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Environmental Noise Assessment in Indore City

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Abstract
The aim of the study was to describe the behavior of environmental noise levels in communities around the city of Indore. Four noise stations were monitored for twenty-four hours in order to describe the levels of environmental noise. The study used a noise level meter (Model1900meter) which is the simplest instrument available to determine sound level. It indicates the root mean square value of the sound. The observation reveals that noise level is exceeding the permissible limits in the following area-Silence, residential and commercial and industrial. The study offers several recommendations which if implemented, would reduce significantly the noise levels in the city. The results from the study indicated that the Permissible limit for Sanwer road is the lowest compare to highest equivalent level produced at MY hospital Indore.
Keywords: Environmental Noise**,** Noise level meter, permissible limits

1. INTRODUCTION

Noise can be define as an unwanted or undesired sound whereas environmental noise is any unwanted or harmful outdoor sound created by human activities that is detrimental to the quality of life of individuals. The sound level above 50 decibel (dB) is considered to be the noise. Continuous exposure may lead to temporary or permanent hearing loss. In addition to it, continuous exposure to noise may also induce other temporary or permanent physiological effects. Research shows that the onset of a loud noise will cause a startle response, characterized by muscle contractions, blink, and head-jerk movement. Also, larger and slower breathing movements, small changes in heart rate, dilation of pupils and a moderate reduction in the diameter of blood vessels in the peripheral regions occur (Burns, 1982).Results of various research also indicate that exposure to high noise levels (such as 95 dBA or more) acts as a stressor which over a long period may produce pathological side-effects and may therefore constitute a health hazard (Janson *et al*., 1996).

2. MATERIALS AND METHODS:

Description of study area : Geography of Madhya Pradesh: it is located in the geographic heart of India and is located at 23° 30' N (Latitude) 80° 00' E (Longitude) and the geographical area of MP is 308,252 km2.
Indore City**:** Indore City is a historical city situated on the banks of River Khan and Saraswati. It's a nerve centre of the economic activities of the state. Commercial capital of central India with a population is 18.37 lakhs.
It is located at 22º 43´ latitude (North) and 75º 57´ longitude (East) with general elevation of about 553 meters above mean sea level (MSL). Indore is located 190 km west of state capital Bhopal. The Central Pollution Control Board carried out Comprehensive Environmental Pollution Index Assessment (CEPI) Study in association with Indian Institute of Technology, Delhi. Based on the study, 43 Industrial Clusters out of 88 listed have been declared as Critically Polluted areas having CEPI of more than 70, which includes Indore City and its industrial clusters at the 38th place.

2.1. The objectives of the study were:

1. To Monitor the Noise Pollution Level (dB-A) due to Traffic in the Indore City
2. To collect statistical data regarding public opinion regarding noise pollution its and health effects on their health.

The study used a noise level meter (Model 1900 Meter) which is the simplest instrument available to determine sound level.It indicates the root mean square value of the sound. Similar methods were used in other noise monitoring programmes in United States of America(Reuters, 2002) and in India (Pal and Samantha, 2002) recommendations for the description and measurement of the environment. Measurements were taken in decibel scale with A weighting

Noise Descriptors

Noise descriptors such as Leq, L_{max} and L_{min} were recorded. Baseline sound levels were monitored for two different periods namely: day-time and night-time readings. Definition for the noise descriptors are presented as follows:

Leq: The equivalent continuous dBA level which has the same energy as the original fluctuating noise for the same given period of time.

L_{max}:The maximum Sound Pressure Level (SPL) value measured during the duration of monitoring.
L_{min}: The minimum Sound Pressure Level (SPL) value measured during the duration of monitoring.

RESULTS AND DISCUSSION

All of the 4 observation stations were found to be exceeding the limits of noise pollution as mentioned in IS: 4954 – 1968 (Reaffirmed 2006).Public opinion survey through questionnaire was conducted. Based on the replies the following analysis is presented:

Priority of Noise Pollution and age: The people of upper (above 60 years) and lower (below 25 years) age groups rank noise pollution higher than the middle age group people. This might be due to more sensitivity.
Priority of noise pollution as ranked by Males and Females: Male respondents rank noise
Pollution high. This is possible due to less exposure of females to the noisy outdoor environment

