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## **AN ASSESSMENT OF ENVIRONMENTAL NOISE POLLUTION OF JODHPUR, RAJASTHAN, INDIA**

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### **Abstract**

Jodhpur is the second largest city of Rajasthan, India. In recent years Jodhpur have expanded exponentially with increase in population, industries, vehicles etc. and this growth has created the problems like noise, air and waste pollution to name a few. Noise pollution is one of the problems which are not being addressed seriously and hence the present study was undertaken. The noise levels  $Leq$  dB (A) were monitored at three sites namely Shastri Nagar (Lachoo memorial College of Science and Technology-LMC), Basni Phase I, and AIIMS main gate road site, grouped as Residential, Industrial and silence zone area respectively. The monthly observations were recorded during morning hour (8-10AM), noon hours (12-2PM), and evening hour (5-7 PM) using sound level meter (Envirotech Instruments) model SLM 100, taking the readings at an interval of 1min, from December 2017 to April 2018. The maximum noise level recorded at Shastri Nagar,(LMC) site was 87.0dB in January 2018 (12-2PM), at Basni Phase I site was 97.2dB in December 2017 (8-10 AM), and was recorded 91.6dB in April 2018 (5-7 PM) at AIIMS main gate road site. The average noise level were found to be more than prescribed limits set by Central Pollution control Board (CPCB 2000) at all the three sites for all the five months and all the three recording hours (8-10AM, 12-2PM, and 5-7 PM), except at Basni Phase I site when it was observed to be slightly below (CPCB limit 75 dB - observed level 71.66 dB & 73.67 dB ) in January 2018(8-10 AM) and February 2018 (12-2 PM) respectively. The present study can be fruitful in devising effective methods to curb this problem.

## **Keywords**

Jodhpur, Noise, Sound Level Meter, L10, L90

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## **1. Introduction**

Noise is present all around human being and is affecting the wellness at every level. Air and water pollution is mostly talked and taken care of but we pay little attention to the noise pollution which is like a slow poison killing the wellness of humans. We cannot live in a sound proof surrounding but we can at least reduce the noise and reduce the misery caused due to unwanted sound.

Excess noise affects humans causing disturbances in daily activities like sleep. This affects the work efficiency, level of judgment and perception. For up growing children it causes shift in behavior which is leading to lack of patience. This may become a major cause of suicide in coming years.

Noise, a physical pollutant, is not easily recognized. This is because the sensitivity of human ear gets automatically adjusted to the ambient level of sound and so slow increases in the ambient level go unnoticed. Therefore, noise continues to do the damage silently. Noise pollution is distinguished from other pollution categories due to its source and diffusion characteristics, which can adversely affect public health and environmental quality in urban environment. Though noise pollution is a slow and subtle killer, yet very little efforts have been made to ameliorate the same. Not only humans wildlife is also affected by noise pollution causing change in path of migratory bird, their feeding habits, breeding duration and season, to name a few.

Jodhpur is second largest city, lying between 26.28°N 73.02°E, of Rajasthan and popularly known as SUN CITY, as the sunshine hours are long throughout the year. Jodhpur is fast expanding with growth in population (1.728 million forecasted in 2017). The area of Jodhpur district is about 22,850 square kms and it has about 24374 industrial units registered as per 2011-12 data given by micro, small and medium enterprises, Government of India, Jaipur. No of vehicles have also increased alarmingly (above 3 lakh of registered vehicles) and all this has created the increase in pollution including noise pollution, which was nonexistent a decade ago.

## **2. Material and Methods**

The noise levels Leq dB (A) were monitored at three sites namely Shastri Nagar (Lachoo memorial College of Science and Technology-LMC), Basni Phase I, and AIIMS main gate road site, grouped as Residential, Industrial and silence zone area respectively (PLATE I). The monthly

observations were recorded during morning hour (8-10AM), noon hours (12-2PM), and evening hour (5-7 PM) using sound level meter (Envirotech Instruments) model SLM 100, taking the readings at an interval of 1min, from December 2017 to April 2018. L10, L90 and noise climate (NC) were also calculated to assess the gravity of noise environment.

### PLATE I OBSERVATION SITES



Three observation sites - Shastri Nagar (Lachoo Memorial College of Science and Technology), Basni Phase I site, and AIIMS main gate road site.

