REPORT ON
AMBIENT NOISE MONITORING IN METROPOLITON CITY - 2012

MAHARASHTRA POLLUTION CONTROL BOARD
Kalpataru Point, 3rd Floor, Sion (East), Mumbai-400022
Website: www.mpcb.gov.in
December, 2012

राजीव कुमार मित्तल भाप्रसे
सदस्य सचिव
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MAHARASHTRA POLLUTION CONTROL BOARD

FOREWORD

Noise pollution in urban areas has emerged as a major environmental concern around the world. In the cities, leading sources of noise pollution are road traffic noise, air craft noise, noise from rail networking, construction noise etc. In order to assess the impact of traffic noise exposure on residents living adjacent to major roads, Maharashtra Pollution Control Board has conducted this noise monitoring study at 25 locations covering six major cities in Maharashtra, as per CPCB protocol. It is also aimed at generating long term ambient noise level data and trend at the identified locations, by repeating the monitoring survey every year. Noise monitoring was carried at 25 locations covering six major cities in Maharashtra, for 24 hours continuously (16 hrs. day time and 8 hrs. night time), for two days, on 15th and 16th December, 2012.

This report contains the methodology and observations made during the study. Results are reported as Leq day time, Leq night time, L10, L50, L90, Lmax, Lmin in dB(A) and are compared with ambient noise standards for the area as well as last three years. Increasing trends in noise levels are observed at most of the locations this year as compared to last year. This clearly indicates rapid urbanization and associated noise producing activities of urban population is in rise

The data and the trends in variation in noise levels in different major cities can help the authorities and the Municipal bodies to develop a suitable action plan and strategies for mitigation. The report is being placed on MPCB website for wider dissemination of information and for public awareness.

Field monitoring of this study was conducted by M/s Ashwamedh Engineers and Consultants C S Ltd; Nashik and was supported by all Regional Offices of the Board in the field. The entire study work including planning, coordination and report preparation was done at PAMS division of the Board. The contributions of Shri P.K.Mirashe, Shri S.C.Kollur and Ms.Poonam Poyrekar are appreciated and acknowledged

(Rajeev Kumar Mital, IAS)
Member Secretary

February, 2013

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CONTENTS

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LIST OF TABLES

LIST OF CHARTS

ABBREVIATIONS

CPCB	Central Pollution Control Board
dB	Decibel
dB(A)	Decibels with "A" weighting
EPA	Environmental Protection Act, 1986
Hz	Hertz
MPCB	Maharashtra Pollution Control Board
kHz	Kilo Hertz
L_{Aeq}	Equivalent continuous A-weighted sound pressure level (dB)
L_{max}	Maximum sound pressure level (dB)
L_{min}	Minimum sound pressure level (dB)
SPL	Sound Pressure Level

1. INTRODUCTION

The Environmental Protection Agency defines noise as "unwanted or disturbing sound". Sound becomes unwanted when it either interferes with normal activities such as sleeping, conversation, or disrupts or diminishes one's quality of life. Though for some, the persistent and escalating sources of sound can often be considered an annoyance. This "annoyance" can have major consequences, primarily to one's overall health. Noise pollution adversely affects the lives of millions of people. Studies have shown that there are direct links between noise and health. Problems related to noise include stress related illnesses, high blood pressure, speech interference, hearing loss, sleep disruption, and lost productivity. Noise Induced Hearing Loss (NIHL) is the most common and often discussed health effect, but research has shown that exposure to constant or high levels of noise can cause countless adverse health affect. The lack of infrastructure and fast paced life in major metropolitan cities of India has made the urban environment extremely crowded, busy as well as noisy and as a result the people living these major metropolitan areas are suffering from the impacts of noise pollution. In order to access the impact of noise pollution, an Ambient Noise Level Monitoring Program is being initiated by Maharashtra Pollution Control Board in six major Metropolitan cities across the state for a period of 24 hours. The survey is being conducted on 18th and 19th of December, 2011.

1.1 Effect of Noise Pollution on Human Health

Noise health effects are the health consequences at elevated sound levels. Elevated workplace or other noise can cause hearing impairment, hypertension, ischemic heart disease, annoyance, premature ejaculation, bowel movements, sleep disturbance, death and decreased sexual performance (WHO). Changes in the immune system and birth defects have been attributed to noise exposure, but evidence is limited. Although some presbycusis may occur naturally with age, in many developed nations the cumulative impact of noise is sufficient to impair the hearing of a large fraction of the population over the course of a lifetime. Noise exposure has also been known to induce tinnitus, hypertension, and other cardiovascular impacts. Beyond these effects, elevated noise levels can also create stress, increase the workplace accident rates, and stimulate aggression and other anti-social behaviors. The most significant causes are vehicle and aircraft noise, prolonged exposure to loud music, and industrial noise.

1.2 Noise Measurement and Standards:

Sound is usually made up of a wide range of different frequencies. The spread of sound energy across the audible frequency "spectrum" (about 20Hz – 20 kHz) is one factor that helps to make it identifiable to the human ear. The human ear is a very sensitive system with an extensive dynamic range.to accommodates this very large range, sound levels are measured using the **decibel (dB) scale**. A sound level meter theoretically has a flat response, in other words it responds exactly the same at different frequencies. Unlike a sound level meter, the human ear responds differently at different frequencies, so a weighting, or filter, can be used so that the meter responds more like the human ear. The most commonly used weighting is referred to as the **'A'** weighting and readings are usually measured in dB(A).Fast response (125 to 200 milli-seconds) was selected to measure noise levels. The human response to noise depends upon the frequency of the sound, the type of noise (continuous, intermittent or impulsive) and the time (day or night) it occurs. In most cases, the sounds and noises we hear are not steady. Apart from variation in tones, the magnitude or the sound pressure level of a sound or noise changes with time. The equivalent continuous noise level (Leq) is the sound pressure level of a steady sound that has, over a given period, the same energy as a fluctuating sound in question. It was calculated using following equation:

$$L_{eq,T} = 10 \log \left(1 / n \sum_{i=1}^{n} 10^{\frac{L_i}{10}} \right)$$

Where, Li = levels observed at n equally spaced times during interval T.

The **"Sound Pressure Level" (SPL)** is twenty times the logarithm to the base 10 of the ratio of the effective pressure (p) of a sound to the reference pressure (Pr) of 20 µPa. Thus the sound pressure level in dB = 20 log10 P/Pr.

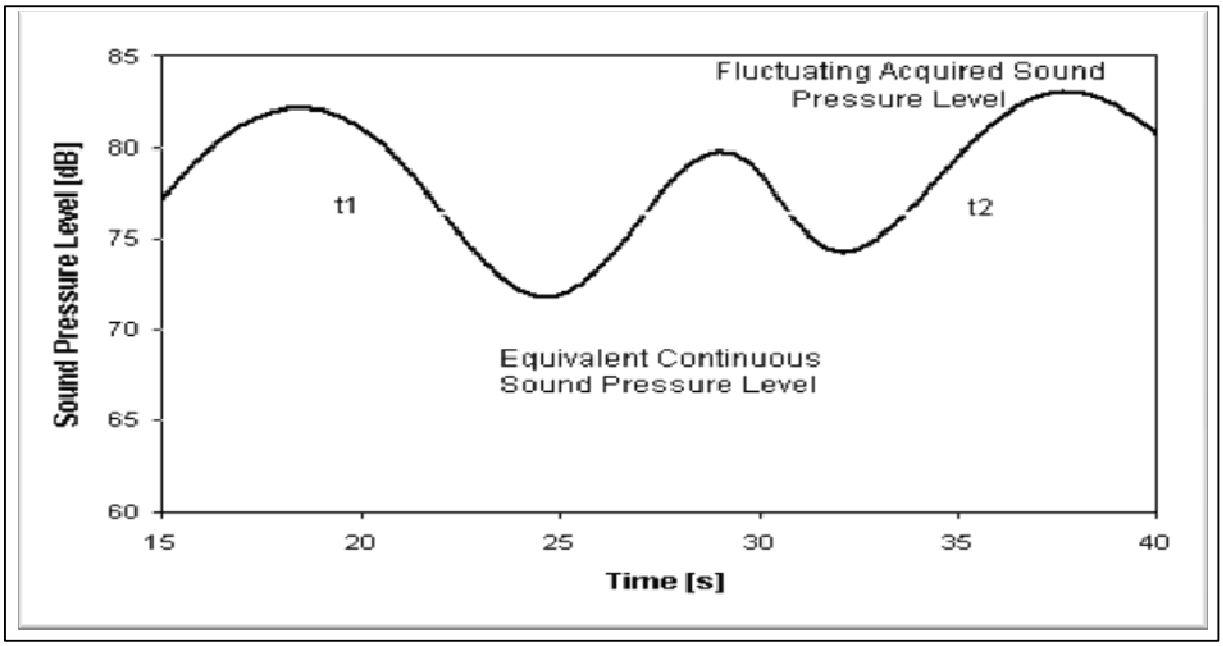

Fig. 1.1: Measurement of Equivalent Continuous Sound Pressure Level

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.

L_{10}: The level that were exceeded during 10% of the measuring time in dB(A)

L_{50}: The level that were exceeded during 50% of the measuring time in dB(A)

L_{90}: The level that were exceeded during 90% of the measuring time in dB(A).

Noise has been recognized as ambient air pollutant. Standards in this regard are laid down under The Environment (Protection) Act, 1986 (and rules made there under) and under the Model Rules of the Factories Act, 1948 for occupational health and safety purposes. The Central Pollution Control Board constituted a National Committee of Experts on Noise Pollution Control. The Committee recommended noise standards for ambient air and for automobiles, domestic appliances and constructions equipment, which were later notified under The Environment (Protection) Act, 1986 as given below in table 1.1:

Table 1.1: Standards of Noise Levels under EPA (1986): Noise Pollution (Regulation & Control) Rules, 2000

Area Code	Category of Area	Limits in dB(A) L_{eq}	
		Day time	Night time
A	Industrial area	75	70
B	Commercial area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Note:

1. Day time is reckoned in between 6 A.M and 10 P.M.
2. Night time is reckoned in between 10 P.M and 6 A.M.
3. Silence zone is referred as areas up to 100 meters around such premises as hospitals, courts, educational institutions and courts. The Silence zones are to be declared by the Competent Authority.
4. Use of vehicular horns, loudspeakers and bursting of crackers shall be banned in these zones.
5. Mixed categories of areas should be declared as one of the four above mentioned categories by the Competent Authority and the corresponding standards shall apply.

2. OBJECTIVES

The main objectives of this study are:

- To determine the impact of various noise sources on an individual in two different scenarios (working and non working) i.e. 15th (Saturday) and 16th (Sunday) of December, 2012.
- To compare the noise levels with Ambient Noise Standards for the area. Further, to create the awareness and educate the public.

3. METHODOLOGY

The Noise Level Monitoring in six Metropolitan cities for 24 hours continuously (16 hrs day time & 8 hrs night time) was carried out on 15th (working day) & 16th (holiday) December 2012. The monitoring was carried at the same locations during both days and during the same period. Noise standards for ambient noise level during day and night are different (refer **Annexure I**); hence noise levels were measured accordingly as follows:

- Day shift from 06:00 Hrs. to 22:00 Hrs: 06:00 to 14:00 Hrs. & 14:00 to 22:00Hrs.
- Night shift from 22:00 Hrs. to 06:00 Hrs.

Pre-calibrated Sound Level Meters were used for the monitoring. All the measurements were made at 'Fast' response mode using 'A' filter, keeping in view the quickly changing nature of noise levels, as 'A' filter also corresponds to the human ear audible range of 20-20000Hz of frequencies. The monitoring stations selected include residential areas, silence areas, industrial and commercial areas, adjacent to major roads (traffic) areas and also extended to air and rail traffic. The main purpose of this exercise is to determine the noise levels during both the days (Working day and Sunday) and to compare it with ambient noise standards for the area. Further, it may help in identifying the significant sources of Noise and finding & implement of remedies to reduce the Noise levels. 25 locations were covered in six major cities of Maharashtra state as shown in the table 3.1.

Table 3.1: Noise Monitoring Locations in Maharashtra

Sr. No.	City	Number of locations
1	Mumbai	10
2	Nashik	03
3	Nagpur	03
4	Aurangabad	03
5	Kolhapur	03
6	Pune	03
	TOTAL	**25**

For detailed list of locations refer **Annexure II**

4. RESULTS

The Global Positioning System (GPS) was used to determine the exact position of the locations of Metropolitan Cities. Also, the selected monitoring station's Latitude and Longitude along with the distance & height of sensor of the sound level meter for all the locations are summarized in the table 4.1:

Table 4.1: Exact position of monitoring station using Global Positioning System

Location	Position	Distance of Monitoring Station in meters	Monitoring Height in meters
MUMBAI			
High Court	N 18^0 55′ 52.3″ E 72^0 49′ 50.2″	2.43	1.23
Mumbadevi temple	N 18^0 57′ 03.1″ E 72^0 49′ 53.4″	3.16	1.24
Borivali National Park	N 19^0 01′ 51.2″ E 72^0 51′ 53.6″	2 .70	1.26
An top Hill	N 19^0 01′ 31.2″ E 72^0 50′ 14.7″	1.87	1.26
Shivaji Park, Dadar	N 19^0 05′ 36.9″ E 72^0 51′ 17.0″	1.66	1.23
Santacruz Airport	N 19^0 10′ 17.6″ E 72^0 51′ 16.4″	2.30	1.20
Goregaon (E)	N 19^0 05′ 17.1″ E 72^0 54′ 27.8″	1.80	1.21
Ghatkopar (W)	N 19^0 12′ 34.4″ E 72^0 49′ 40.9″	1.93	1.27
Charkop, Kandivali (W)	N 19^0 01′ 56.0″ E 72^0 53′ 48.7″	2.29	1.23
Vashi Naka, Chembur	N 19^0 13′ 51.1″ E 72^0 51′ 53.3″	2.52	1.26
PUNE			
Pune University	N 18^0 32′ 28.6″ E 73^0 49′ 38.4″	3.60	1.24