Exposure to various type of noise sources: Highest numbers of people (67.55%) are exposed to high noise level due to traffic.
Noise and its effects: In a recent study conducted by a leading newspaper, it was found that in Indore city, there are 631 vehicles on every 1000 people. This increase in the number of vehicles and lack of foresight has led to chaos on the major roads. This has led to frequent jams and thus further increasing air and noise pollution.
Due to the construction work on the roads,BRTS project work and lack of proper diversions to the city traffic, the traffic is flowing in an unorganized and haphazard manner, further leading to the use of horns and mainly pressure horns. Also, because of lack of adequate number of traffic personnel at observation stations, mismanaged traffic signal durations, people often broke rules by driving wrong sides, breaking signals which often lead to traffic jams. Such a situation causes people to blow more horns. It was also found that wherever the traffic flow was smooth, the noise pollution levels were quite low.

Table: 1"Avg Noise level value at Polo Ground in Indore"

Average (Day and Night)											
Place of Monitoring	**Category of Area/Zone**	**Hours**	**Day Time**			**Night Time**			**TC**	**TEL**	**%EL**
			Min.	**Max.**	**Avg.**	**Min.**	**Max.**	**Avg.**			
Polo ground	Industrial Area	Noise Level dB (A) Leq	50.1	80	65.05	42.9	72	57.45	24	08	33.3

Table: 2"Avg Noise level value at Bada Ganpati in Indore"

Average (Day and Night)											
Place of Monitoring	**Category of Area/Zone**	**Hours**	**Day Time**			**Night Time**			**TC**	**TEL**	**%EL**
			Min.	**Max.**	**Avg.**	**Min.**	**Max.**	**Avg.**			
Bada Ganpati	Commercial area	Noise Level dB (A) Leq	56	85	70.5	42	60	51	24	17	70.8

Table: 3"Avg Noise level value at Bhanwarkua in Indore"

Average (Day and Night)											
Place of Monitoring	**Category of Area/Zone**	**Hours**	**Day Time**			**Night Time**			**TC**	**TEL**	**%EL**
			Min.	**Max.**	**Avg.**	**Min.**	**Max.**	**Avg.**			
Bhanwarkua	Residential area	Noise Level dB (A) Leq	47	80.3	63.65	41	62	51.5	24	15	62.5

Table: 4"Avg Noise level value at Choithram hospital in Indore"

Average (Day and Night)											
Place of Monitoring	**Category of Area/Zone**	**Hours**	**Day Time**			**Night Time**			**TC**	**TEL**	**%EL**
			Min.	**Max.**	**Avg.**	**Min.**	**Max.**	**Avg.**			
Chiothram Hospital. Indore	Silence Zone	Noise Level dB (A) Leq	40	76	58	41	62	51.5	24	20	83.3

Table:5 Noise level value of different location with% of exceed limit in Indore.

Sr. No.	Location	Categories of area	Day		Night		% Of exceed limit
			Min.	Max.	Min	Max.	
1	Polo Ground	Industrial	50.1	80	42.9	72	33.3
2	Bada Ganpati	Commercial	56	85	42	60	70.8
3	Bhanwar kua	Residential	47	80.3	41	62	62.5
4	Choithram. Hospital	Silence	40	76	41	62	83.3

Noise level in different location at Indore is reflected in Table (5).The observation reveals all the values of noise level are exceeding the permissible limit in the following area. Industrial, commercial, residential silence and mixed area.

In industrial area at Polo Ground location the minimum value is found to be 50.1dB (A) and 42.9dB(A) at day and night time respectively, while maximum value obtained is found to be 80dB(A) and 72dB(A) at day and night time respectively. The percentage of exceed limit in industrial area is 33.3%at Polo Ground. We obtained different noise level values for different locations as Bada Ganpati(commercial),Bhanwar kua (residential), Choithram.Hospital (silence) have been shown in above table(5) having percentage of exceed limit 33.3, 70.8 ,62.5 and 83.3 for respective locations.

4. CONCLUSION

As, all of the 4 observation stations were found to be exceeding the limits of noise pollution.
Total percentages of noise pollution exceed limit is higher in which Choithram. Hospital is most noise polluted area and Polo Ground is less polluted area. This comes in silent zone and industrial area respectively.
Order of noise polluted area of Indore city is (according to exceed limit)-
Choithram Hospital > Bada Ganpati > Bhanwar kua > Polo Ground.
Silent > Commercial >Residential> Industrial.

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