



Assessment of (L_d) day time average noise level at major crossings of Jammu City, J&K (India)

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Abstract

The present study has been carried to assess (L_d) Day Time Average Noise level (7.00 A.M. to 9.00 P.M) at eleven major crossings of Jammu City. The minimum and maximum noise levels were recorded to be 39.9 dB (A) and 109.2 dB (A) respectively. The (L_d) values at all the sites were observed to be above permissible limits prescribed by CPCB. The calculated value of L_d at all the sites were observed to be statistically significant at 0.05 (5%) level of significance ($p=0.000-0.004$).

Keywords: Noise pollution, traffic noise, major crossings, (L_d), day time average noise level

Introduction

Increasing urbanization has led to the problem of noise, introducing into the privacy of urban dwellers, affecting the quality of life. Noise must also be considered a potentially serious health hazard. India is noise loving country *i.e.* from birth to death loud noise, band and orchestra is the part of our culture. It has been rightly pointed out that civilization itself is noise and man's progress through the ages has been accompanied by activities involving ever increasing noise intensities.

Transportation noise is a key problem in the cities of the world today. Noise from road vehicles produces disturbance to more people than from any other source of noise and has been increasing very fast over the last few decades. Traffic noise is created by a continuous flow of auto-vehicles and is generated by engines in jets, motor in trucks and contact of tyres on roads and wheels on rails. This affects not only those persons who live adjacent to roads but also the occupants of the transportation means as well. On any road there is a general noise level as long as any traffic is moving. This general noise level varies with

traffic density and time of the day. Distinctive and regular peaks in the noise level occur in the morning and evening as people travel to and from schools and work places (Ahmad and Khan, 2003). Moreover, no regulation is observed in blowing horns and use of defective silencers. Sometimes, people even use their vehicles without silencer pipes which generate highly intolerable noise. Motor cycles with their exposed engines and inadequately silencing arrangement are notorious noise producers.

The menace of noise pollution is growing not only in developing and underdeveloped countries but the highly civilized and industrialized countries throughout the world are also threatened with the same. The impact of road traffic noise on exposed population can cause annoyance by disturbing sleep, causing speech interference or interrupting daily activities. While there is no risk of long term auditory damage from traffic noise but there was a great deal of evidence that noise could cause adverse health effects on people (Al-Dakhlah and Jadaan, 2005; Chakraborty *et al.*, 1998, 2002; Rao and Rao, 1992; Banerjee and Chakraborty, 2006). Traffic was the dominating source of noise (Skanberg and Ohrstrom, 2002) and was the major source of

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nuisance and annoyance as cited in social surveys (Pandya, 2003).

The present study has been carried out to assess (L_d) Day time average noise level (7.00 A.M. to 9.00 P.M) at major crossings of Jammu city, J&K (India).

Materials and Method

Study area has been divided into XI sites:-

Site-I (Janipur Crossing):- The crossing forms the centre point of Bus Stand-Bantalab, Parade-Janipur Colony, Bus Stand-Kot bhalwal and Bagh-E-Bahu-Janipur Colony traffic routes.

Site-II (Ambphalla Crossing):- This crossing lies on the Jammu-Srinagar National Highway I-A. Various vehicles going to different parts of the city pass through this crossing.

Site-III (Rehari Crossing):- This crossing on National Highway (I-A) lies next to Ambphalla crossing towards Bus Stand. Various public and private vehicles going to Rajpura, Parade, Bantalab, Janipur *etc.* pass through this crossing.

Site-IV (Kachi Chawani Crossing):- This crossing lies in the heart of the city. Kachi Chawani is a hub of various coaching institutes. This zone forms the main focal point of the commercial activity in the Jammu city.

Site-V (Parade Crossing):- This forms the central point of all important traffic routes connecting different parts of the Jammu city such as Kachi Chawani, Bus Stand, Talab Tillo, Gandhi Nagar, Trikuta Nagar, Bagh-e-Bahu Temple, Railway Station *etc.* It is main centre of vegetable market, fruit market and conventional commercial activity.

Site-VI (Indira crossing):- This site is located near Bus Stand. This crossing connects Shalamar, Hari Market, Gumat, Bus Stand and K.C. Chowk.

Site-VII (Jewel Crossing):- It is one of the busiest crossings of Jammu City. The traffic routes to Talab Tillo, Gumat, Bus Stand, Satwari pass through this crossing.