Location	Position	Distance of Monitoring Station in meters	Monitoring Height in meters
Nucleus Mall	N 18^0 31′ 06.0″ E 73^0 52′ 30.8″	2.89	1.20
Kakade Angan	N 18^0 37′ 27.9″ E 73^0 47′ 6.1″	3.10	1.25
NASHIK			
Dwarka Circle	N 19^0 59′ 34.9″ E 73^0 47′ 53.5″	3.61	1.25
Pandit Colony Near NMC	N 20^0 00′ 08.3″ E 73^0 46′ 34.6″	3.42	1.21
Pavan Nagar CIDCO	N 19^0 58′ 27.1″ E 73^0 45′ 23.5″	2.56	1.22
AURANGABAD			
Ghati Hospital	N 19^0 53′ 19.08″ E 75^0 19′ 07.4″	2.88	1.22
Nirala bazaar	N 19^0 52′ 44.5″ E 75^0 19′ 28.5″	3.37	1.21
CIDCO N-4	N 19^0 52′ 10.0″ E 75^0 21′ 44.7″	2.90	1.20
NAGPUR			
Government Medical College	N 21^0 08′ 10.3″ E 79^0 03′ 38.9″	3.58	1.23
Sitabardi Police Station	N 21^0 08′ 34.6″ E 79^0 04′ 54.8″	3.89	1.20
Shivaji Nagar	N 21^0 07′ 44.5″ E 79^0 05′ 54.5″	4.50	1.22
KOLHAPUR			
Collector Office	N 16^0 42' 29.9" E 74^0 14' 08.6"	3.45	1.20
Dasara Chowk	N 16^0 42' 04.7" E 74^0 13' 36.1"	2.69	1.25
Shahupuri	N 16^0 41' 59.5" E 74^0 14' 25.6"	2.87	1.22

4.1 Noise Levels at Various Locations in the City:

The noise levels at all locations were continuously monitored for a period of 24 hours during holiday and normal working day. The hourly equivalent noise recorded at each of the locations is shown in table below:

Table 4.1.1 Ambient Noise levels at each location as on 15th Dec. 2012

Sr. No.	Monitoring Site	Date	Day Time (6AM-10PM) values in dB(A)				Date	Night Time (10PM-6AM) Values in dB(A)			
			L_{eq}	L_{10}	L_{50}	L_{90}		L_{eq}	L_{10}	L_{50}	L_{90}

Sr. No.	Monitoring Site	Date	Day Time (6AM-10PM) values in dB(A)				Date	Night Time (10PM-6AM) Values in dB(A)			
			L_{eq}	L_{10}	L_{50}	L_{90}		L_{eq}	L_{10}	L_{50}	L_{90}
1)	**Mumbai:**										
1	High Court	15.12.12	74.8	70.5	75.5	78.9	15.12.12 to 16.12.12	53.3	43.2	48.7	69.7
2	Mumbadevi	15.12.12	70.5	66.8	71.7	73.9	15.12.12 to 16.12.12	56.2	51.1	52.8	67.2
3	Borivali National Park	15.12.12	72.5	65.1	73.9	79.6	15.12.12 to 16.12.12	71.5	65.5	69.3	79.8
4	An top Hill	15.12.12	73.3	67.8	74.0	78.1	15.12.12 to 16.12.12	59.0	55.0	57.3	64.8
5	Shivaji Park	15.12.12	68.4	62.1	68.2	75.4	15.12.12 to 16.12.12	53.2	48.8	53.3	56.8
6	Santacruz Airport	15.12.12	74.8	67.6	74.9	80.2	15.12.12 to 16.12.12	71.6	69.9	70.9	74.6
7	Ghatkopar	15.12.12	70.1	64.0	70.5	74.7	15.12.12 to 16.12.12	65.5	61.8	65.7	68.4
8	Vashi Naka	15.12.12	81.0	76.6	81.4	86.5	15.12.12 to 16.12.12	71.3	67.1	71.0	75.8
9	Goregon	15.12.12	73.8	65.2	72.4	82.1	15.12.12 to 16.12.12	52.1	42.8	52.4	61.1
10	Charkop	15.12.12	69.0	59.4	66.6	80.0	15.12.12 to 16.12.12	58.7	55.5	58.7	61.8
2)	**Pune**										
1	Nucleus Mall	15.12.12	74.4	78.2	74.1	70.9	15.12.12 to 16.12.12	71.7	74.9	70.2	69.6
2	Pune University	15.12.12	74.6	78.0	73.7	71.7	15.12.12 to 16.12.12	72.4	74.2	72.5	70.3
3	Kakade Angan	15.12.12	71.9	74.3	71.1	70.1	15.12.12 to 16.12.12	65.0	69.8	63.3	62.0
3)	**Nashik:**										
1	Dwarka Circle	15.12.12	78.0	84.6	76.6	72.4	15.12.12 to 16.12.11	72.1	78.4	72.2	66.1

Sr. No.	Monitoring Site	Date	Day Time (6AM-10PM) values in dB(A)				Date	Night Time (10PM-6AM) Values in dB(A)			
			L_{eq}	L_{10}	L_{50}	L_{90}		L_{eq}	L_{10}	L_{50}	L_{90}
2	Pandit Colony	15.12.12	67.3	76.8	64.9	60.5	15.12.12 to 16.12.11	66.7	70.7	66.7	62.2
3	Pavan Nagar	15.12.12	71.1	86.8	67.6	63.9	15.12.12 to 16.12.11	68.0	73.4	68.5	62.2
4) Aurangabad:											
1	Ghati Hospital	15.12.12	67.3	71.3	68.0	62.3	15.12.12 to 16.12.11	51.8	57.7	50.9	45.9
2	Nirala Bazaar, Samarth Nagar	15.12.12	68.4	71.2	68.7	65.7	15.12.12 to 16.12.11	61.7	64.9	61.9	57.6
3	CIDCO N-4	15.12.12	64.1	66.8	64.4	61.0	15.12.12 to 16.12.11	54.1	57.2	54.1	50.9
5) Nagpur											
1	Govt. Medical College	15.12.12	65.7	69.6	66.3	61.7	15.12.12 to 16.12.11	49.7	54.3	48.4	46.3
2	Sitabardi Police Station	15.12.12	70.9	73.0	70.7	68.4	15.12.12 to 16.12.11	63.5	71.9	62.7	57.7
3	Shivaji Nagar	15.12.12	66.1	68.5	66.3	62.5	15.12.12 to 16.12.11	56.7	61.7	54.8	53.2
6) Kolhapur											
1	Collector Office	15.12.12	55.6	63.1	55.7	47.0	15.12.12 to 16.12.11	48.4	51.9	47.1	45.9
2	Shahupuri	15.12.12	71.9	77.0	72.6	66.6	15.12.12 to 16.12.11	53.3	61.0	51.4	46.8
3	Dasara Chowk	15.12.12	63.9	67.1	65.7	58.7	15.12.12 to 16.12.11	51.0	56.3	49.4	46.9

Table 4.1.2 Ambient Noise levels at each location as on 16th Dec. 2012

Sr. No	Monitoring Site	Date	Day Time (6AM-10PM) values in dB(A)				Date	Night Time (10PM-6AM) Values in dB(A)			
			L_{eq}	L_{10}	L_{50}	L_{90}		L_{eq}	L_{10}	L_{50}	L_{90}
1) Mumbai:											
1	High Court	16.12.12	72.7	61.4	74.2	78.9	16.12.12 to 17.12.12	54.0	46.0	50.6	66.3
2	Mumbadevi	16.12.12	67.6	63.2	67.7	71.7	16.12.12 to 17.12.12	60.3	53.0	61.9	67.0
3	Borivali National Park	16.12.12	72.4	64.4	73.2	79.2	16.12.12 to 17.12.12	57.2	49.0	53.3	70.1
4	An top Hill	16.12.12	72.5	66.1	72.4	78.7	16.12.12 to 17.12.12	61.1	54.1	60.0	68.3
5	Shivaji Park	16.12.12	73.7	67.2	73.9	80.3	16.12.12 to 17.12.12	57.1	51.0	57.3	62.5
6	Airport	16.12.12	74.2	68.9	75.5	79.3	16.12.12 to 17.12.12	70.6	68.4	71.0	72.3
7	Ghtkopar	16.12.12	71.0	58.5	74.4	79.1	16.12.12 to 17.12.12	65.2	54.7	67.1	75.7
8	Vashi Naka	16.12.12	80.5	76.0	82.2	83.7	16.12.12 to 17.12.12	71.4	68.9	70.7	75.3
9	Goregaon	16.12.12	75.2	66.3	78.4	82.5	16.12.12 to 17.12.12	55.9	45.5	55.4	68.2
10	Charkop	16.12.12	68.0	62.7	67.7	73.5	16.12.12 to 17.12.12	62.1	54.2	59.8	72.2
2) Pune:											
1	Nucleus Mall	16.12.12	74.4	77.9	75.1	70.7	16.12.12 to 17.12.12	72.5	75.0	73.0	69.6
2	Pune University	16.12.12	74.8	78.3	73.7	72.1	16.12.12 to 17.12.12	72.8	74.0	72.8	71.3
3	Kakade Angan	16.12.12	71.7	73.6	71.3	70.0	16.12.12 to 17.12.12	65.2	68.0	64.0	63.0`

Sr. No	Monitoring Site	Date	Day Time (6AM-10PM) values in dB(A)				Date	Night Time (10PM-6AM) Values in dB(A)			
			L_{eq}	L_{10}	L_{50}	L_{90}		L_{eq}	L_{10}	L_{50}	L_{90}
3) Nashik:											
1	Dwarka Circle	16.12.12	73.6	76.3	73.5	71.3	16.12.12 to 17.12.12	69.8	72.5	69.9	67.1
2	Pandit Colony	16.12.12	69.0	73.7	69.0	63.8	16.12.12 to 17.12.12	65.7	69.6	65.0	62.8
3	Pavan Nagar	16.12.12	69.3	76.3	68.8	64.4	16.12.12 to 17.12.12	67.6	71.7	67.6	63.6
4) Aurangabad:											
1	Ghati Hospital	16.12.12	67.4	71.1	67.2	64.0	16.12.12 to 17.12.12	52.1	58.1	51.4	46.9
2	Nirala Bazaar, Samarth Nagar	16.12.12	71.1	72.8	71.4	68.9	16.12.12 to 17.12.12	61.7	65.2	62.2	56.8
3	CIDCO N-4	16.12.12	67.3	69.2	67.5	64.9	16.12.12 to 17.12.12	56.4	60.2	56.5	52.6
5) Nagpur											
1	Govt. Medical College	16.12.12	65.1	68.5	66.4	60.4	16.12.12 to 17.12.12	48.1	50.8	48.4	45.2
2	Sitabardi Police Station	16.12.12	72.8	74.7	72.5	71.7	16.12.12 to 17.12.12	65.8	70.9	64.3	62.7
3	Shivaji Nagar	16.12.12	64.9	67.9	65.1	61.3	16.12.12 to 17.12.12	56.7	62.2	57.0	50.0
6) Kolhapur											
1	Collector Office	16.12.12	55.5	62.9	55.1	47.5	16.12.12 to 17.12.12	49.2	53.0	48.2	46.0
2	Shahupuri	16.12.12	71.0	77.2	71.9	65.0	16.12.12 to 17.12.12	53.0	61.4	51.0	46.1
3	Dasara Chowk	16.12.12	62.9	66.3	63.7	58.3	16.12.12 to 17.12.12	50.8	57.2	49.6	46.6

Mumbai: A total of 10 locations were monitored continuously for two days from 15th to 16th December, 2012 for 24 hours (as shown in Table 4.1.1 and Table 4.1.2). It was observed that, on 15th December, among all the 10 locations Vashi Naka, Chembur was having the highest noise level at day time with 86.7 dB(A) and Borivali National Park was having the highest noise level at night time with 80.9 dB(A). On 16th December, Vashi Naka was found to be have highest noise level at day time with 84.7 dB(A) and at night time, Borivali National Park with 78.1 dB(A) was found to have high noise level. The present study also shows that:

- At the silence areas the minimum sound level was 41.9 dB(A) and the maximum sound level was 82.9 dB(A).
- At the industrial areas the minimum sound level was 42.7 dB(A) and maximum sound level was 85.5 dB(A).
- At the commercial areas the minimum sound level was 48.4 dB(A) and maximum sound level was 86.7 dB(A).
- At the residential areas the minimum sound level was 48.3 dB(A) and maximum sound level was 81.7 dB(A).

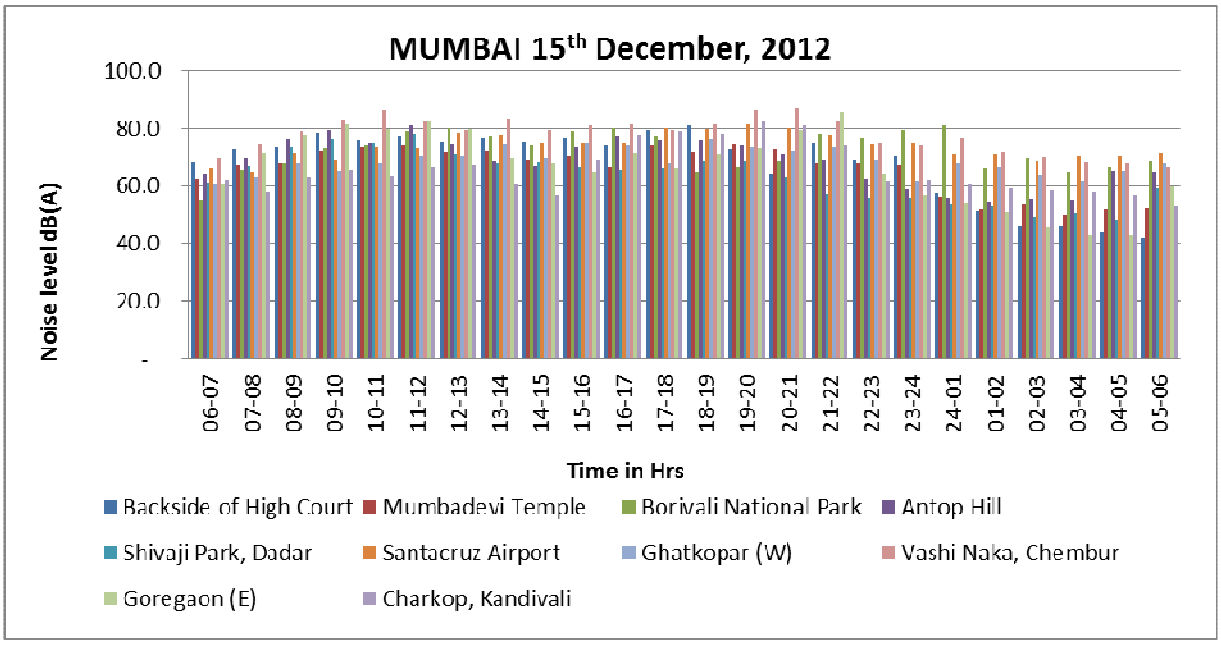

Fig 4.1.1(a): Continuous Equivalent Noise Levels at Different Parts of Mumbai during 15th December, 2012

