

Assessment of Noise Levels in Different Residential, Industrial and Commercial Areas of Jammu City, India

Sheetal¹, Shashi Devi² and Anil Thakar^{3*}

¹*Department of Environmental Sciences, Government Degree College Boys, Udhampur, J&K, India*

²*Department of Environmental Sciences, Government Degree College, Budhal, J&K, India*

³*School of Interdisciplinary and Transdisciplinary Studies, Indira Gandhi National Open University, New Delhi, India*

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ABSTRACT

Due to the contemporary mechanical lifestyle noise has been one of the most unwanted by-products. To assess the noise levels in different locations of Jammu city, a study was conducted twice a day i.e., day (6 – 9am) and night (9 pm – 6 am). The present study deals with assessment of noise pollution in different residential, commercial and Industrial areas of Jammu city. The noise level was measured with the help of sound meter (SL 4010) at different locations of Jammu south, north east and west from (June 2016 to May 2017). During the study period, the average noise intensity at various residential sites ranges between 49.8 L_{eq} dB (A) to 68.5L_{eq} dB (A) during day time whereas during the night time ambient noise level ranges between 39.66 dB to 57.3 dB. The results clearly demonstrate that the noise quality at those areas is beyond the permissible limits as specified by Central Pollution Control Board CPCB thus contributing to noise pollution. Moreover, the L_{eq} Max values are also greater than the permissible limits. Major sources of noise pollution are vehicular transport, frequent use of horns in vehicles during the day. Whereas due to traffic jam at night on congested roads and use of loudspeakers and DJ in marriage and banquet halls.

Key words: Contemporary, Noise quality, Noise pollution, Ambient noise, CPCB, L_{eq}, dB(A)

Introduction

Any undesirable sound which creates a disturbance and may lead to some physical and psychological stress to the humans and animals exposed to it is classified as noise (Singh and Davar, 2004). For the human health noise is a threat that comprises of all the sounds in our communities that creates nuisance and commotion in the specific environment (Nawaz and Hasnain, 2013). The infrastructure development and increase in transportation on the roads leads to the noise pollution (Allen *et al.*, 2009; Geurs and

Wee, 2006; Li and Tao, 2004; Ross *et al.*, 2011). The potential health effects of noise pollution include hypertension, impairment of health, various cardiovascular disease and raised blood pressure which lead to insomnia, reduced working concentration, and hampering of communication and recreation attitude (Stansfeld and Matheson, 2003). The noise pollution is dangerous for birds also as it reduces the species density / population richness in diverse avian communities due to the change of predator-prey interactions (Francis *et al.*, 2009; Khan and Ali, 2014; Sharma *et al.*, 2014). The study on noise pollution in

the city of Curitiba, Brazil showed the effects on humans and results shows that 93.3% locations displayed over 65 dB noise and 40.3% locations measured display over 75 dB noise level (Zannin *et al.*, 2002). A case study in Chandigarh, India, shows that up to 80 dB noise level was measured at the emergency hospital and around which is classified as silent zone. About 74% of the total hospital patients said that they have irritation due to loud noise, 40% reported a headache, 29% reported a loss of sleep and 8% reported hypertension (Khawal *et al.*, 2016). Jammu city is facing noise pollution especially in winters due to influx of vehicles with darbar move as it is the winter capital of Jammu and Kashmir. Several major government offices and people migrate due to better facilities and hence people prefer to reside here, which create extra pressure on the overall environmental scenario of the city.