Site-VIII (Vikram Crossing):- This crossing connects old Jammu city with New Jammu city and lies on NH-IA. Muthi-Bagh-E-Bahu Temple, Janipur-Satwari, Ambphalla-Channi, Parade-Railway station, Ambphalla-Airport, Parade-Gandhi Nagar traffic routes pass through this crossing.

Site-IX (Panama Crossing):- This crossing is without commercial activity and lies on outskirts of Jammu. Traffic routes to Railway station,

Channi, Narwal Mandi, Greater Kailash go *via* this crossing.

Site-X (Satwari Crossing):- This crossing lies on NH-IA. Public and private vehicles plying to Pathankot (Samba, Kathua, Gangyal, Digiana and Airport) follow this traffic crossing.

Site-XI (Gole Market crossing):- This lies in Gandhi Nagar commercial area. It is the heart of the well planned part of the Jammu city. It is also regarded as the managed commercial hub of the Jammu city.

The measurement of sound pressure levels at each crossing were carried out at an interval of one hour from 7.00 A.M.-9.00 P.M. hours with the help of Sound Level Meter (Model-8928) at 'A' weightage. During each sampling of noise, 20 readings of SPL were recorded at an interval of 30 seconds in a period of 10 minutes. The minimum and maximum SPL were also recorded. The L_{eq} was calculated by using the formula:-

$$L_{eq} = 10 \log \left(\sum_{i=1}^{n=0} f_i (10^{L_i/10}) \right) \text{ dB (A)}$$

Where,

f_i =fraction of time for which the constant sound level persists

i =time intervals.

n =number of observations.

L_i =sound intensity at a time interval.

L_d (Day time average noise level) was calculated by applying the formula:

$$L_d = 10 \log \{1/15 [15 (10^{L_{eq}/10})]\}$$

Results and Discussion

The analysis of the data revealed that maximum L_d of 90.3 dB (A) was observed at Kachi Chawani crossing (Site-IV) with minimum SPL of 39.9 dB (A) on Sunday and maximum SPL of 107.5 dB (A) on Thursday. Whereas the minimum L_d of 78.2 dB (A) was observed at Rehari crossing (Site III) with minimum SPL of 39.9 dB (A) on Monday, Tuesday, Wednesday and maximum SPL of 104.6 dB (A) on Monday (Table.1 and 2). ANOVA computed data (with SPSS 17.0) of L_d at all the days revealed significant variations in L_d of Sunday versus that of all the working days (Monday, Tuesday, Wednesday, Thursday, Friday and Saturday) at Site-V (Parade crossing), Site-VI (Indira crossing), Site-VII (Jewel crossing)



Table 1. L_d (Day Time Average Noise level) at major crossings of the Jammu City

(L_d) on	(L_d) dB (A)										
	Site-I	Site-II	Site-III	Site-IV	Site-V	Site-VI	Site-VII	Site-VIII	Site-IX	Site-X	Site-XI
Sunday	73.9	76.1	75.7	83.8	77.2	79.0	80.8	77.9	75.3	78.6	80.2
Monday	77.5	79.8	78.6	91.2	87.8	82.2	88.2	82.6	79.5	81.7	84.8
Tuesday	78.0	79.0	79.5	91.4	88.0	82.2	88.0	81.8	79.9	81.8	85.0
Wednesday	78.2	80.2	78.6	91.1	90.2	82.6	87.3	81.4	80.2	81.6	84.7
Thursday	80.6	79.3	76.8	91.9	90.2	82.0	86.7	81.6	80.2	81.2	84.5
Friday	81.6	78.9	78.8	91.5	90.4	82.7	86.8	81.2	80.0	81.2	85.8
Saturday	79.4	78.0	79.4	91.2	90.5	82.3	86.8	80.6	80.0	81.0	84.4
Average L_d	78.5*	78.8*	78.2*	90.3*	87.8*	81.9*	86.4*	81.1*	79.3*	81.1*	84.2*

* = Significant at 0.05 (5%) level.