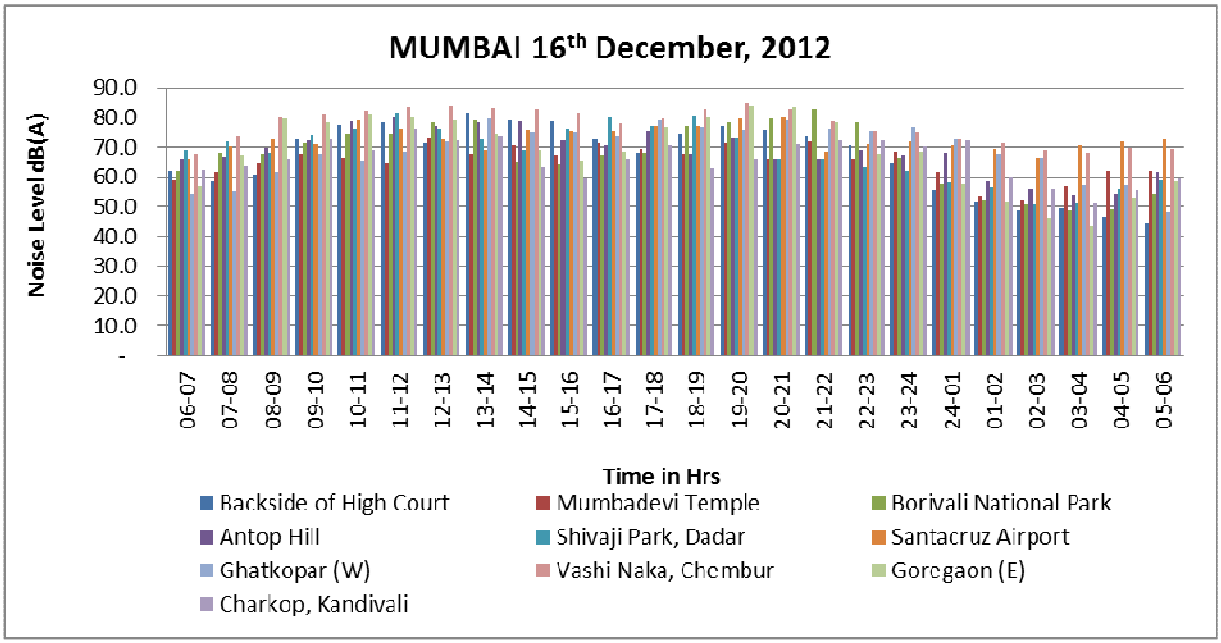

Fig 4.1.1(b): Continuous Equivalent Noise Levels at Different Parts of Mumbai during 16th December, 2012

Pune: a total of 3 locations were monitored continuously for two days from 15th to 16th December, 2012 for 24 hours. Among the entire locations Nucleus mall was observed to have the highest noise level on 15th December, at day and Kakade Angan at night time with 78.9 dB(A) and 75.8 dB(A) respectively. On 16th December, Pune University at day time and Nucleus mall at night time were found to have highest noise levels with 78.4 dB(A) and 75.2 dB(A) respectively. In Pune, it was also observed that:

- At the silence areas the minimum sound level was 70.0 dB(A) and the maximum sound level was 78.4 dB(A).
- At the commercial areas the minimum sound level was 68.9 dB(A) and maximum sound level was 78.9 dB(A).
- At the residential areas the minimum sound level was 61.0 dB(A) and maximum sound level was 75.8 dB(A).

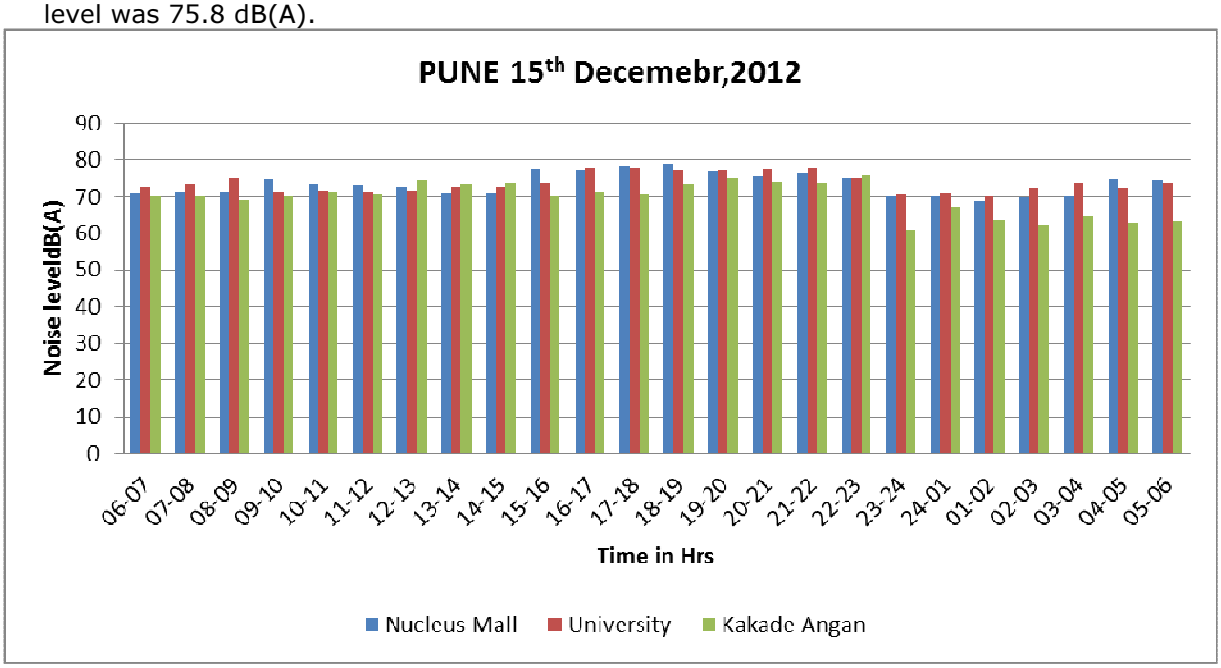

Fig 4.1.2(a): Continuous Equivalent Noise Levels at Different Parts of Pune during 15th December, 2012

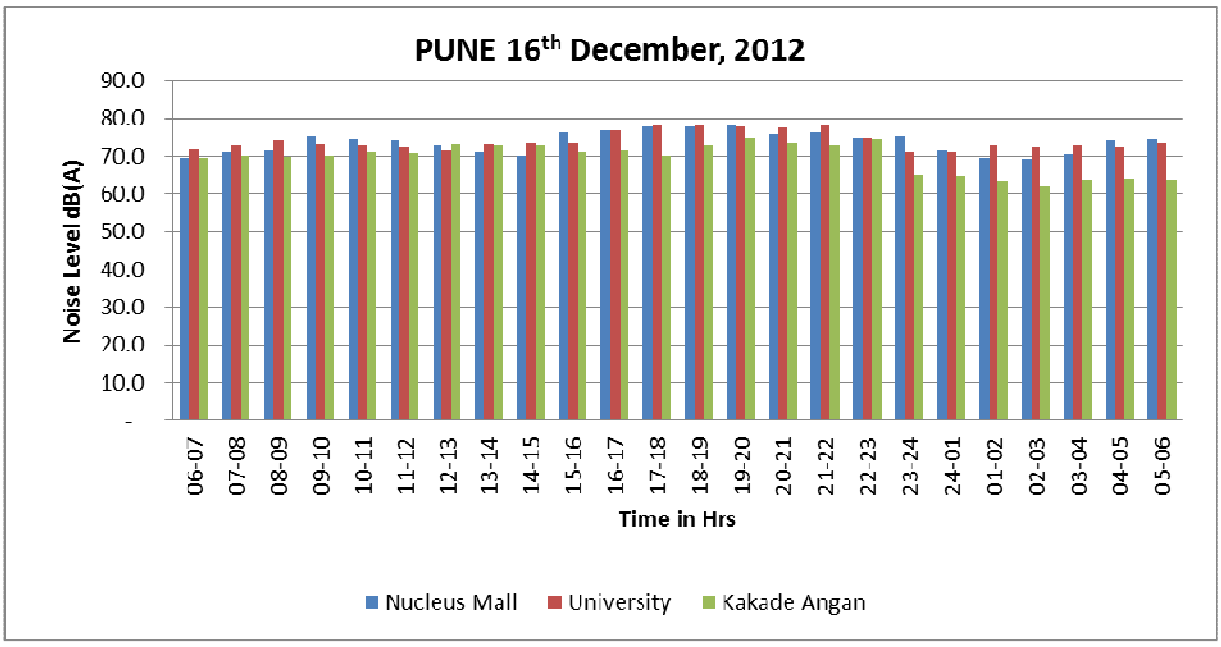

Fig 4.1.2(b): Continuous Equivalent Noise Levels at Different Parts of Pune during 16th December, 2012

Nashik: a total of 3 locations were monitored continuously for two days from 15th to 16th December, 2012 for 24 hours. It was observed that, on 15th December, among all the locations Pavanagar was having the highest noise level at day time and Dwaraka Circle at night time with 91.4 dB(A) and 82.5 dB(A) respectively. On 16th December, Dwarka Circle was found to be have highest noise level at day time and Pavan Nagar at night time with 79.0 dB(A) and 72.8 dB(A) respectively. The present study also shows that:

- At the commercial area, the minimum sound level was 55.5 dB(A) and maximum sound level was 91.4 dB(A).
- At the residential areas, the minimum sound level was 52.2 dB(A) and maximum sound level was 89.9 dB(A).

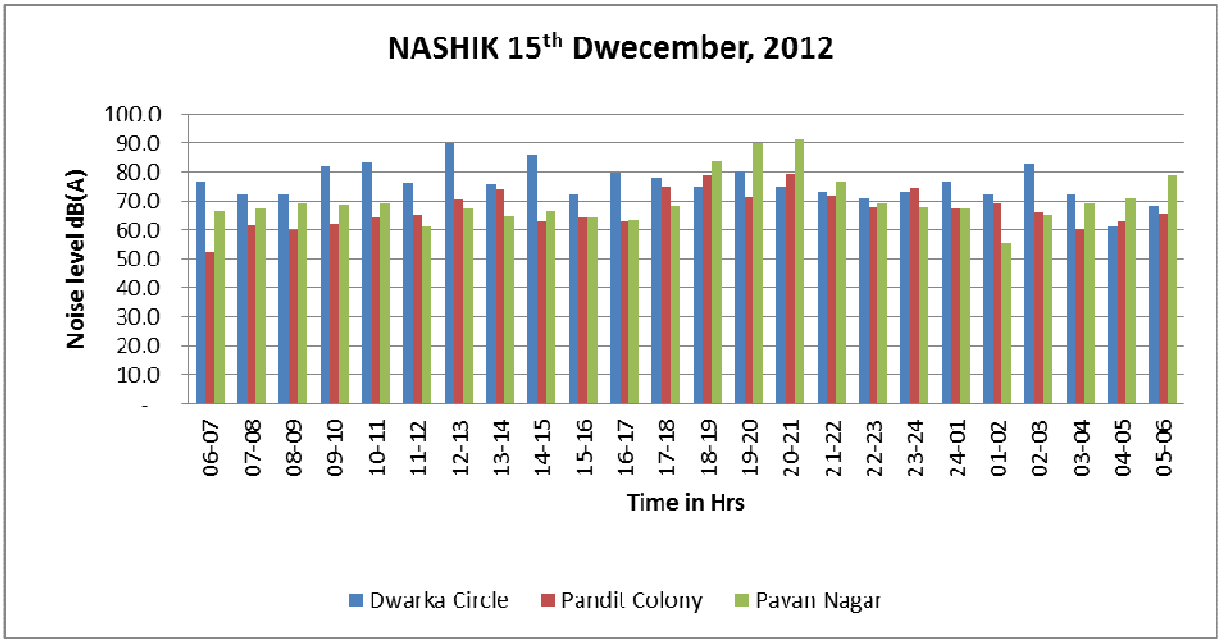

Fig 4.1.3(a): Continuous Equivalent Noise Levels at Different Parts of Nashik during 15th December, 2012

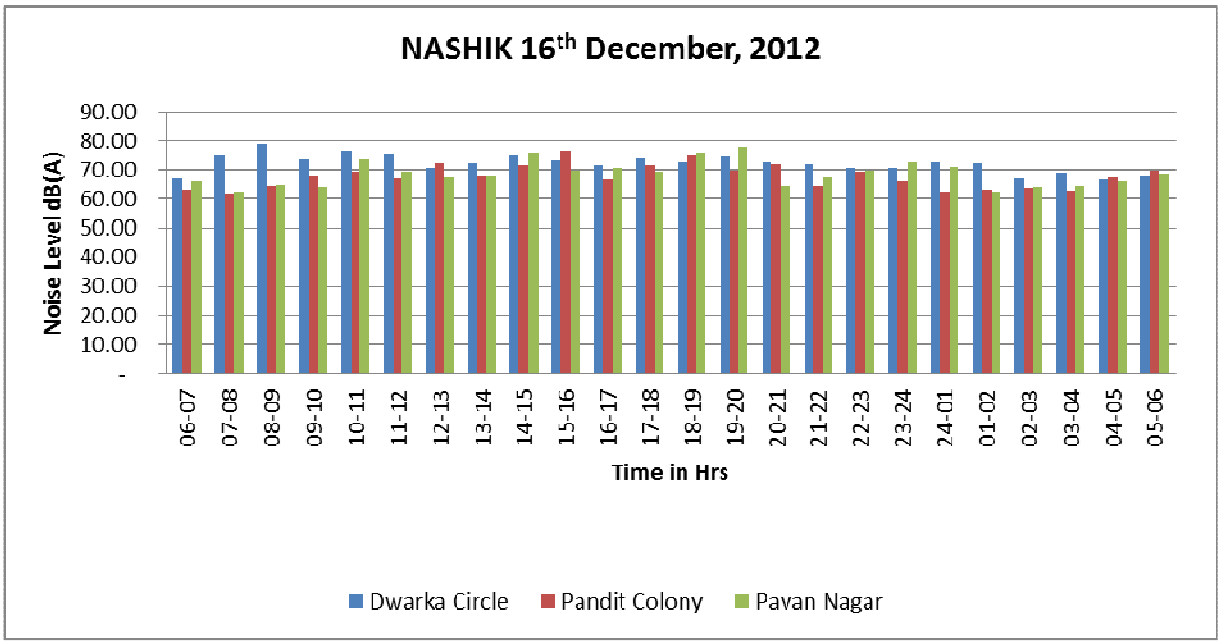

Fig 4.1.3(b): Continuous Equivalent Noise Levels at Different Parts of Nashik during 16th December, 2012

Aurangabad: 3 locations were monitored continuously for two days from 15th to 16th December, 2012 for 24 hours. It was observed that on both days, Nirala Bazaar was noisiest at day as well as at night time. It was also observed that:

- At the silence areas the minimum sound level was 45.4 dB(A) and the maximum sound level was 72.3 dB(A).
- At the commercial areas the minimum sound level was 54.9 dB(A) and maximum sound level was 73.6 dB(A).
- At the residential areas the minimum sound level was 48.5 dB(A) and maximum sound level was 70.2 dB(A).

