Evaluation of the Traffic Noise Pollution at Some Busiest Sites of Faisalabad City, Pakistan

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ABSTRACT

Noise Pollution Levels (L_{np}) at three busiest cites i.e., Rail Bazaar, Jhang Bazaar and Chenab Chowk of Faisalabad city were evaluated. The noise levels were measured by noise level meter (NA-24 RION) at regular intervals of 5 minutes. The traffic noise levels were measured for three consecutive days to determine the behavior of Q_{eq} and L_{np} i.e., traffic density and noise pollution level, respectively. The Q_{eq} and L_{np} were measured from 7am to 7pm in three hours spell i.e., 7:00-11:00 (Morning), 11:00-03:00 (Noon) and 03:00-07:00 (Evening). Hence, all the three selected sites were found to be badly polluted with traffic noise having L_{np}, on average, greater than 85dB (A) which may be able to hamper the health of local dwellers.

Keywords: Traffic noise, Traffic density, Noise pollution level (L_{np}), Statistical noise level

INTRODUCTION

Everything around us such as water, trees, animals etc., constitute our environment and the nature has set up symmetry and balances in the universe. Therefore, anything which causes imbalance in our environment is termed as "Pollutant". There are many factors which cause the environment to be polluted and one of those undesired and unpleasant factors is "Noise" which affects the quality of life as it interferes in the activities of an individual like concentration, communication, relaxation and sleep. Some authors have defined noise as any audible acoustic energy that adversely affects the physiological or psychological well being of the people. The term noise is commonly used to describe sounds that are disagreeable or unpleasant produced by acoustic waves of random intensities and frequencies.

Faisalabad, the Manchester of Asia, is the third largest city of Pakistan with an estimated population of 2,008,861 in 1998 with annual growth rate 3.58, according to the population census organization, Ministry of Economic Affairs and Statistics, Pakistan. The increasing population of Faisalabad city demands more vehicles for commuting requirements of local dwellers. So the traffic density is increasing linearly with the population density.

According to the survey, the hearing capability of the local people in the environment of such a huge traffic density is threatened due to the constant exposure of noise for more than 8 hours (Ali and Tamura, 2003). Another survey was also done for the evaluation of the variation in traffic equivalent noise levels as distance from the road intersection increases (Abo-Qudais and Alhiary, 2004). Moreover, the people on the locality of Katchehry Bazaar (Faisalabad) were constantly exposing themselves to 93.5 dB(A) noise level averagely for about 10 to12 hours (Hussain et al., 2008). Following the same spirit, present study was done to calculate the noise pollution level L_{np} at three busiest sites i.e., Rail Bazar, Jhang Bazar and Chenab Chowk of Faisalabad city within the Municipal range.

EXPERIMENTAL

Materials and Methods

Digital noise level meter NA-24 RION (manufactured by RION Company, Tokyo, Japan) was used to measure noise level at all the sites of investigation. Meter was placed at a distance of 30 feet from the center of the road and 1.5 meter above the road level. Noise levels were measured at the three selected busiest places i.e., Rail Bazar, Jhang Bazar and Chenab Chowk in the city area from 7am to 7pm. Data were taken after each 5 minutes. From the recorded data L_{10}, L_{50}, L_{90} and L_{np} were measured. Here, L_{10}, L_{50} and L_{90} are statistical noise levels, such that, a sound level exceeded in 10% of the measurement periods, is called L_{10}, if it exceeded in 50% of the measurement periods then it is called L_{50} and if it is exceeded in 90% of the measurement periods then it is known as L_{90} (Vincent and Wooten, 1980).

RESULTS AND DISCUSSION

The main objective of this research work was to calculate equivalent traffic density Q_{eq} and statistical noise pollution levels (Zannin et al., 2002). Equivalent traffic density Q_{eq} was calculated by the relation given as

$$Q_{eq} = Q \times (1 + n \times R_p /100) \ldots\ldots.. (1)$$

Where, "Q" is the traffic density per hour, R_p is the percentage of Rickshaws in the "Q" and *n* is the correlation coefficient between Q and R_p. During the survey it was found that Rickshaws were the major source of heavy noise. Noise pollution level L_{np} was determined by the relation (Parbat and Nagarnaik, 2007).

$$L_{np} = L_{50} + (L_{10} - L_{90})^2 /60 + L_{10} - L_{90} \ldots\ldots.. (2)$$

Table 1. Average values of Noise Pollution Level L_{np} of Rail Bazaar

Days	Time	Q_{eq}	L_{np}
	07:00-11:00 (Morning)	3197.44	91.16
Day 1	11:00-03:00 (Noon)	4852.19	103.19
	03:00-07:00 (Evening)	3383.12	97.78
	07:00-11:00 (Morning)	4237.19	107.79
Day 2	11:00-03:00 (Noon)	4417.19	102.01
	03:00-07:00 (Evening)	3023.12	98.32
	07:00-11:00 (Morning)	4088.71	106.21
Day 3	11:00-03:00 (Noon)	4528.96	102.13
	03:00-07:00 (Evening)	3328.37	96.67

