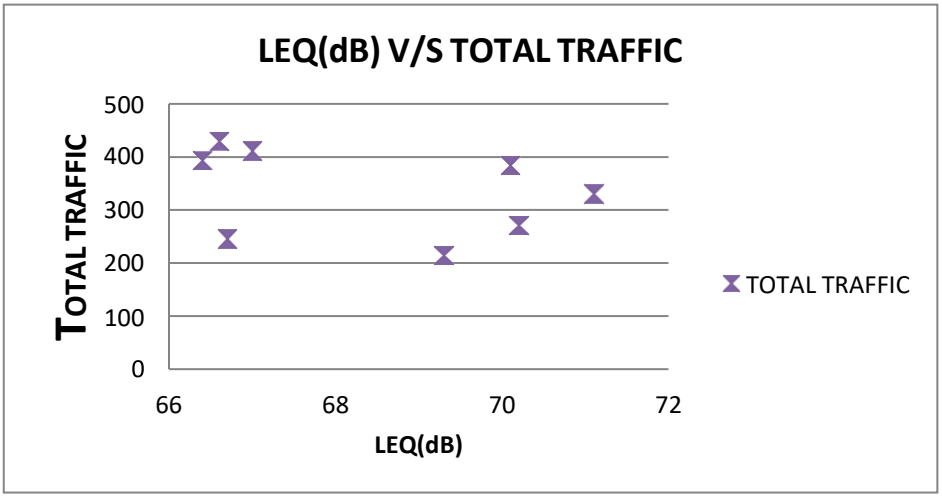

Fig 3: Variation LEQ in dB(A) with no. of total traffic at Bhopal Railway station

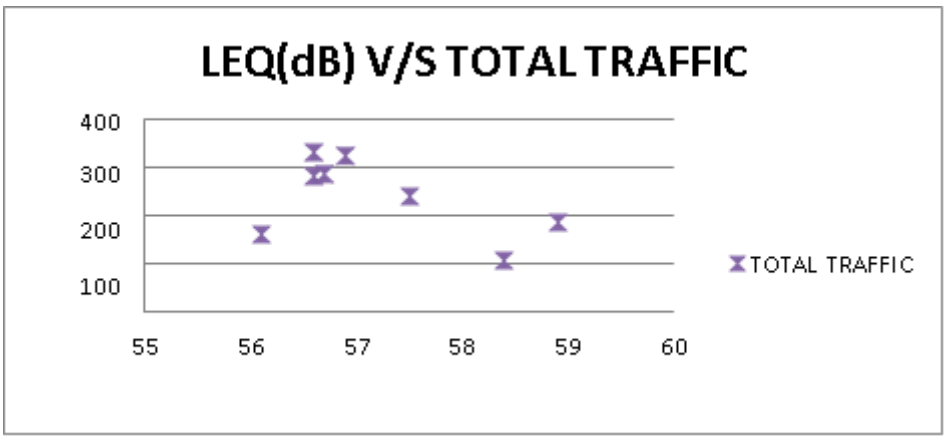

Fig 4: Variation LEQ in dB(A) with no. of total traffic at Prabhat square

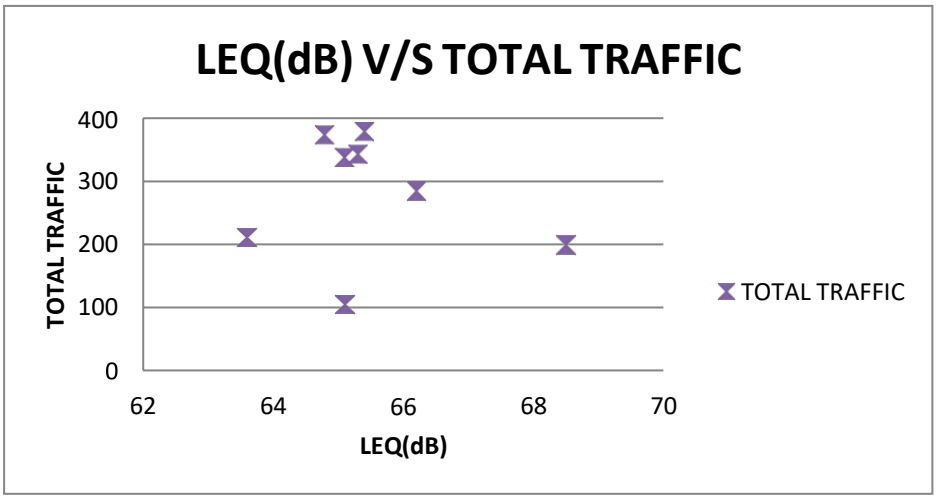

Fig 5: Variation LEQ in dB(A) with no. of total traffic at Bhopal talkies square

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