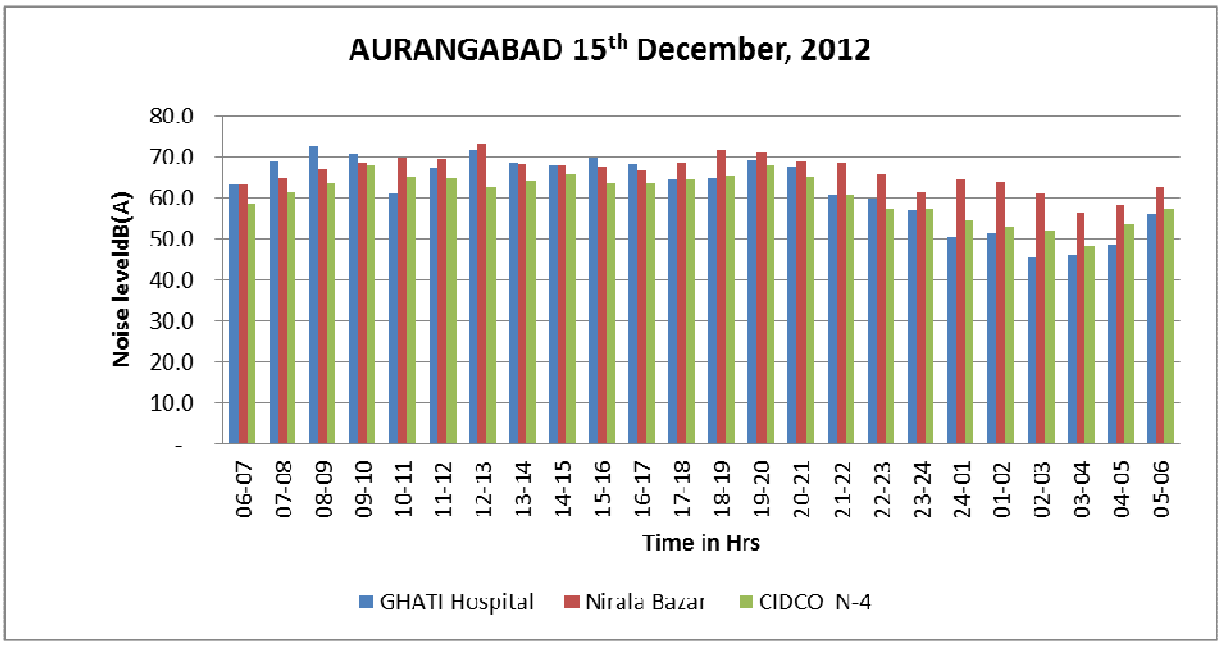

Fig 4.1.4(a): Continuous Equivalent Noise Levels at Different Parts of Aurangabad during 15th December, 2012

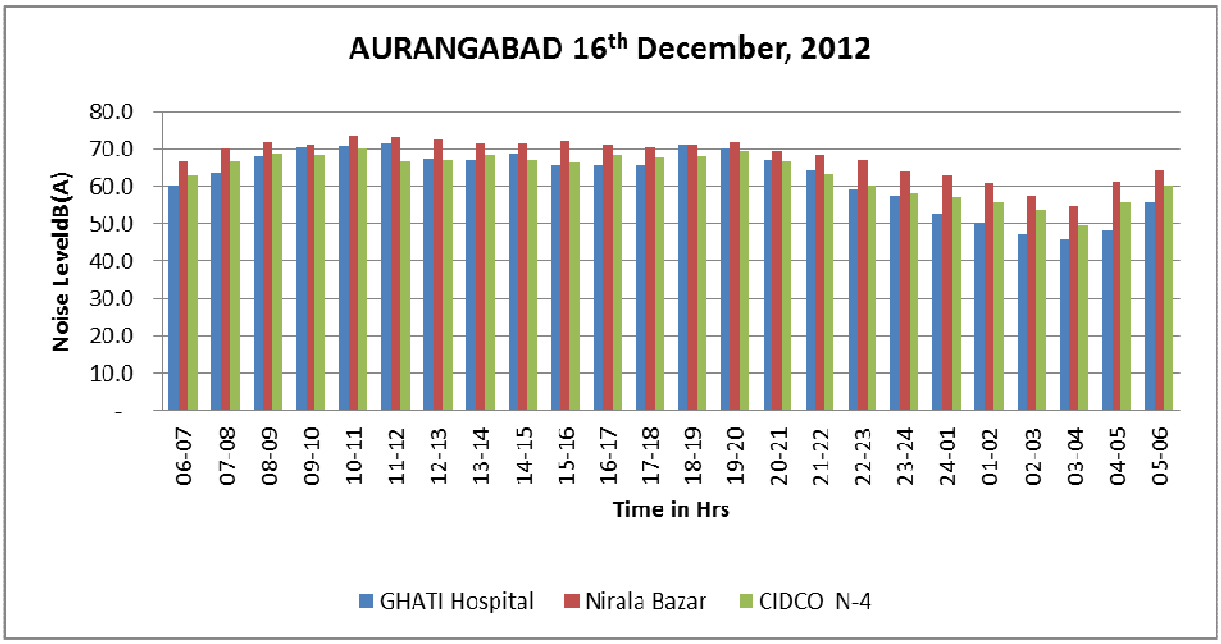

Fig 4.1.4(b): Continuous Equivalent Noise Levels at Different Parts of Aurangabad during 16th December, 2012

Nagpur: also, a total of 3 locations were monitored continuously for two days from 15th to 16th December, 2012 for 24 hours. It was observed that on both days, Sitabardi Police station was having maximum noise level at day as well as at night time. It was also observed that:

- At the silence areas the minimum sound level was 43.7 dB(A) and the maximum sound level was 70.8 dB(A).
- At the commercial areas the minimum sound level was 55.8 dB(A) and maximum sound level was 75.1 dB(A).
- At the residential areas the minimum sound level was 52.0 dB(A) and maximum sound level was 73.2 dB(A).

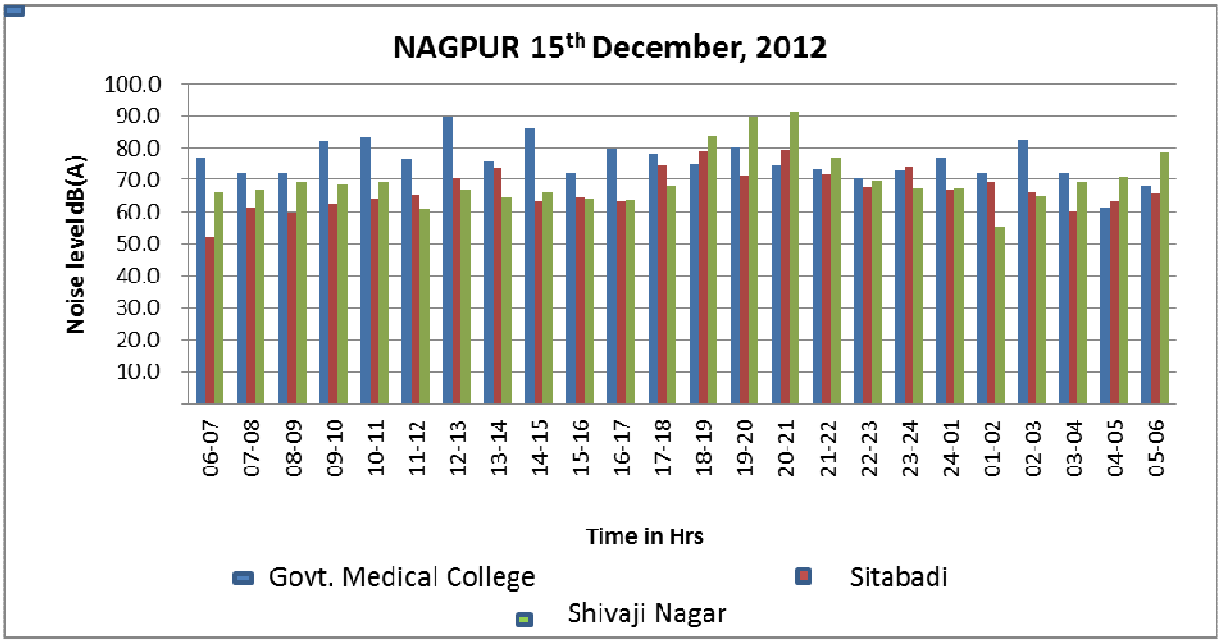

Fig 4.1.5(a): Continuous Equivalent Noise Levels at Different Parts of Nagpur during 15th December, 2012

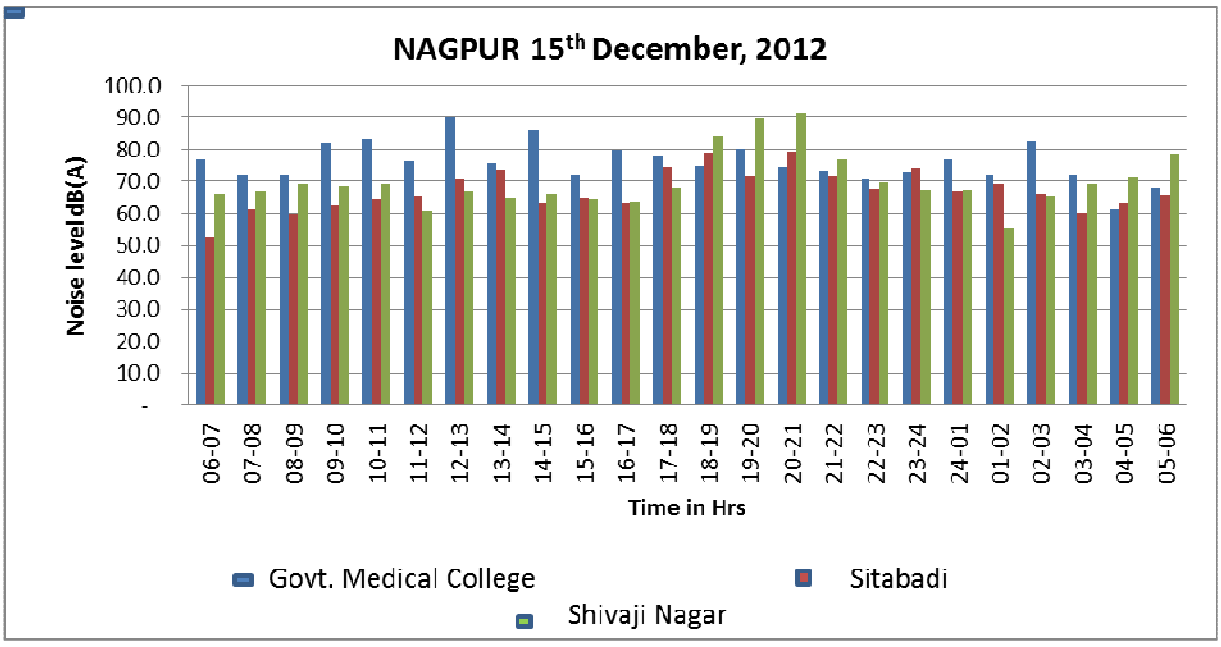

Fig 4.1.5(b): Continuous Equivalent Noise Levels at Different Parts of Nagpur during 16th December, 2012

Kolhapur: also 3 locations were monitored continuously for two days from 15th to 16th December, 2012 for 24 hours. It was observed that, among all the locations Shahupuri was found to be having highest noise level on the 15th and 16th December both day & night time. It was also observed that:

- At the silence areas the minimum sound level was 46.2 dB(A) and the maximum sound level was 68.7 dB(A).
- At the commercial areas the minimum sound level was 45.8 dB(A) and maximum sound level was 79.8 dB(A).
- At the residential areas the minimum sound level was 45.2 dB(A) and maximum sound level was 65.8 dB(A).