Table 2. Average values of Noise Pollution Level L$_{np}$ of Jhang Bazaar

Days	Time	Q$_{eq}$	L$_{np}$
	07:00-11:00 (Morning)	4481.58	101.44
Day 1	11:00-03:00 (Noon)	3543.84	104.77
	03:00-07:00 (Evening)	5008.50	106.10
	07:00-11:00 (Morning)	3963.84	99.77
Day 2	11:00-03:00 (Noon)	5624.35	101.73
	03:00-07:00 (Evening)	8028.57	104.74
	07:00-11:00 (Morning)	2759.73	101.12
Day 3	11:00-03:00 (Noon)	2848.39	112.90
	03:00-07:00 (Evening)	4784.35	115.30

Table 3. Average values of Noise Pollution Level L$_{np}$ of Chenab Chowk

Days	Time	Q$_{eq}$	L$_{np}$
	07:00-11:00 (Morning)	4491.87	103.89
Day 1	11:00-03:00 (Noon)	3665.75	100.43
	03:00-07:00 (Evening)	4449.95	103.23
	07:00-11:00 (Morning)	6184.80	106.97
Day 2	11:00-03:00 (Noon)	4853.90	102.84
	03:00-07:00 (Evening)	6452.82	107.06
	07:00-11:00 (Morning)	4434.80	103.48
Day 3	11:00-03:00 (Noon)	4267.67	101.42
	03:00-07:00 (Evening)	4257.82	101.62

CONCLUSION

It was concluded that the average value of L$_{np}$ for **"Morning"** spell for Rail Bazaar, Jhang Bazaar and Chenab Chowk was found to be 92 dB(A) [with a range of 84-96 dB(A)], 100 dB(A) [with a range of 99-101 dB(A)] and 101 dB(A) [with a range of 100-102 dB(A)], respectively. The average value of L$_{np}$ for **"Noon"** spell for Rail Bazaar, Jhang Bazaar and Chenab Chowk was found to be 102 dB(A) [with a range of 102-103 dB(A)], 106 dB(A) [with a range of 101-112 dB(A)] and 102 dB(A) [with a range of 101-103 dB(A)], respectively. Moreover, The average value of L$_{np}$ for **"Evening"** spell for Rail Bazaar, Jhang Bazaar and Chenab Chowk was found to

be 97 dB(A) [with a range of 96-98 dB (A)], 108 dB(A) [with a range of 104-112dB(A)] and 104 dB(A) [with a range of 101-107 dB(A)], respectively. This study, led us to conclude that traffic noise levels at Chenab chowk were the highest in comparison to the other two places i.e., Rail Bazaar and Jhang Bazaar. It is an established fact that at all the places where average traffic noise level falls in the range 60-115 dB (A) it becomes the main cause of headache, high blood pressure, dizziness and fatigue (Pathak et al., 2008). As in our study all the three selected sites are in well agreement with this limit of noise pollution level so these spots are declared to be the sites badly polluted with traffic noise.

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REFERENCES

[1] Population Census Organization. (1998). Ministry of Economic Affairs and Statistics, Pakistan Available online at:
www.statpak.gov.pk/depts/pco/statistics/pop_major_cities/pop_major_cities.html

[2] Ali, S.A. & A. Tamura. (2003). Road traffic noise levels, restrictions and annoyance in Greater Cairo, Egypt. *Applied Acoustics; 64*, 815-823.

[3] Abo-Qudais, A.& Alhiary, A. (2004). Effect of distance from road intersection on developed traffic noise levels. *Canadian Journal of Civil Engineering, 31*(4), 533–538.

[4] Hussain, M. Y., Islam-ud-Din, Inam-ul-Haq, T. Hussain, Shabbir, R. & Sattar, S. (2008). Assessment of noise pollution from traffic in Faisalabad, its sensitivity precision and statistical interpretation. *Soil & Environ., 27*(2), 236-240.

[5] Vincent, E. M. & Wooten, D.C. (1980). Environmental Impact Analysis Hand Book (Vol. 2). New York: McGraw-Hill & Co.

[6] Zannin, P. H. T., Calixto, A. & Diniz, F. B. (2002). The statistical modeling of road traffic noise in an urban setting. *Cities; 20*(1), 23-29.

[7] Parbat, D. K & Nagarnaik, P. B. (2007). Assessment and ANN modeling of noise levels at major road intersections in an Indian Intermediate city. *Journal of research in science, computing and engineering; 4*(3), 39-49.

[8] Pathak, V., Tripathi, B. D. & Mishra, V. K. (2008). Evaluation of traffic noise pollution and attitudes of exposed individuals in working place. *Atmos Environ., 42*(16), 3892–3898.