

Assessment of Vehicular Noise Pollution Levels at Different Busiest Intersection in Jabalpur City, MP (India)

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Abstract - In this study we have compare level of noise pollution due to railway and vehicular traffic in jabalpur city of our country viz. using digital sound meter along with the collection of traffic volume data. This study determines the level of noise and health impact due to rapidly growth of road traffic vehicles. The main objective of this paper is to give a review about the noise pollution problem in various cities of India and its effect on the public health.

In emergent country resembling India with the vehicle population increasing at an frightening rate, the residents of cities are experiencing severe environmental troubles that results from road traffic in particular from automobiles. Noise from road traffic is chief source of environmental pollution and it has unfavorable effects on human beings.

In this paper road traffic noise survey was conducted in Jabalpur at four sites viz. 1. Shastri Bridge Square 2. Ranitaal square 3. Damoh Naka square 4. Collectorate Square.5. Ghamapur chowk Based on this study broad conclusions are presented and suggestion made to reduce noise to traffic.

Key Words: Noise, Leq, Vehicle, frightening, Intersection, Decibels.

1. INTRODUCTION

The word noise has been derived from Latin word "Nausea" which implies 'unwanted sound' or unnecessary' or unpleasant [1]. Traffic noise is one of the most immediate and certain environmental problem associated with rapid industrialization, urbanization and population growth. Rapid urbanization, industrialization, development of road network and infrastructure causes severe Noise pollution problem [2]. Noise is an inevitable part of everyday life. Mild noise can be annoying, excessive noise can destroy a person's hearing. The slightest unwanted sound can become very annoying if it continues for lengthy period of time. The vehicular traffic and railways are the major sources of noise [3].Fast growing vehicle population in town in the current years, has resulted in significant increase in traffic on roads Causing frightening noise pollution. Noise level increases with traffic volume in an exponential mode. In India like many other developing countries traffic noise is major contributors of environmental pollution and now it has become effect of urban and sub-urban life. It is very harmful to human beings. Taking a step in this direction a case study was undertaken in JEC Jabalpur in post – graduate M.E. dissertation work. Noise pollution level was measured in Jabalpur city and various parameters determined and the same are briefly presented in this paper.

1.2 Measurement of Noise

The alarming increase in environmental noise pollution, have given the permissible noise standards. It depends on the location and period of day. Industrial areas obviously have somewhat higher acceptable sound levels than those prescribed for residential areas. The collected night standards are stringent than the daytime standards

TABLE.1

S.NO.	Category of area	Day time intensity (in dB)	Night time intensity (in dB)
1.	Industrial Area	75	70
2.	Commercial Area	65	55
3.	Residential Area	55	45
4.	Silence Zone		

2. MATERIALS AND METHODOLOGY

In the present study an Environmental sound level meter. (Envirotech SLM 100, Sound Level Meter, Type 2 dBA) is used. It is used to measure the existing equivalent noise level (Leq) dB (A) at the various intersections (locations). The noise levels were measured during day time i.e between

6 am to 10 pm along with simultaneous counting of different types of vehicle. Whole study duration was divided into time slot of 2 hours each and for each time slot sampling was done in middle half an hour from 21th June to 4th July 2017. The readings were taken on four major squares of Jabalpur city viz. 1. Shastri Bridge Intersection 2. Ranitaal Intersection 3. Damoh Naka Intersection 4. Collectorate Intesection. 5. Ghamapur chowk . First three Including Ghamapur Intersection come under commercial area and Collectorate Square comes under silent zone. 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. Further, Leq and total number of vehicles for different time slots were correlated

Decibel Scale

Intensity of sound and noise is measured by a sound meter and is expressed in a unit called decibel (dB). Decibel is the one-tenth part of the larger unit Bel. The name Bel is given after the name of Alexander graham bell [7].