Table 2. Minimum and Maximum Noise levels (SPL) at major Traffic crossings of the Jammu City(India)

Days	Noise parameter	Traffic crossings (Sites)										
		Site-I	Site-II	Site-III	Site-IV	Site-V	Site-VI	Site-VII	Site-VIII	Site-IX	Site-X	Site-XI
Sunday	Min.	41.2	39.9	40.5	39.9	43.8	40.3	43.2	43.8	39.9	45.2	42.4
	Max.	103.4	101.4	101.6	104.3	102.4	102.8	104.3	102.6	96.4	101.9	104.4
Monday	Min.	47.8	48.4	39.9	41.2	42.6	46.2	45.6	44.5	39.9	46.8	43.2
	Max.	104.3	104.7	104.6	106.3	106.3	104.1	106.2	105.6	101.5	102.4	105.9
Tuesday	Min.	40.4	46.1	39.9	45.4	41.2	49.8	44.7	48.3	42.3	43.6	39.9
	Max.	102.9	103.4	104.3	107.5	106.8	105.3	106.2	104.7	103.1	104.7	105.1
Wednesday	Min.	39.9	45.2	39.9	45.4	43.8	42.7	46.2	42.6	44.3	42.4	39.9
	Max.	101.2	103.3	104.2	106.8	106.2	104.3	105.4	105.1	102.1	101.5	105.4
Thursday	Min.	50.8	46.1	42.0	42.3	43.1	47.2	45.1	45.1	43.8	43.2	40.1
	Max.	106.7	104.1	103.4	108.8	106.2	103.3	105.4	106.9	103.9	102.4	105.2
Friday	Min.	51.6	48.6	41.6	42.6	44.3	40.6	46.1	42.6	42.6	45.1	42.2
	Max.	106.3	102.4	104.2	106.9	109.2	101.4	105.7	104.7	102.4	106.7	105.1
Saturday	Min.	43.9	46.3	42.4	42.3	46.9	45.4	43.6	48.7	43.1	43.1	42.0
	Max.	102.4	104.2	103.1	106.8	106.4	102.4	105.7	104.8	102.4	102.4	105.2

Site-I (Janipur Crossing),
 Site-II (Ambphalla Crossing)
 Site-III (Rehari Crossing)
 Site-IV (Kachi Chawani Crossing)
 Site-V (Parade Crossing)
 Site-VI (Indira Crossing)

Site-VII (Jewel Crossing)
 Site-VIII (Vikram Crossing)
 Site-IX (Panama Crossing)
 Site-X (Satwari Crossing)
 Site-XI (Gole Market Crossing)



and Site-IX (Panama crossing) because these crossings lie nearer to or in a way to schools, colleges and offices and due to non-working day or holiday traffic flow rates were low as compared with that of working days and consequently the noise level (L_d) was observed to be less on Sunday as compared with that of working days. Srivastava and Dhabal (1998) also reported increased noise levels in commercial and residential buildings of Delhi and Calcutta due to traffic noise. Pandya and Srivastava (1999) and Gopalaswamy *et al.* (2002) also reported close relationship between volume of vehicles and noise level. Whereas it revealed insignificant variations in L_d at Sunday versus that of all the working days at Site-III (Rehari crossing), Site-IV (Kachi Chawani crossing), Site-VIII (Vikram crossing), Site-X (Satwari crossing), Site-XI (Gole Market crossing) because in spite of Sunday (a non-working day) these sites (crossings) have high traffic flow and commercial activity as these are junction points from where every vehicle has to cross while going to market or picnic spot or religious place or any working place. So there is no change in traffic flow rate even on Sunday. Site-I (Janipur crossing) exhibited significant variations in L_d of Sunday versus that of Thursday, Friday and Saturday and insignificant variations in L_d of Sunday versus that of Monday, Tuesday and Wednesday. Site-II (Ambphalla crossing) exhibited significant variation in L_d of Sunday versus that Wednesday and insignificant variations in L_d of Sunday versus that of rest of working days.

By applying One-way ANOVA using SPSS-17.0 the calculated value of L_d at all the sites were observed to be statistically significant at 0.05 (5%) level of significance ($p=0.000-0.004$). So it can be concluded that all the crossings vary in the status of noise level due to variation in various attributes like traffic flow rate, degree of jams, commercial activity, location *etc.* which vary from crossing to crossing (Table. 1).

The average L_d at average crossing of Jammu City was calculated to be 82.7 ± 4.2 dB (A) with a range from 78.2-90.3 dB (A) which was observed to be quite high above the permissible limit of 65.0 dB (A).

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