Shastri Nagar (Lachoo memorial college of Science and Technology) site is a residential area with number of houses. Vehicular traffic, construction activities and other activities create the noise pollution in this area. Basni Phase I site is the area which is part of industrial area of Jodhpur hence noises arising from machineries, heavy traffic, generator etc are the main contributors to noise pollution. AIIMS, a premier health institute which was established in 2012 by the Ministry of Health & Family Welfare, Government of India under the Pradhan Mantri Swastha Suraksha Yojana (PMSSY), is the center point for the diseased people who flock to this center in large number. The surroundings of this silence zone have lot of activities which create unnecessary sound which is quite disturbing to the persons admitted and recovering in this health center.

### 3. Results and discussion

The maximum noise level recorded at Shastri Nagar, (LMC) site was 87.0dB in January 2018 (12-2PM), at Basni Phase I site was 97.2dB in December 2017(8-10 AM), and was recorded 91.6dB in April 2018 (5-7 PM) at AIIMS main gate road site. The average noise level were found to be more than prescribed limits set by Central Pollution control Board (CPCB 2000)( Table A) at Shastri Nagar,(LMC) site (Fig 1, Table B) ,at Basni Phase I site( Fig 2, Table B) and AIIMS main gate road site (Fig 3,Table B), for all the three months and all the three recording hours ( 8-10AM ,12-2PM, and 5-7 PM )except at Basni Phase I site when it was observed to be slightly below (CPCB limit 75dB - observed level 71.66 dB &73.67dB ) in January 2018(8-10 AM) and February 2018 (12-2 PM) respectively. The noise climate (NC) calculated was found to be highest (10.14dB) at Shastri Nagar,(LMC) site in February 2018(5-7 PM), March 2018((8-10 AM), and in April 2018 (5-7 PM). At Basni Phase I site it was highest in December 2017 (20.28dB) (8-10AM), and AIIMS main gate road site it was highest in April 2018 (10.14dB) (5-7 PM) (Table D).

Gayathri et al (2012) assessed noise pollution in Thoothukudi City. The study areas were demarked as Silent Zone, Commercial Zone and Heavy Traffic Zone and the sound level prevailed in these areas, were analyzed and it was observed that in all the study areas the observed sound level exceeded from the normal permissible level (i.e. Silent Zone (40-50 dB), Commercial Zone (55-60 dB), Heavy Traffic Zone (80-85dB)) to a greater significant extent. Balashanmugam et al (2013) studied the noise pollution in Cuddalore town due to road traffic. The noise assessment revealed that noise level is escalating and the reasons he pointed may be unplanned urbanization, improper roads lack of sufficient parking spaces and exponential growth of both private and public vehicles in the city. Singh and Pandey (2013) did study of noise in Gorakhpur city, Uttar Pradesh (India), recording it in different area of Gorakhpur city categorized as silent, residential and commercial zones, respectively. The study revealed that the range of noise levels in all the areas were much higher than the permissible values as per standards. Phukan and Kalyan (2013) did an experimental study of noise pollution in Gauwhati University campus, Guwahati, Assam, India by measuring of noise levels at three different time intervals of the day This study concluded that that equivalent noise level is maximum during the time interval in the morning 9-11am and registered minimum during the time interval midday at 12-2pm at the sampling. The average equivalent noise level was ranged between 57dB(A)– 64.4dB(A) during 9-11am of the day, between 55.3dB(A)-63.4dB(A) during the hours 12-2pm and ranging between 56.1dB(A)-63.5dB(A) during the time interval 6-8pm respectively. The minimum equivalent noise level registered at Gauhati University Hospital followed by samadhi