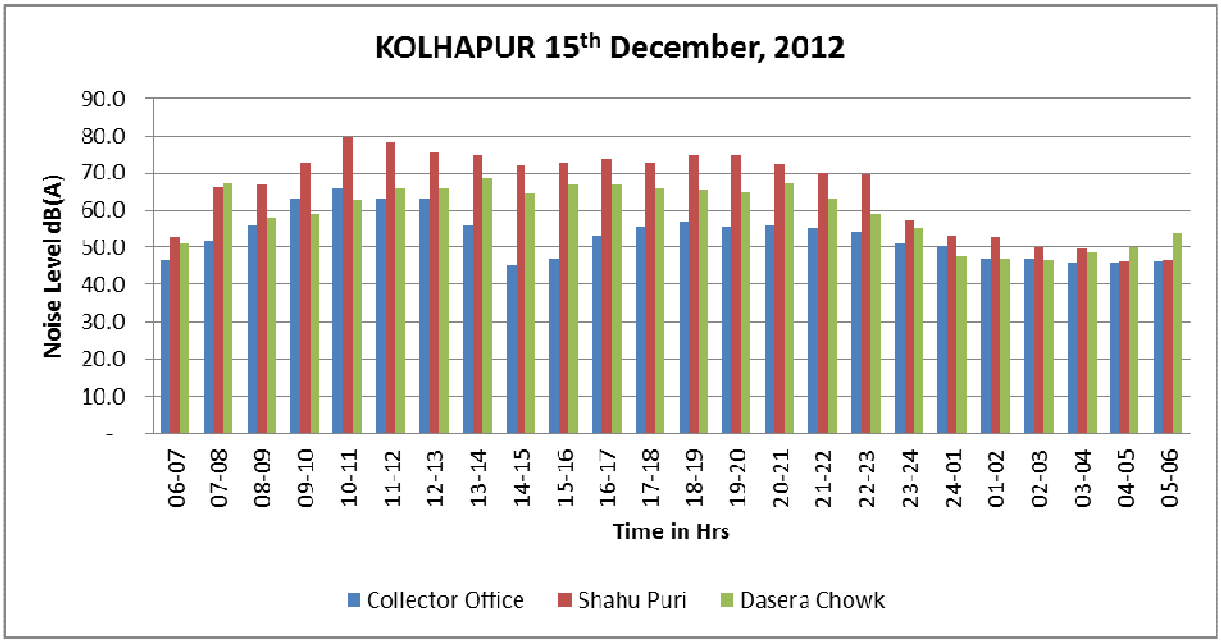

Fig 4.1.6(a): Continuous Equivalent Noise Levels at Different Parts of Kolhapur during 15th December, 2012

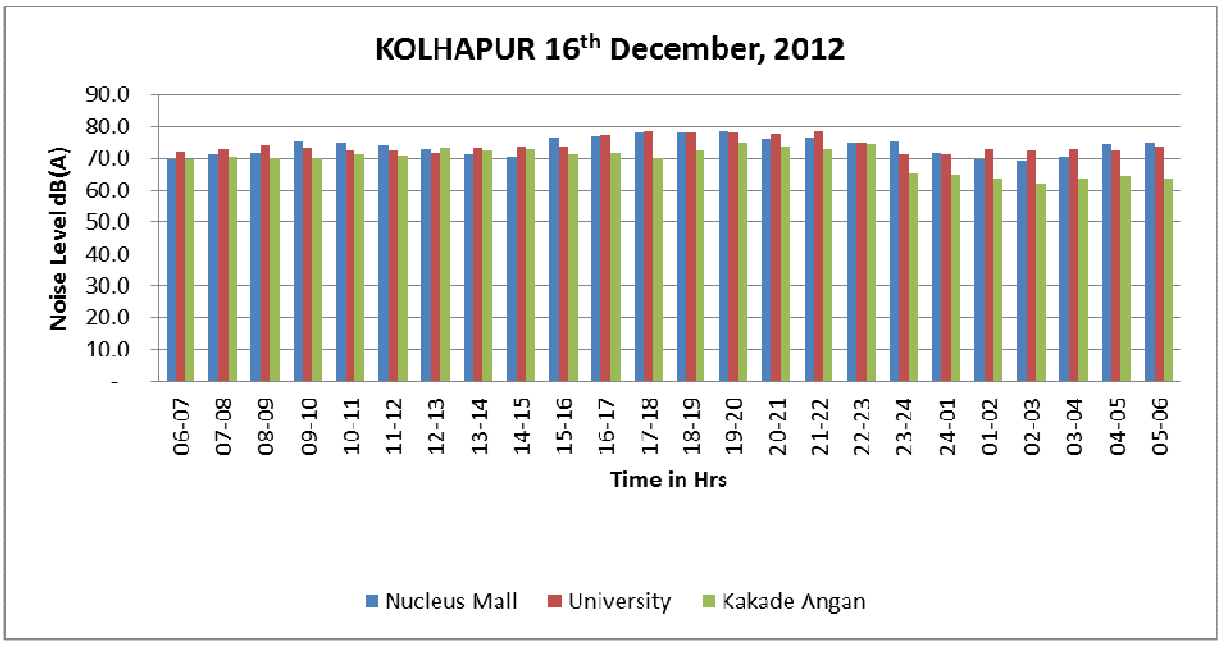

Fig 4.1.6(b): Continuous Equivalent Noise Levels at Different Parts of Kolhapur during 16th December, 2012

4.2 Graphical representation of L_{eq}, L_{10}, L_{50}, L_{90}:

The following are the graphs of each metropolitan city which shows the noise levels at day time and night time.

1) Mumbai

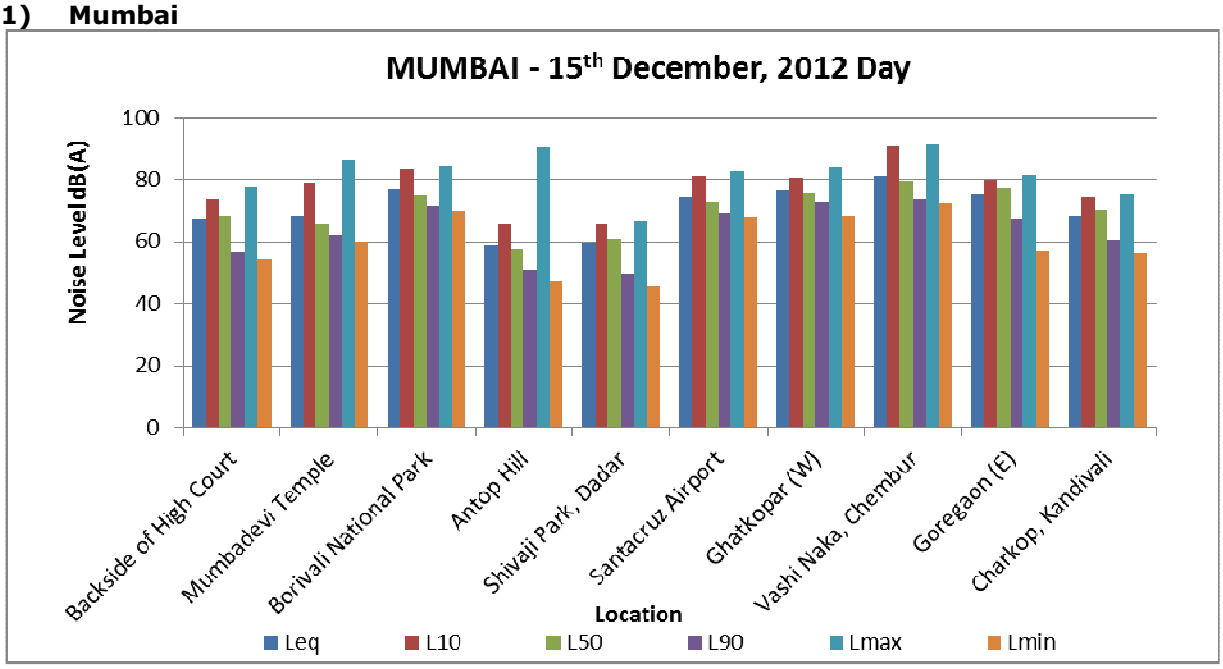

Fig 4.2.1(a): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in Mumbai on 15th December, 2012 at Day Time

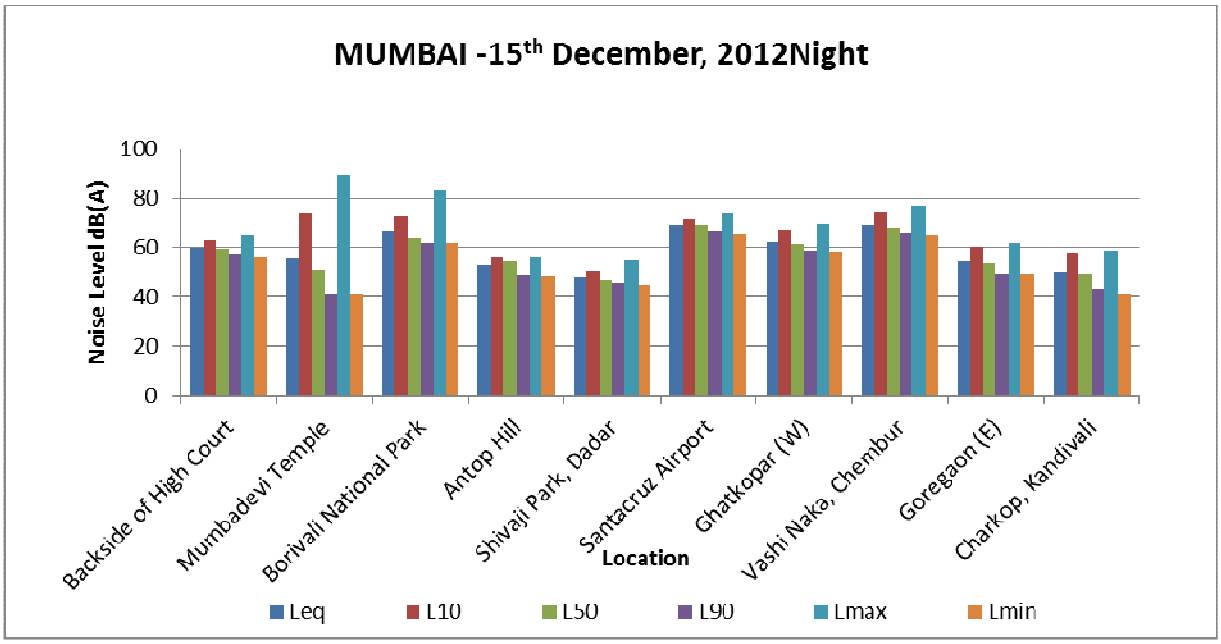

Fig 4.2.1(b): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in Mumbai on 15th December, 2012 at Night Time

Figure 4.2.1(a) shows that the ambient noise levels (L_{eq}) during day time on 15th December ranged between 68.4 dB(A) at Shivaji Park, Dadar to 81.0 dB(A) at Vashi naka, Chembur during day time. However at night time, Fig 4.2.1(b), noise levels (L_{eq}) ranged between 52.1 dB(A) at Goregaon (E) to 71.6 dB(A) at Santacruz Airport.

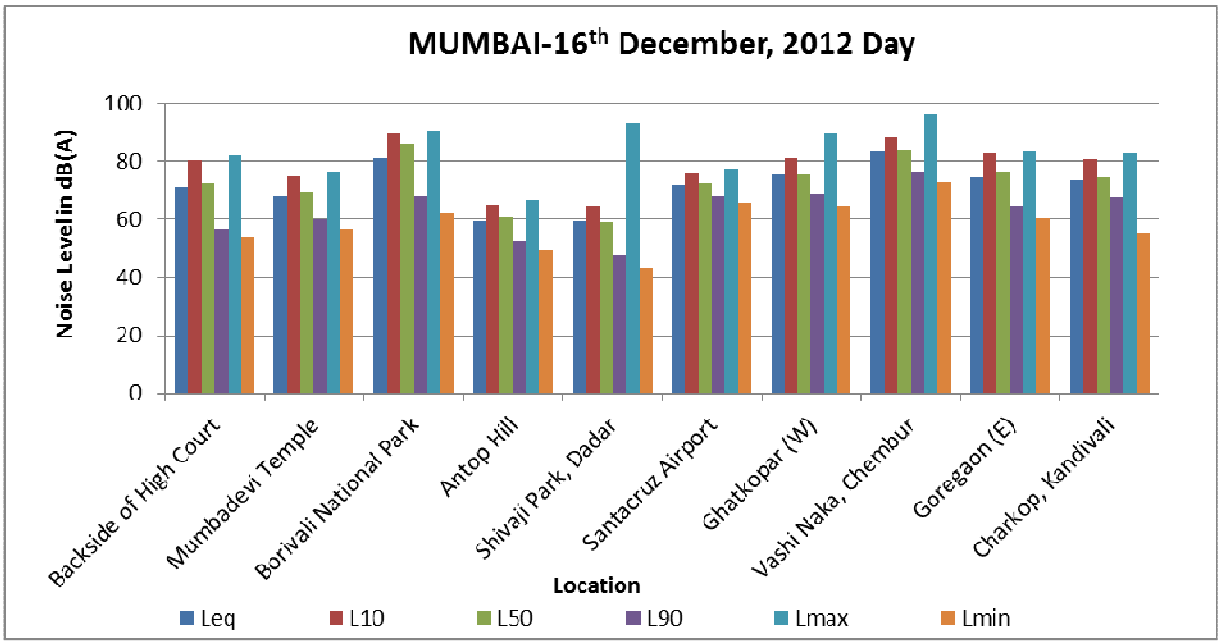

Fig 4.2.1(c): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in Mumbai on 16th December, 2012 at Day Time

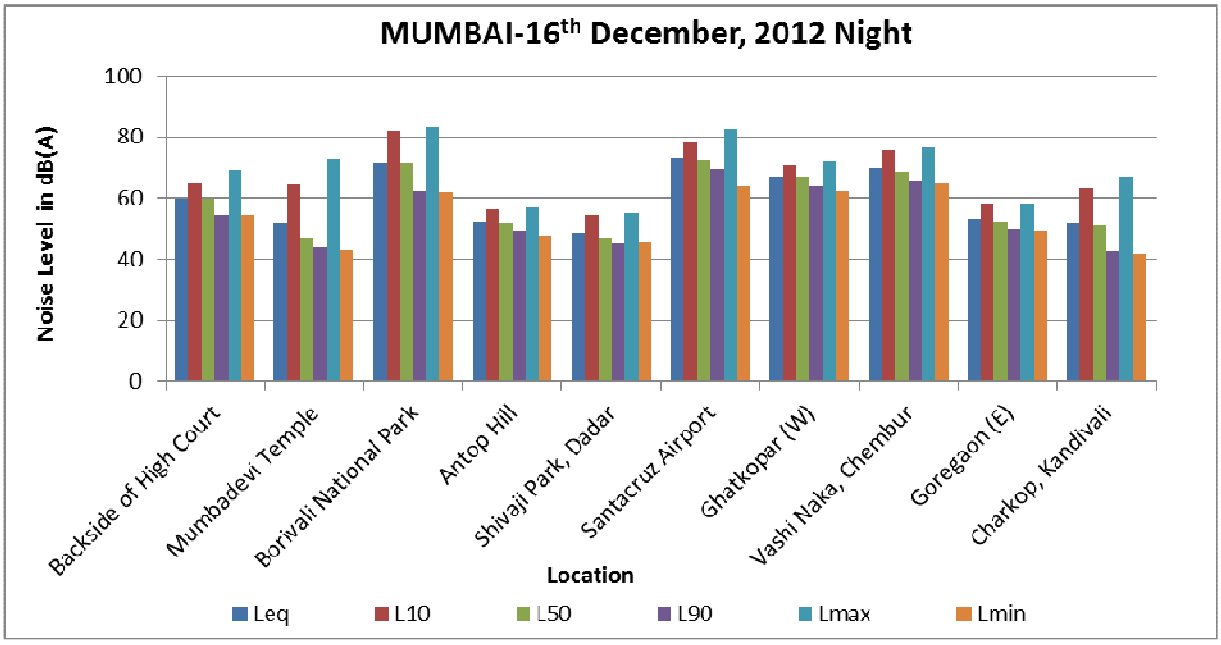

Fig 4.2.1(d): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in Mumbai on 16th December, 2012 at Night Time

Figure 4.2.1(c) shows that the ambient noise levels (L_{eq}) during day time of 16th December ranged between 67.6 dB(A) at Mumbadevi Temple to 80.5 dB(A) at Vashi Naka, Chembur during day time. However at night time Fig. 4.2.1(d), noise levels (L_{eq}) ranged between 54.0 dB(A) at Backside of High Court to 71.4 dB(A) at Vashi Naka, Chembur.