Materials and Methods

The study area Jammu city popularly known as the 'City of Temples', lies on the mid uneven ridges of Shivalik hills between 32° 50'–33° 30' N latitude to 74° 24'–75° 18' E longitude (Figure 1). In this study, 15 sites were selected for ambient noise level measurements during day (6–9 am) and night (9 pm–6 am) from June 2016 to May 2017. Ambient noise levels were measured from three categories of zones i.e., residential, commercial, and industrial zones as categorised by CPCB (CPCB, 200). A digital Sound Lutren SL 4010 was used (Krishnamurthy *et al.*, 2007; Ziauddin *et al.*, 2007) which can measure noise level between 0 and 150 dB and calibrated at 100 dB (A). All readings were recorded at 1.5 m height from the ground (Ghafoor *et al.*, 2012) and 7.5 m away from the source and at regular interval of one minute. From each site, twenty readings were taken

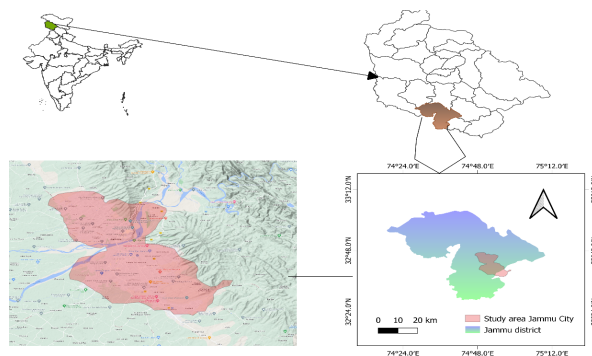


Fig. 1. Study area in Jammu District

and their mean along with standard deviation (SD) were calculated. For the assessment of results, following sound parameters were used,

- Leq = equivalent sound level.
- Lmax and Lmin at day and night time.

To develop a noise risk zone of Jammu city, an evaluation criterion was adopted that creates six zones based on noise intensity as done earlier in West Bengal (Banerjee *et al.*, 2008). The criteria are mentioned in Table 1.

Table 1. Noise risk zone criteria used for the present study (Banerjee *et al.*, 2008)

Intensity of noise in dB (A)	Zones
Less than 66	Safe
66–71	Tolerable
71–76	Low risk
76–81	Moderate risk
81–86	High risk
Greater than 86	Extremely high risk

Results and Discussion

The average noise intensity at various residential places varies between 49.8 L_{eq} dB (A) to 68.5 L_{eq} dB (A) during the day time (Table 3) whereas the range varies from 39.66 dB to 57.3 dB during night time (Table 4) and Figure 2. During the day time noise intensity at the all-residential sites is beyond the permissible limits i.e., 55 dB(A) as specified by CPCB, India (CPCB noise pollution control regulations, 2000) except Bhagwati Nagar site where the noise value is slightly above the permissible limits due to the low traffic movement in the area. Whereas, during night time the noise value goes beyond the permissible limit of 45 dB(A) because of the movement of heavy trucks and other vehicles plying on the road, the reason being Bhagwati

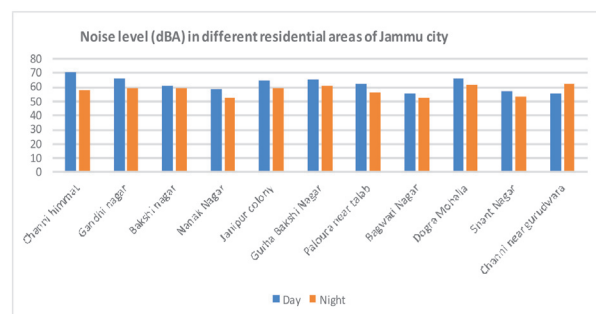


Fig. 2. Noise level in different residential areas of Jammu city

Table 2. Ambient Noise Quality Standard (Source: CPCB, 2000)

Zone Code	Zone	Day Time (6 am - 9 pm)	Night Time (9 pm - 6 am)
Limits in dB(A)			
A.	Industrial	75	70
B.	Commercial	65	55
C.	Residential	55	45
D.	Silent	50	40

Nagar area is bypass road for the heavy transport vehicles. The noise intensity at various commercial and industrial places varies from 42 dB(A) to 81 dB(A) during day time (Table 5) whereas the night

time range is 38 dB(A) to 76 dB(A) (Table 6). All the commercial and industrial sites depict high noise intensity during day and night time than the permissible limits due to traffic movement and other commercial activities. Similar attempt has been made to monitor noise level in the commercial areas of samba district in 2017 (Rasool and Rampal, 2017). The studies show the noise intensity was 77.4 ± 4.9 dB (A) which is greater than the permissible limits. On comparing the both studies our study areas show slight decrease in the level of noise than the preceding study because samba is more commercial and industrialised as compare to Jammu. In Haridwar city a study was done in the residential areas which