Decibel is the ratio expressed in logarithmic scale of intensity to be measured and a reference sound level[9].

$$dB = 10 \log_{10} I/I_0$$

Where I = sound intensity to be measured, I_0 = reference sound level

Decibel can also be used as a measure of sound pressure level (SPL).

$$SPL \text{ or } dB = 10 \log_{10} P/P_0$$

S. No.	Sound effect	Sound level (in dB)
1.	Threshold of normal hearing	0 (Theor.)
2.	Normal conversations	50-60
3.	Speech interference	75
4.	Annoyance/ irritation	80
5.	Disturbance in motor activity of man	90
6.	Physiological disturbance in man	120

III. RESULT AND DISCUSSION

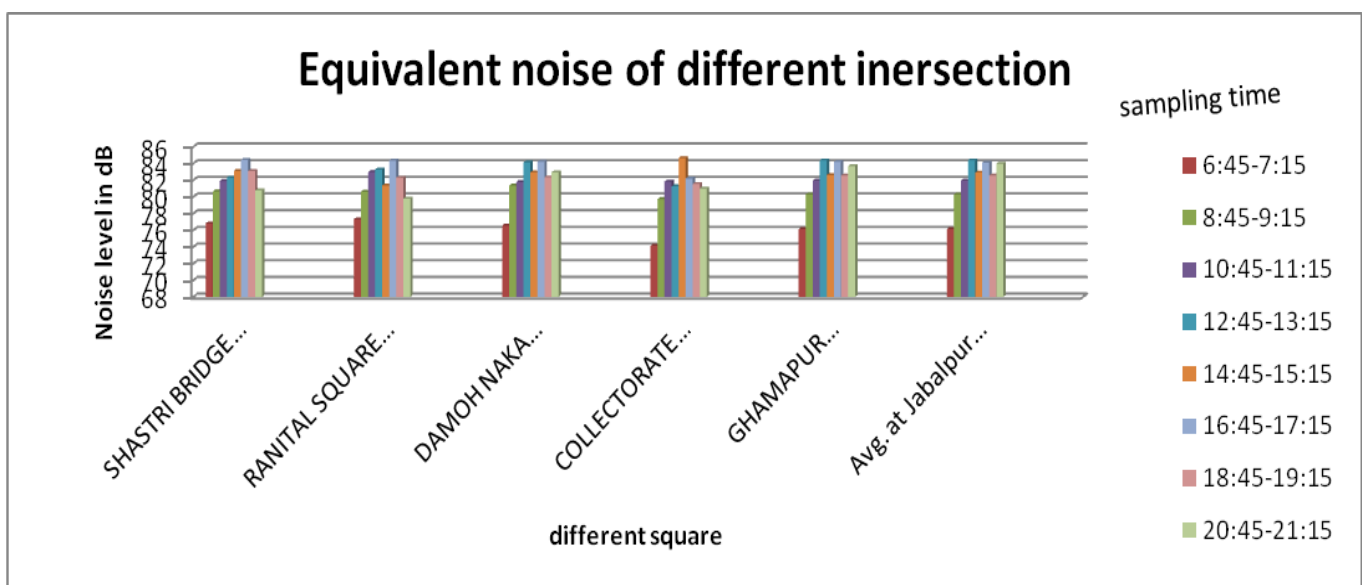
The Leq for each sampling time showed a minimum and maximum value of 74.4 dB (A) and 85.1 dB (A) during early morning between 6-8 am and between 2-4 pm time slot respectively at Collectorate Square itself. Other three study location namely Shastri Bridge Square, Ranital square, Damoh Naka square have maximum value Leq 84.7, 83.5 and 84.5 during 4-6 PM, 12-2 PM and 4-6 PM time slot respectively. 6-8 am time slot for all the squares have least value because of least number of total traffic during this time. According to