2) Pune:

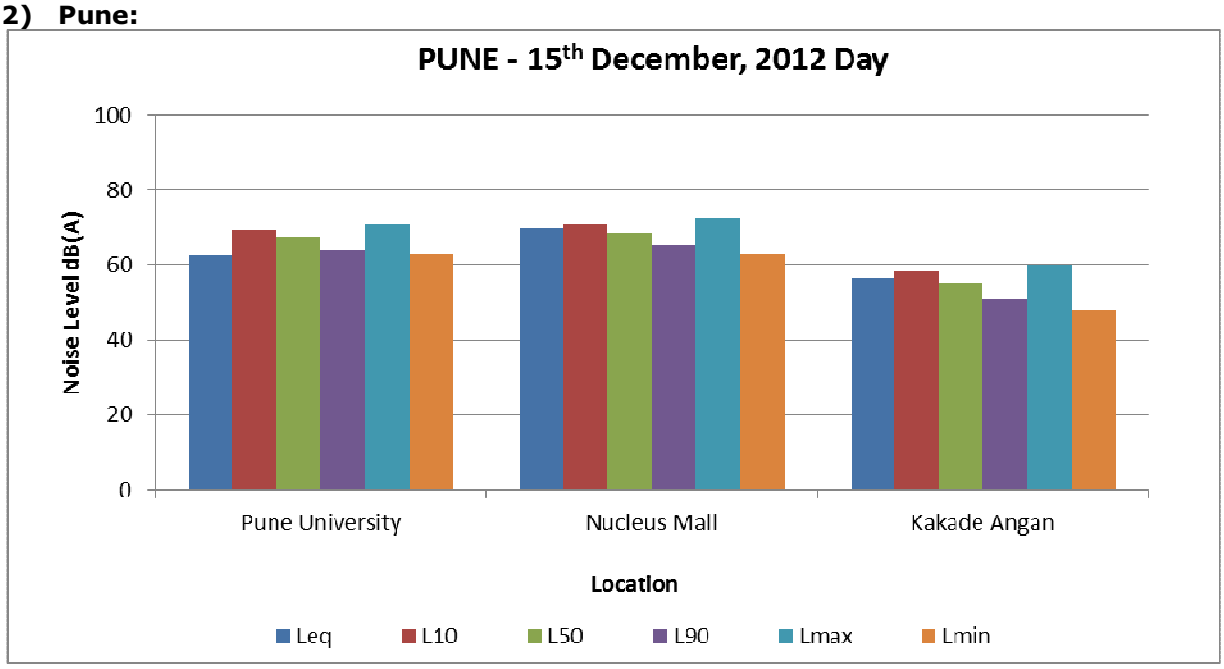

Fig 4.2.2(a): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in Pune on 15th December, 2012 at Day Time

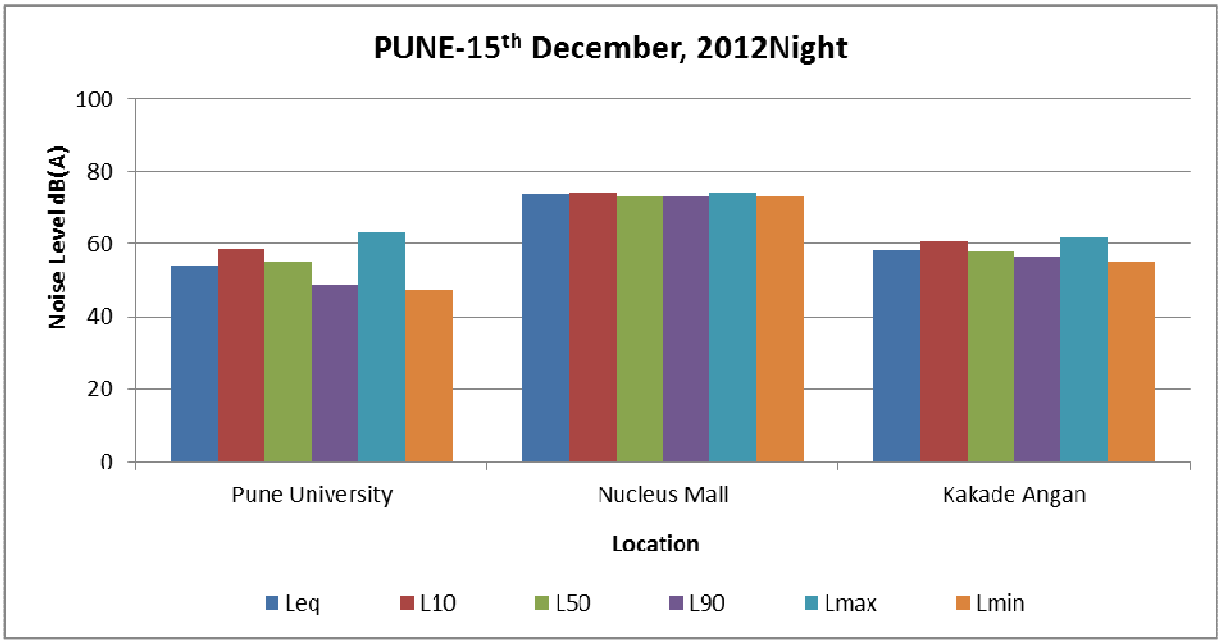

Fig 4.2.2(b): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in Pune on 15th December, 2012 at Night Time

Figure 4.2.2(a) shows that the ambient noise levels (L_{eq}) during day time of 15th December ranged between 71.9 dB(A) at Kakade Angan to 74.4 dB(A) at Nucleus mall during day time. However at night time, Fig 4.2.2(b), noise levels (L_{eq}) ranged between 65.0 dB(A) at Kakade Angan to 72.4 dB(A) at Pune University.

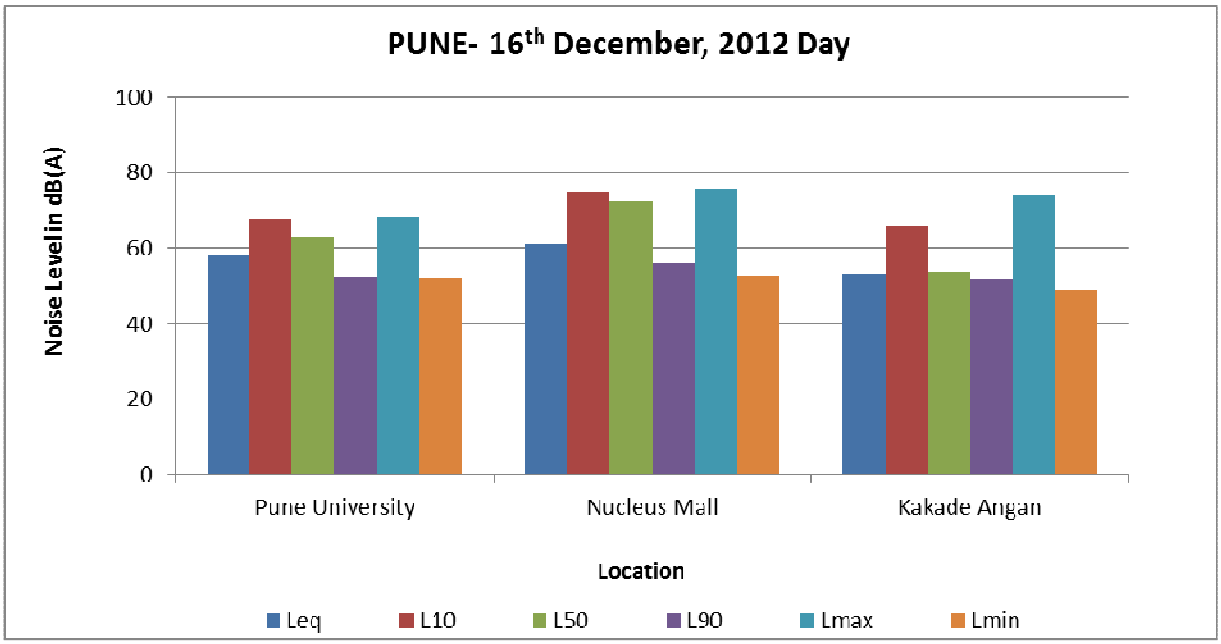

Fig 4.2.2(c): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in Pune on 16th December, 2012 at Day Time

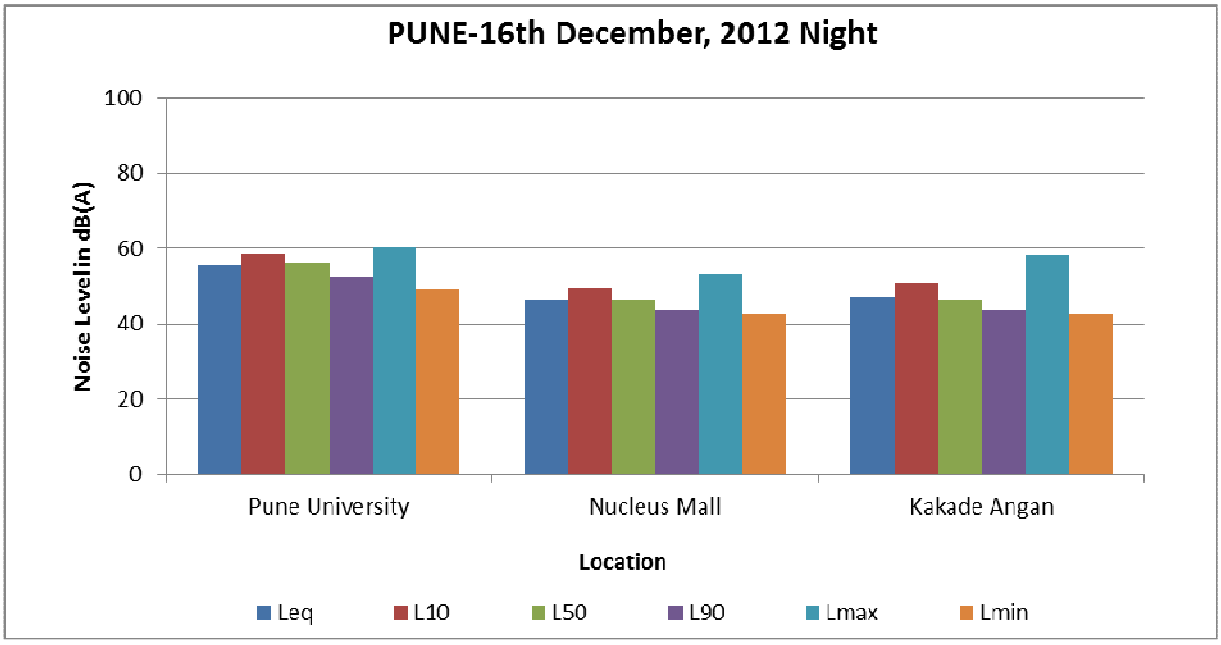

Fig 4.2.2(d): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in Pune on 16th December, 2012 at Night Time

Figure 4.2.2(c) shows that the ambient noise levels (L_{eq}) during day time of 19th December ranged between 71.7 dB(A) at kakade Angan to 74.8 dB(A) at Pune University during day time. However at night time Fig 4.2.2(d), noise levels (L_{eq}) ranged between 65.2 dB(A) at kakade Angan to 72.8 dB(A) at Pune University.