Table 3. Noise intensity of various residential locations during day time in Jammu (6 am - 9 pm)

S. No.	Monitoring Sites	Observed Noise Intensity dB (A)		
		Min.	Max.	Mean and SD
1.	Channi Himmat	58.4	70.3	59.68±11.21
2.	Gandhi Nagar	42.8	65.9	57.91±9.63
3.	Bakshi Nagar	39.8	61.2	59.57±5.81
4.	Nanak Nagar	36.7	58.6	51.74±7.43
5.	Janipur Colony	55.4	64.7	62.85±9.34
6.	Gurha Bakshi Nagar	50.9	65.3	58.59±14.36
7.	Paloura near Talab	48.6	62.6	60.94±12.478
8.	Bhagwati Nagar	43.5	55.3	49.83±6.59
9.	Dogra Mohalla	53.0	65.8	61.98±8.68
10.	Shanti Nagar	45.1	57.4	50.77±5.93

Table 4. Noise intensity of various residential locations during night time in Jammu (9 pm - 6 am)

S. No.	Monitoring Sites	Observed Noise Intensity dB (A)		
		Min.	Max.	Mean and SD
1.	Channi Himmat	36.5	57.8	49.95±10.85
2.	Gandhi Nagar	39.7	59.2	50.63±9.37
3.	Bakshi Nagar	39.8	59.6	51.95± 10.59
4.	Nanak Nagar	35.3	52.7	45.14±6.13
5.	Janipur Colony	42.9	59.6	45.72±8.34
6.	Gurha Bakshi Nagar	40.3	60.6	55.20±5.17
7.	Paloura near Talab	37.2	56.1	48.99±5.83
8.	Bhagwati Nagar	33.5	52.3	43.41±6.78
9.	Dogra Mohalla	48.6	61.4	50.34±5.46
10.	Shanti Nagar	42.8	53.7	51.67±7.28

Table 5. Noise intensity of various commercial and industrial places during day time in Jammu (6 am - 9 pm)

S. No.	Monitoring Sites	Category	Observed Noise Intensity dB (A)		
			Min.	Max.	Mean and SD
1.	Gangyal	Industrial	52.5	81.3	70.4±13.67
2.	Bus Stand BC Road	Commercial	42.8	72.6	72.7±14.32
3.	Satwari Chowk	Commercial	48.3	69.8	68.45±9.78
4.	Bikram Chowk	Commercial	42.6	79.4	70.85±11.83
5.	Janipur Colony	Commercial	50.3	71.9	65.34±14.27

Table 6. Noise intensity of various commercial and industrial places during night time in Jammu (9 pm - 6 am)

S. No.	Monitoring Sites	Category	Observed Noise Intensity dB (A)		
			Min.	Max.	Mean and SD
1.	Gangyal	Industrial	60.2	76.4	63.125±17.251
2.	Bus Stand BC Road	Commercial	45.6	60.7	65.17±13.123
3.	Satwari Chowk	Commercial	40.4	56.8	57.34±12.453
4.	Bikram Chowk	Commercial	46.8	62.3	60.4±9.276
5.	Janipur Colony	Commercial	38.6	61.5	59.45±10.671

shows noise intensity range between 87.6 dB(A)±7.78 to 74.5 dB(A) ± 6.12 (Chauhan *et al.*, 2010) and the noise intensity level was between 57.1 dB(A) to 63.25 dB(A) at some residential sites in Orissa (Mohapatra and Goswami, 2012). Therefore, these studies support our study that high traffic movement in the residential areas results in the increase in noise intensity beyond the permissible limits and lies in moderate risk zone.

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