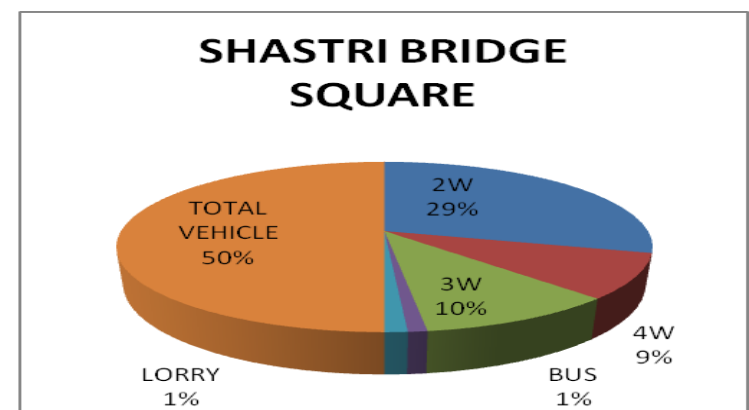
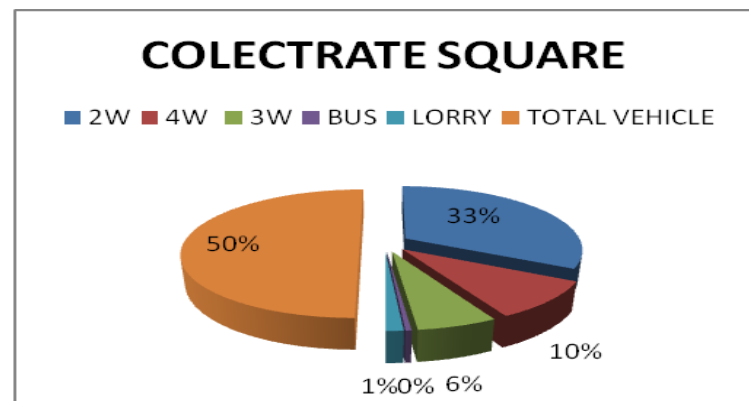
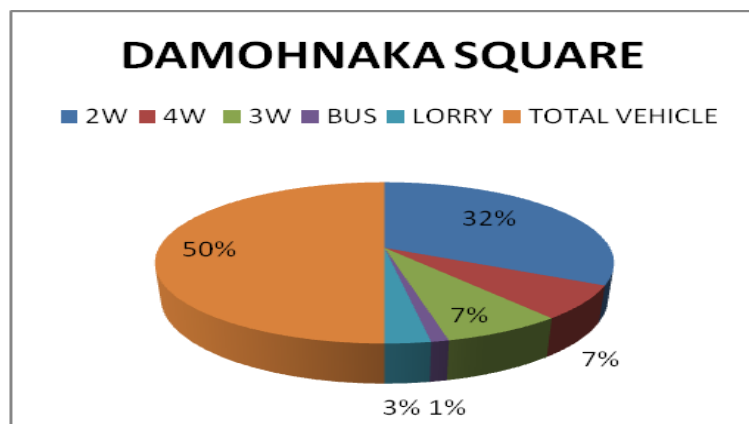
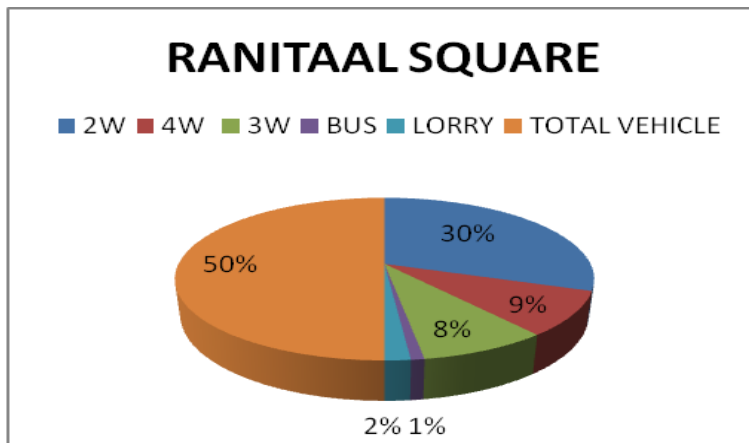
Environment Protection Act, 1986 permissible value of noise level at day time at commercial area is 65 dB and that of silence zone is 50 dB. Thus our observations are much above the prescribed limit. Correlation between