3) Nashik:

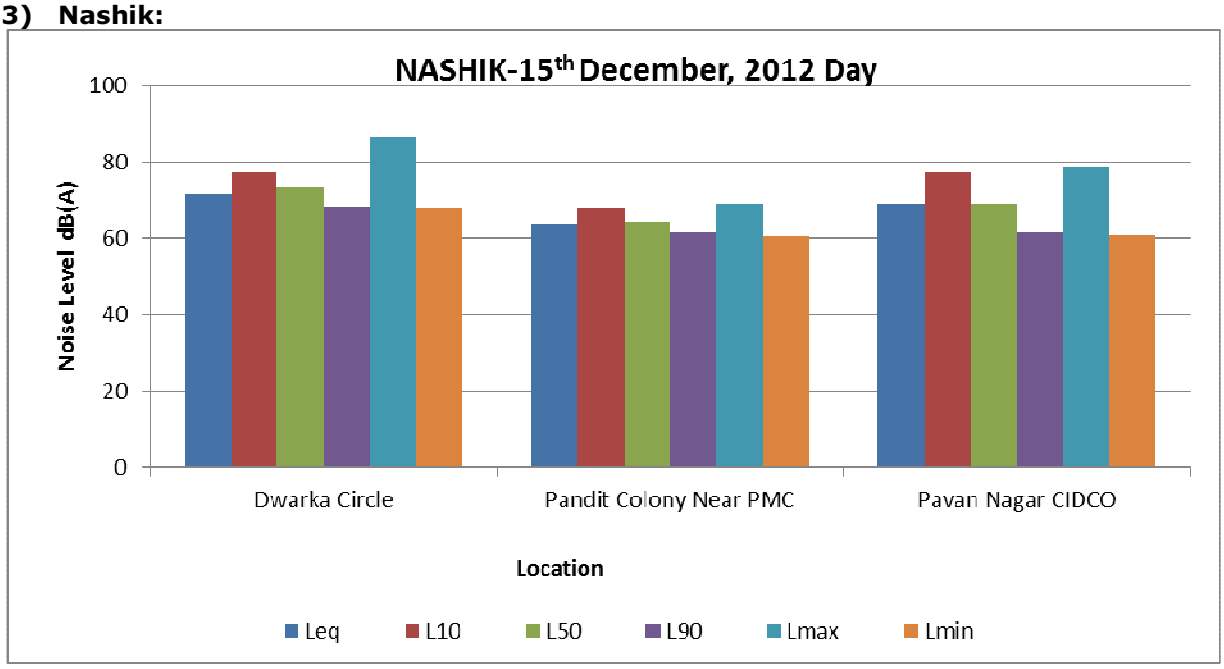

Fig 4.2.3(a): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in Nasik on 15th December, 2012 at Day Time

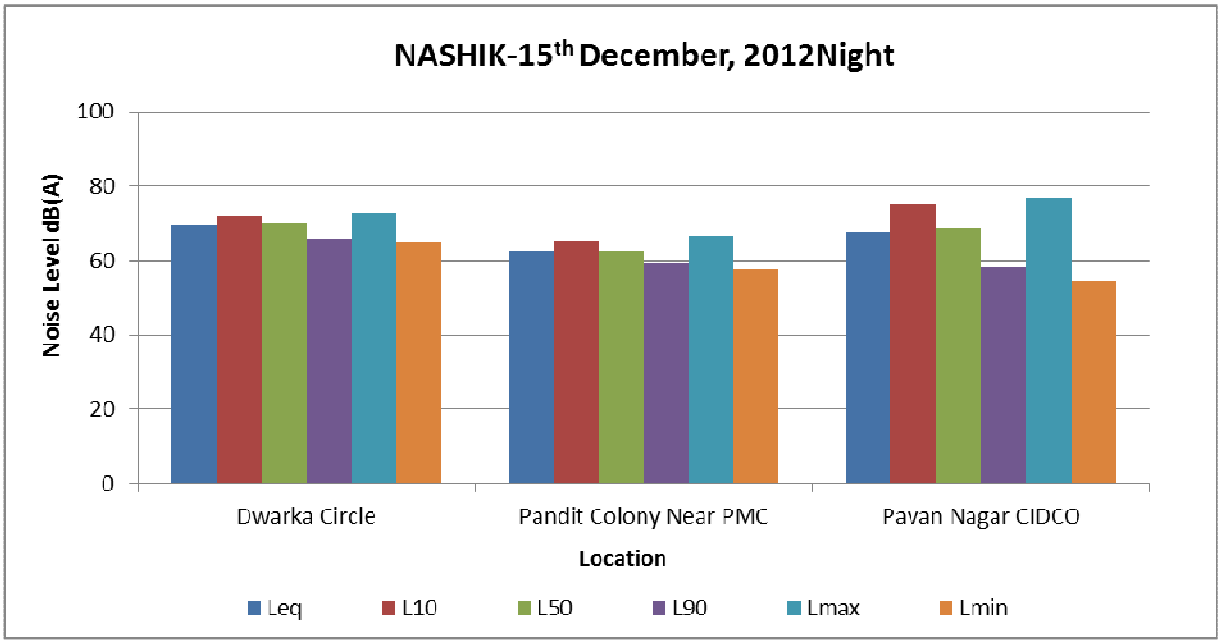

Fig 4.2.3(b): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in Nasik on 15th December, 2012 at Night Time

Figure 4.2.3(a) shows that the ambient noise levels (L_{eq}) during day time of 15th December ranged between 67.3 dB(A) at Pandit colony near PMC to 78.0 dB(A) at Dwarka circle during day time. However at night time and Fig 4.2.3(b), noise levels (L_{eq}) ranged between 66.7 dB(A) at Pandit colony to 72.1 dB(A) at Dwarka Circle.

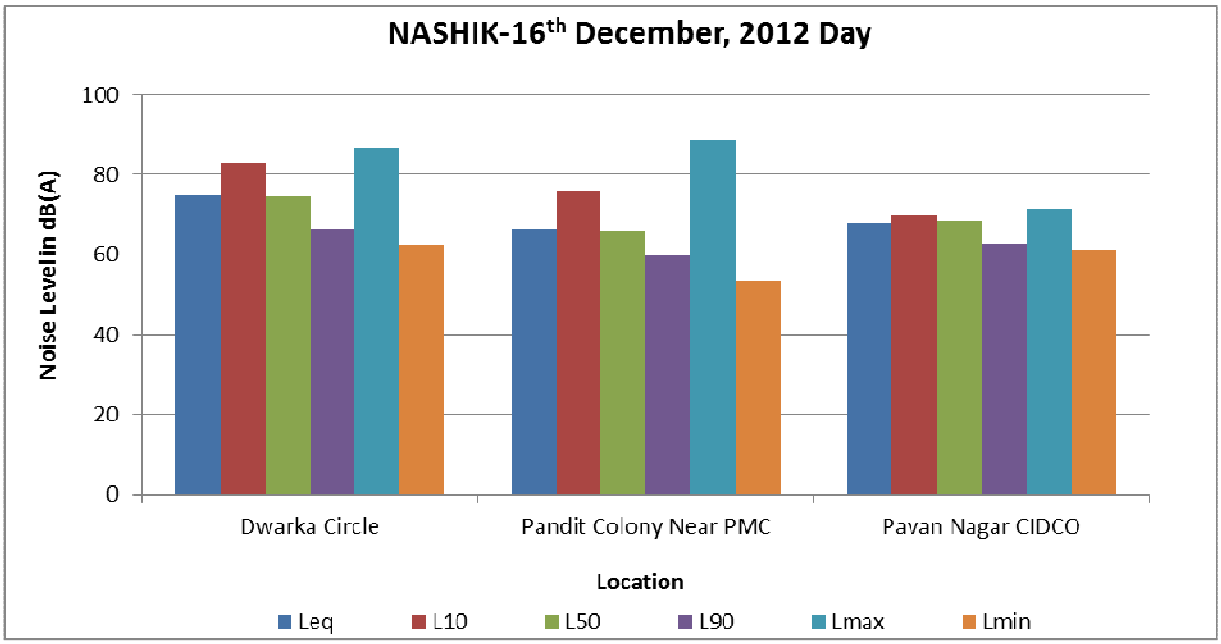

Fig 4.2.3(c): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in Nasik on 16th December, 2012 at Day Time

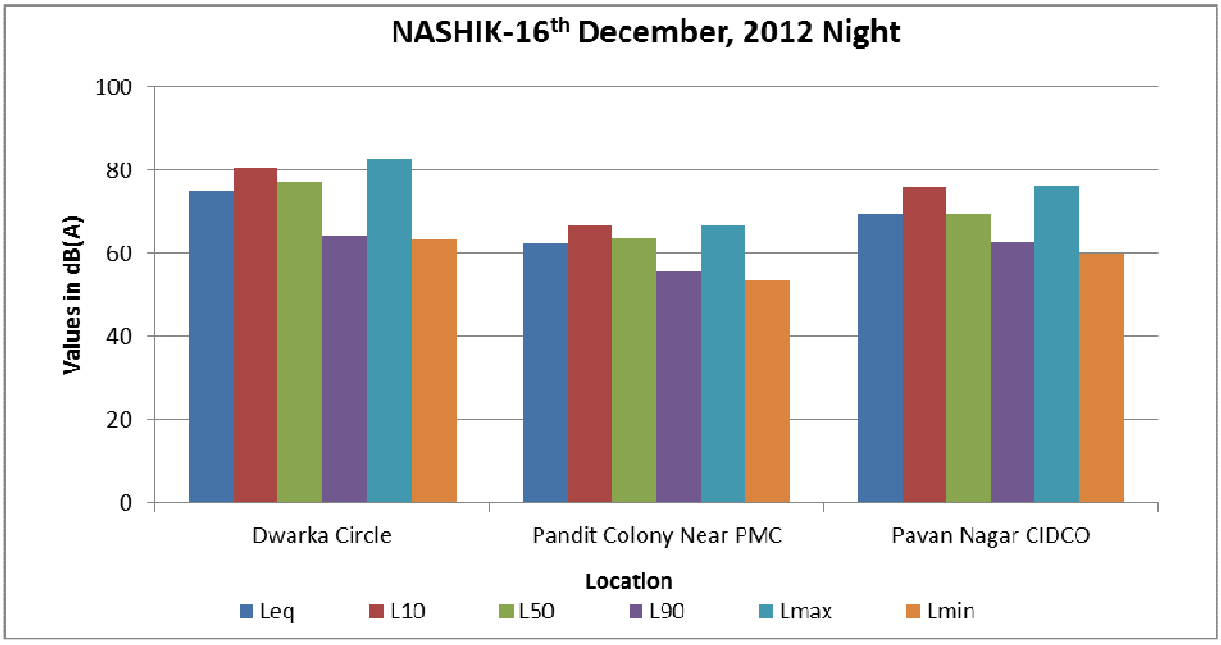

Fig 4.2.3(d): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in Nasik on 16th December, 2012 at Night Time

Figure 4.2.3(c) shows that the ambient noise levels (L_{eq}) during day time of 16th December ranged between 69.0 dB(A) at Pandit colony near PMC to 73.6 dB(A) at Dwarka circle during day time. However at night time, Fig 4.2.3(d), noise levels (L_{eq}) ranged between 65.7 dB(A) at Pandit colony near PMC to 69.8 dB(A) at Dwarka Circle.

4) Aurangabad:

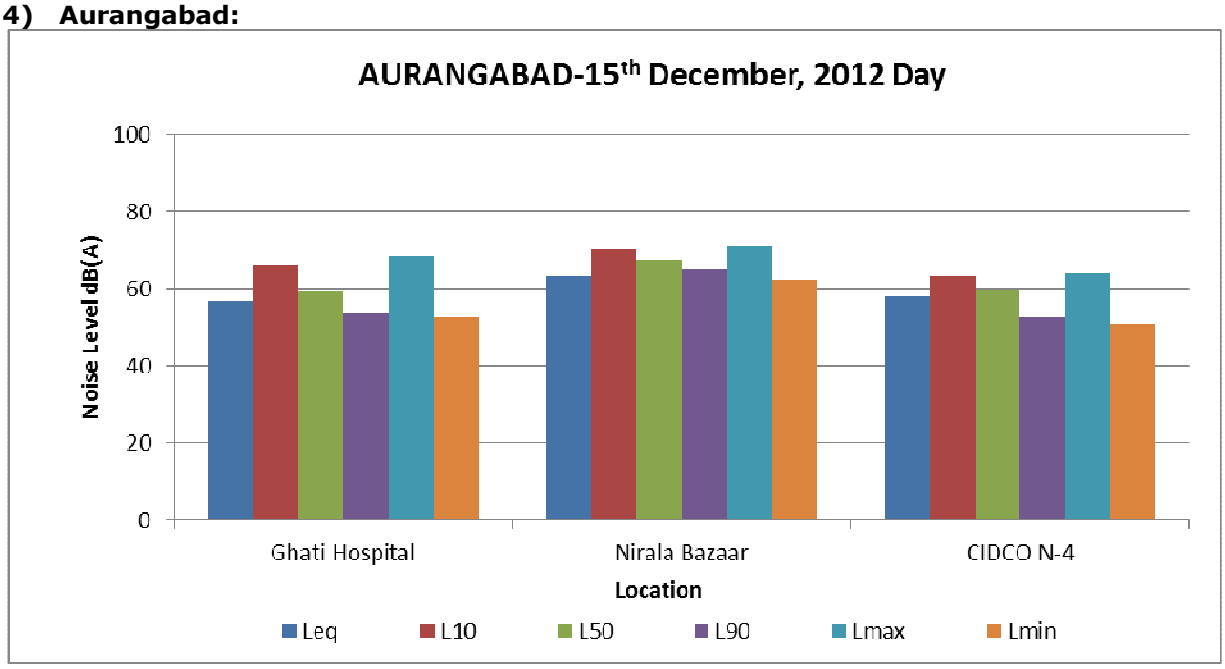

Fig 4.2.4(a): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in Aurangabad on 15th December, 2012 at Day Time

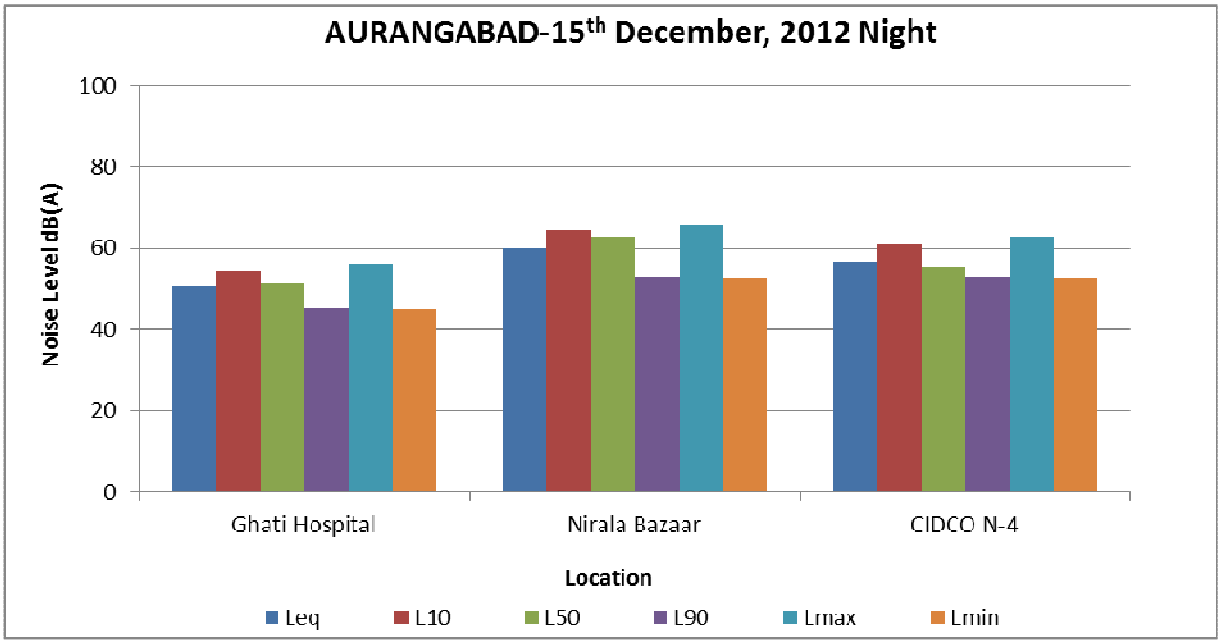

Fig 4.2.4(b): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in Aurangabad on 15th December, 2012 at Night Time

Figure 4.2.4(a) shows that the ambient noise levels (L_{eq}) during day time of 15th December ranged between 64.1 dB(A) at CIDCO N-4 to 68.4 dB(A) at Nirala Bazar during day time. However at night time, Fig 4.2.4(b) also, noise levels (L_{eq}) ranged between 51.8 dB(A) at Ghati Hospital to 61.7 dB(A) at Nirala Bazar.