khetra was justified as the distance was maximum (approximately 100m) from the noise source among the all sampling sites. Similarly maximum equivalent noise level was registered at State Bank of India, Gauhati University branch followed by auditorium as these sampling sites were close to the noise source (30m) among the all sampling sites. Bhende, and Bhawe (2014) studied noise pollution during Ganesh utsav in Mumbai city and observed that the level of noise pollution during Ganesh immersion is much higher when compared with the standard limits. At all the locations the observed sound levels were above the permissible limit in 2012 but seen to decrease in 2013 during the Ganesh Festival. Pritam et al (2014) did assessment of both outdoor and indoor noise pollution in commercial areas of Gorakhpur city. The observation sites were selected at eleven different locations in commercial areas of Gorakhpur city and Energy Equivalent noise (Leq) for hourly observations for indoor and outdoor noise were made at these sites. The study revealed that outdoor noise levels are influenced by traffic volume and congestion, user's generators and crowd on roads. It is also seen that, on many sites, significant increase in indoor noise is observed only in the afternoon hours around 3:00 pm - 4:00 p.m. Sahu and Sahu (2015) did environmental noise assessment of Indore city and found that noise level are higher than the limits. Sharma et al (2015) did study on noise pollution in some places of industrial, commercial, residential and silence zone within Jagi road town, Assam. The findings indicate that the maximum noise level is found in commercial area due to heavy vehicular movement, high traffic congestion, outdated vehicles, narrow poorly managed roads, unplanned urban area and commercial zones. Kumar et al (2015) did noise pollution analysis in different megacities of India during deepawali festival it was observed that the sound pressure level produced by Indian crackers is higher than the permissible limits prescribed by the Central Pollution Control Board (CPCB). Baniya and Mishra (2016) did noise pollution analysis during chhath puja in Gorakhpur city. It was found that the noise levels are generated by traffic volume and congestion, generators and people on roads. It is also seen that, on many sites, significant increase in noise is observed whole day as because of public holiday. Maximum people were in the market for shopping and after 2 p.m. people were in chaos to arrive at Chhath ghats. Due to Chhath puja daily traffic volume in the market was larger than the normal days. Baghel et al (2016) did evaluation of present scenario of ambient noise level in residential zone and silence zone of Jabalpur city. The investigation reveals that the Residential Zone and Silence Zones of Jabalpur City are highly exposed to noise pollution. Spontaneous urbanization, heavy traffic flow and vehicle horn are the main reason that cause noise pollution in the city. Charan (2017) assessed environmental noise pollution in Bikaner city of western Rajasthan, India. The present investigation was focused of the assessment of noise level at five different sites in Bikaner city for day time as well night time during

February, 2016 to April, 2016. The investigation revealed that the noise level in Bikaner city is extremely high from the prescribed level. Almost all the observations at Industrial, Commercial, Residential and even the silence zone (PBM Hospital) have shown the level of noise above its maximum permissible level. The residential site (JNV colony) was quite noiseless during night time, however in day time, noise level at JNV colony site has also found above the prescribed level. Patel and Pandey (2017) did a study of noise pollution at the campus of Madan Mohan Malaviya University of Technology Gorakhpur, Uttar Pradesh (India). The present study shows that each and every sampling site recorded noise level more than the prescribed limit suggested by Central Pollution Control Board, India (CPCB) for the prescribed area category

The results of present study match with the findings of different workers and it is high time that we start devising methods to control this problem otherwise it will create more diseases than the air and water pollutions.

**Table 1:** Noise standards as given by Central Pollution Control Board, India (CPCB, 2000)

Area code	Category of area/Zone	Limits in dB (A) Leq	
		Day time	Night Time
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

1. Day time shall mean from 6.00 a.m. to 10.00 p.m.
2. Night time shall mean from 10.00 p.m. to 6.00 a.m.
3. Silence zone is an area comprising not less than 100 metres around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority.

**Table 2:** Observed Noise Average (dB) at different sites during study period (December, 2017 to April 2018)

S.no	Zone	Place of observation	December, 2017			January 2018			February 2018			March 2018			April 2018		
			8 -10 AM (dB)	12 -2 PM (dB)	5-7 PM (dB)	8 -10 AM (dB)	12 -2 PM (dB)	5-7 PM (dB)	8 -10 AM (dB)	12 -2 PM (dB)	5-7 PM (dB)	8 -10 AM (dB)	12 -2 PM (dB)	5-7 PM (dB)	8 -10 AM (dB)	12 -2 PM (dB)	5-7 PM (dB)
1	Residential (Acceptable limit daytime 55 dB)	Shastri Nagar (Lachoo Memorial college of Sc and Tech.)	64.3	68.76	66.88	69.79	72.06	71.45	70.70	70.89	69.48	68.25	72.24	67.52	66.27	70.09	69.6
2	Industrial Area (Acceptable limit daytime 75 dB)	Basni Phase I	81.22	75.10	79.21	71.66	78.46	78.32	76.74	73.67	78.02	82.08	76.19	77.13	79.25	78.49	77.71