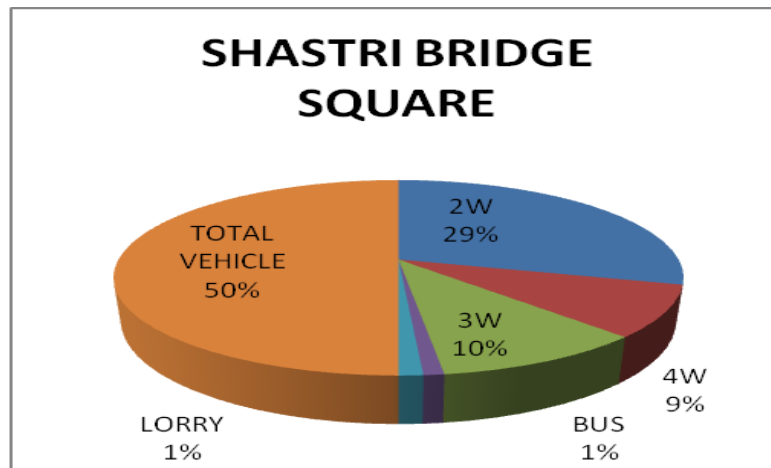
equivalent noise level (Leq) dB (A) and total vehicles count for different study locations was analyzed by linear regression. The Figure 1-4 shows the total vehicle count for each sampling time was plotted with the respective Leq and regression equations were found using linear regression for all study locations.

There is a strong correlation between total vehicles and Leq at all different intersection in Jabalpur city. In above intersection the total traffic is maximum at Ghamapur then Damohnaka intersection. The 2W is maximum and approximately equal at ghamapur and collectorate intersection so Ghamapur is most crowded intersection of Jabalpur. So noise level in Ghamapur Intersection is maximum and 4w is maximum at Shastri bridge intersection. It is also satisfactory correlation. Generally, correlation coefficient R^2 value of 1.0 is considered to be the best fit, where as 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.

	SHASTRI BRIDGE SQUARE (Leq)	RANITAL SQUARE (Leq)	DAMOH NAKA SQUARE (Leq)	COLLECTORATE SQUARE (Leq)	GHAMAPUR CHOWK	Avg. at Jabalpur of all square
6:45-7:15	76.8	77.3	76.6	74.1	76.1	76.1
8:45-9:15	80.7	80.6	81.4	79.8	80.3	80.3
10:45-11:15	81.9	83.0	81.8	81.8	81.9	81.9
12:45-13:15	82.3	83.3	84.1	81.3	84.4	84.4
14:45-15:15	83.1	81.4	82.9	84.7	82.6	82.9
16:45-17:15	84.4	84.4	84.2	82.2	84.2	84.1
18:45-19:15	83.1	82.3	82.3	81.6	82.6	82.6
20:45-21:15	80.8	79.8	82.9	81.0	83.7	84.0







It can be well correlated that the minimum value of Leq at all Intersection are due to the presence of very less traffic during 6-8am time slot. 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 results 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 may be another factor. Size of the Intersection also affects measured noise pollution level at any Intersection as the proximity from the source of noise pollution i.e. vehicle and noise level measuring instrument decreases or increases accordingly.

Observed health impact of noise pollution[9]:

- Reduction in individual’s efficiency in work.
- Frustration
- Neutral stress
- Sleep interference
- Headache
- Irritability
- Speech interference
- Communication interference

Remedies to control noise pollution[10]:

- By controlling the number of vehicles
- By controlling public transport system
- There should be no signal kept by spacing of half K.M
- The airport should keep away from the colonies
- School, Hospital and Busy Office should keep away from the main route
- By keeping the colour of houses in light blue and green

IV Remedial Measures [10-11]

Since the fact that public health has been a matter of great concern for us, hence control of noise pollution is necessary. The remedial measure for noise pollution can be broadly classified as:

- (a) Control at source
- (b) Control in the transmission path
- (c) Using protective equipment
- (d) Vegetation
- (e) Use of suitable noise absorbing material for wall/door/window/ceiling will reduce the noise levels

3. CONCLUSIONS

The study revealed that noise level had exceeded permissible limits at all the five locations due to extreme traffic and due to too much use of horn by the drivers. From the above observations we can accomplished that there is a need to be relevant guidelines to control the noise level by relevant authorities. Hence, controlling the noise pollution is unrealistic without making people awareness about its impacts. So there is a need to educate and regulate people about the exceeded level of loud sound. This can be done by study sites and dense tree plantation can reduce the communication means of entertainment like radio, theater group etc. It can also reduce by the noise barrier good Proper pavement design .spacing near the observation sites reduce the sound pressure level effectively. Our government and we must bring this noise pollution to an end for our own peace.

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