3	Silence Zone (Acceptable limit daytime 50 dB)	AIIMS Main gate road	71.57	78.06	74.92	64.05	66.89	68.01	70.80	70.89	69.48	71.14	77.52	79.15	78.62	73.66	79.25
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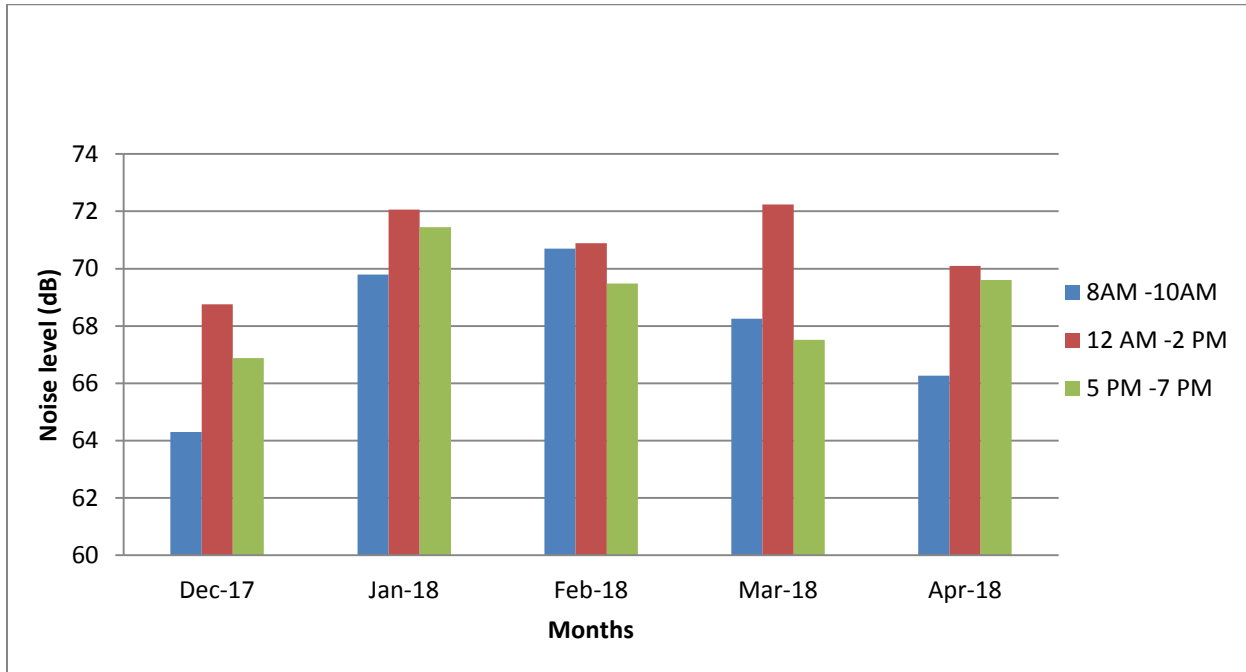
**Table 3: Observed Lmax and Lmin at different sites during study period (December, 2017 to April 2018)**

S.no	Zone	Place of observation	December, 2017			January 2018			February 2018			March 2018			April 2018		
			Lmax dB	Lmin dB	Difference between Lmax and Lmin dB	Lmax dB	Lmin dB	Difference between Lmax and Lmin dB	Lmax dB	Lmin dB	Difference between Lmax and Lmin dB	Lmax dB	Lmin dB	Difference between Lmax and Lmin dB	Lmax dB	Lmin dB	Difference between Lmax and Lmin dB
1	Residential	Lachoo Memorial college of Sc and Tech. Observation duration	80.2	54.6	25.6	87.0	58.9	28.1	84.1	60.6	23.5	84.1	58.2	25.9	81.9	57.2	24.7
			5-7 PM	8 -10 AM	--	12 -2 PM	12 -2 PM	--	12 -2 PM	12 -2 PM	--	12 -2 PM	5-7PM	--	12 -2 PM	8 -10 AM	--
2	Industrial	Basni Phase I Observation duration	97.2	67.1	30.1	87.0	58.9	28.1	84.8	68.3	16.5	85.3	71.7	13.6	81.6	75.0	6.6
			8 -10 AM	12 -2 PM	--	12 -2 PM	8 -10 AM	--	8 -10 AM	8 -10 AM	--	12 -2 PM	12 -2 PM	--	8 -10 AM	5-7 PM	--
3	Silence Zone (Acceptable limit daytime 50 dB)	AIIMS Main gate road	82.8	60.9	21.9	74.2	56.8	17.4	81.6	68.3	13.3	84.6	67.9	16.7	91.6	61.3	30.3
			12 -2 PM	8 -10 AM	--	12 -2 PM	8 -10 AM	--	5-7 PM	8 -10 AM	--	5-7 PM	8 -10 AM	--	5-7 PM	5-7 PM	--

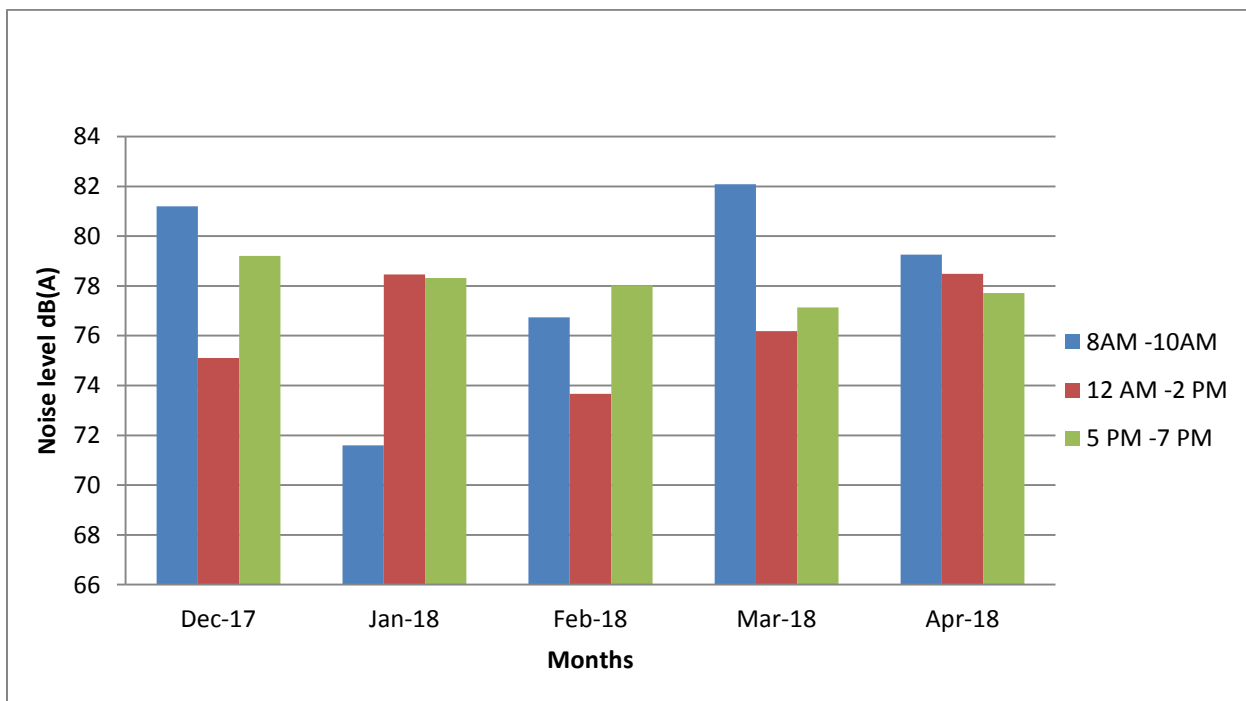


**Table 4:** Observed Noise climate (NC) at different sites during study period (December, 2017 to April 2018)

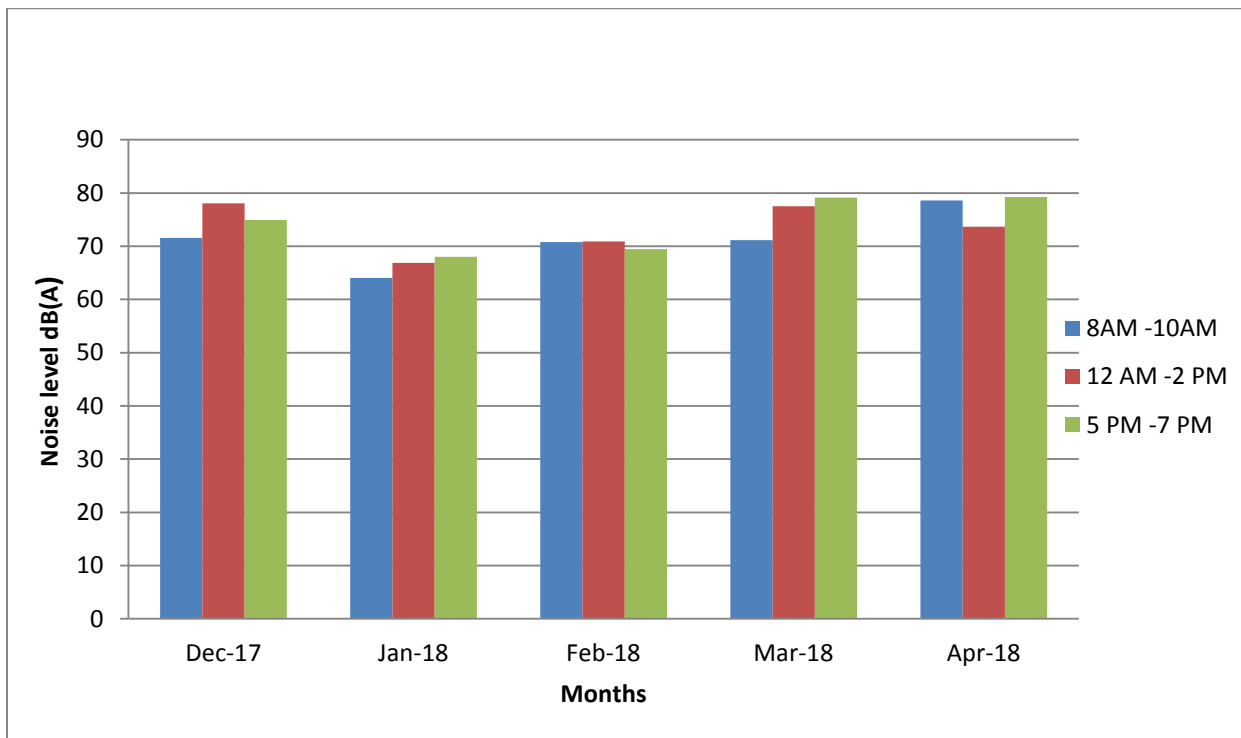
S.no	Zone	Place of observation	December2017			January 2018			February 2018			March 2018			April 2018		
			8 -10 AM	12 -2 PM	5-7 PM	8 -10 AM	12 -2 PM	5-7 PM	8 -10 AM	12 -2 PM	5-7 PM	8 -10 AM	12 -2 PM	5-7 PM	8 -10 AM	12 -2 PM	5-7 PM
1	Residential	Lahoo Memorial college of Sc and Tech. Observation duration	5.07 dB	9.86 dB	10.0 dB	5.14 dB	9.92 dB	9.64 dB	10.0 dB	5.21dB	10.14 dB	10.14dB	9.93 dB	10.0 dB	10.07 dB	5.07 dB	10.14 dB
2	Industrial	Basni Phase I Observation duration	20.28 dB	14.93 dB	5.14 dB	9.93 dB	10.07dB	4.86 dB	5.0 dB	5.0 dB	5.21 dB	5.14 dB	4.93 dB	4.57 dB	5.0 dB	5.21 dB	5.21 dB
3	Silence Zone (Acceptable limit daytime 50 dB)	AIIMS Main gate road	14.79 dB	9.79 dB	5.07 dB	10.0 dB	5.14 dB	5.0 dB	4.93 dB	12.25 dB	4.72 dB	4.79 dB	4.93 dB	10.0 dB	4.93 dB	4.93 dB	20.14 dB



**Figure 1:** Observed Noise Average (Db) At Shastri Nagar (Lachoo Memorial College of Sc & Tech Residential) Site during Study Period



**Figure2:** Observed Noise Average (Db) At Basni Phase I (Industrial Area) Site during Study Period



**Figure3:** Observed Noise Average (Db) At AiiMS Main Gate Road (Silence Area) Site during Study Period

#### 4. Conclusion

The study concludes that increase in population had put load on the existing system. Increase in vehicular traffic and increase in industrial units have added salt to the miserable condition. Only few researchers have studied noise pollution of Jodhpur and hence the present study can help a lot in understanding the problem and how to tackle it.

#### 5. Recommendations

It is strongly recommended to undertake a detailed study of noise pollution of Jodhpur by Government of Rajasthan as well as Government of India and proper planning should be undertaken to curb this problem in coming years. Noise pollution is a physical pollutant which is not easily recognized, but it act as silent killer aggravating the behavior, and diseases like cardiovascular disease to a great extent.

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