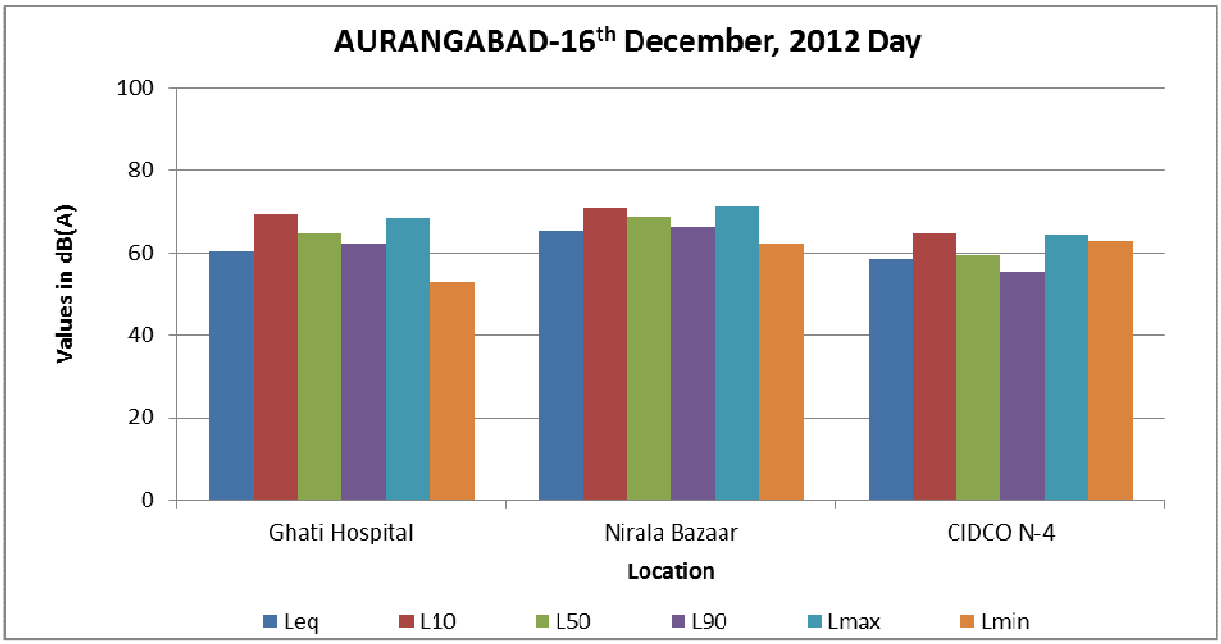

Fig 4.2.4(c): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in Aurangabad on 16th December, 2012 at Day Time

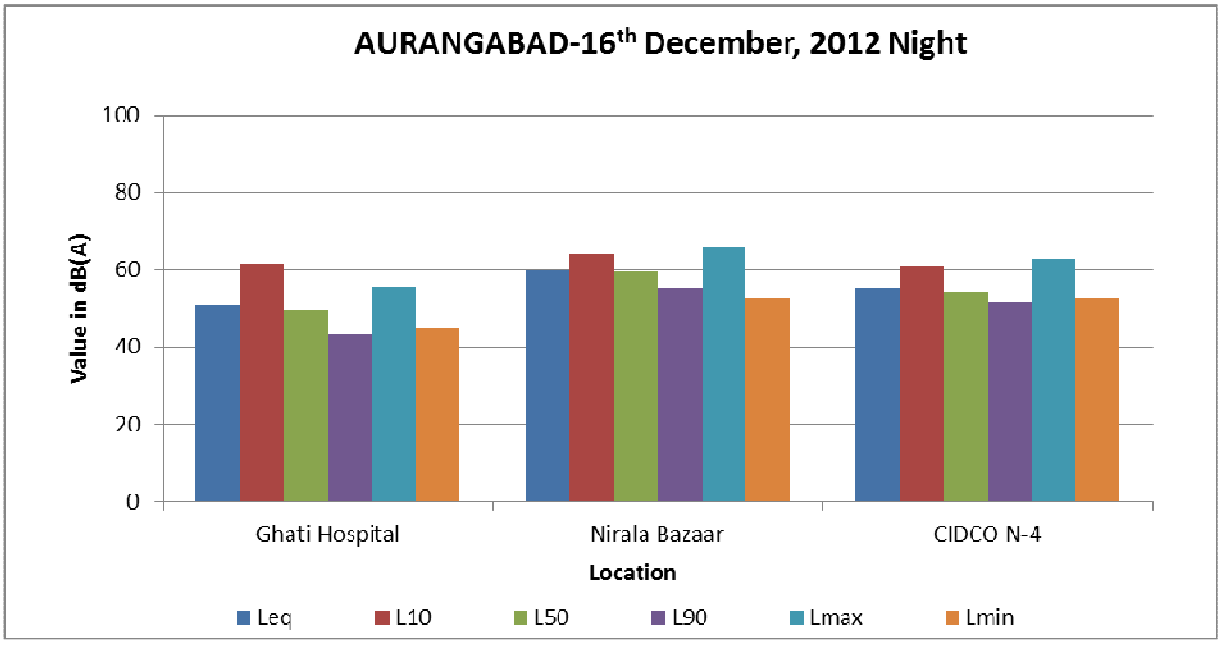

Fig 4.2.4(d): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in Aurangabad on 16th December, 2012 at Night

Figure 4.2.4(C) shows that the ambient noise levels (L_{eq}) during day time of 16th December ranged between 67.3 dB(A) at CIDCO N-4 to 71.1dB(A) at Nirala Bazar during day time. However at night time, Fig 4.2.4(d) also, noise levels (L_{eq}) ranged between 52.1 dB(A) at Ghati Hospital to 61.7dB(A) at Nirala Bazar.

5) Nagpur

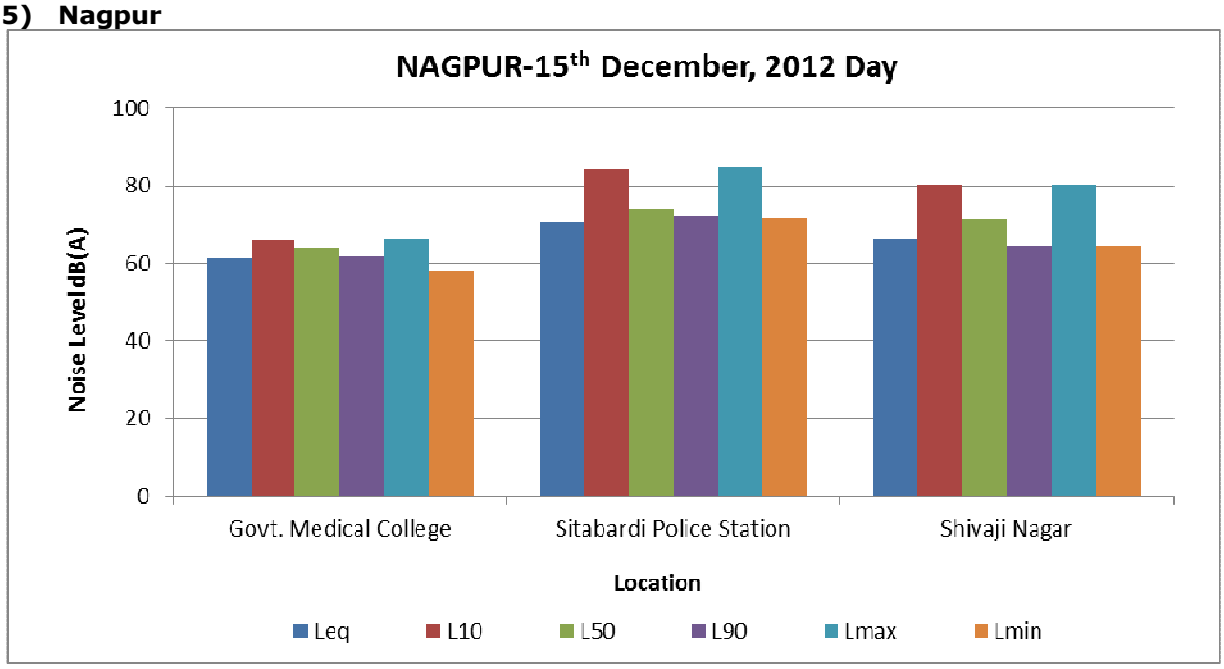

Fig 4.2.5(a): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in Nagpur on 15th December, 2012 at Day Time

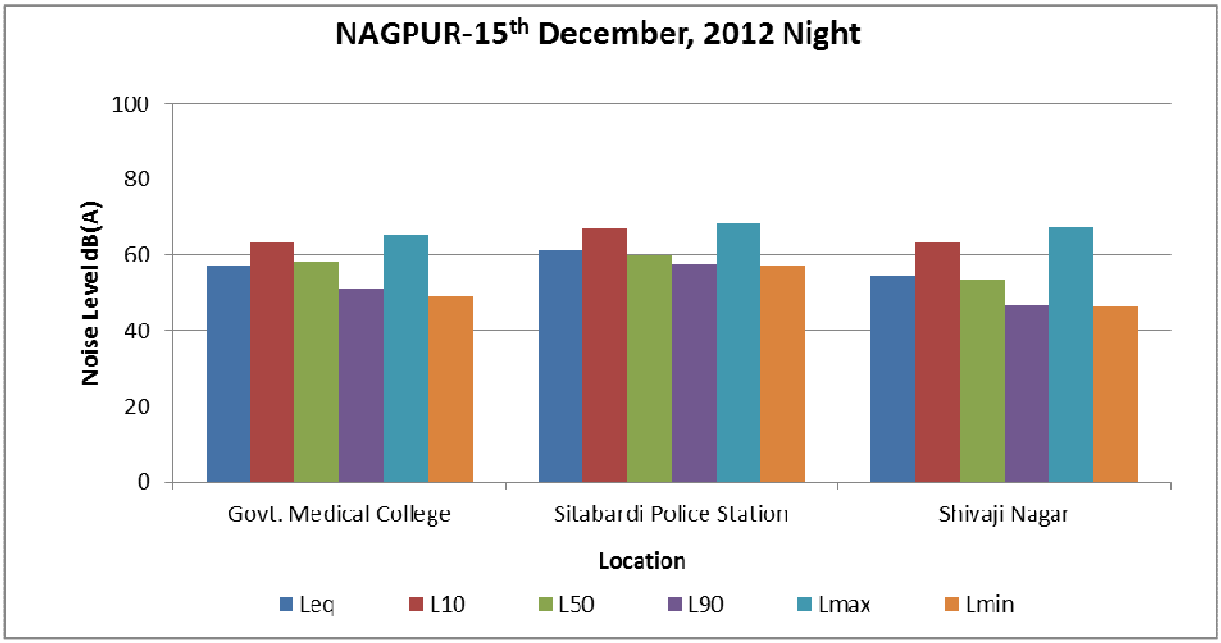

Fig 4.2.5(b): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in Nagpur on 15th December, 2012 at Night Time

Figure 4.2.5(a) shows that the ambient noise levels (L_{eq}) during day time of 15th December ranged between 65.7 dB(A) at Govt. medical college to 70.9 dB(A) at Sitabardi police Station during day time. However at night time, Fig 4.2.5(b), noise levels (L_{eq}) ranged between 49.7 dB(A) at Shivaji NagGovt. Medical College to 63.5 dB(A) at Sitabardi Police station.

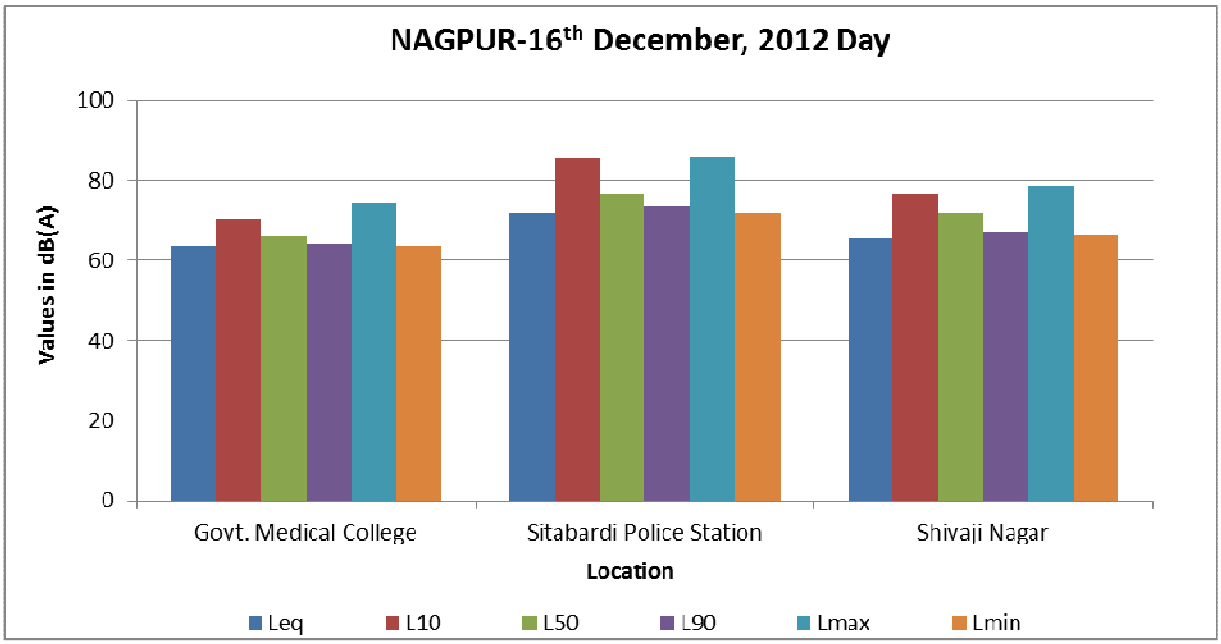

Fig 4.2.5(c): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in Nagpur on 16th December, 2012 at Day Time

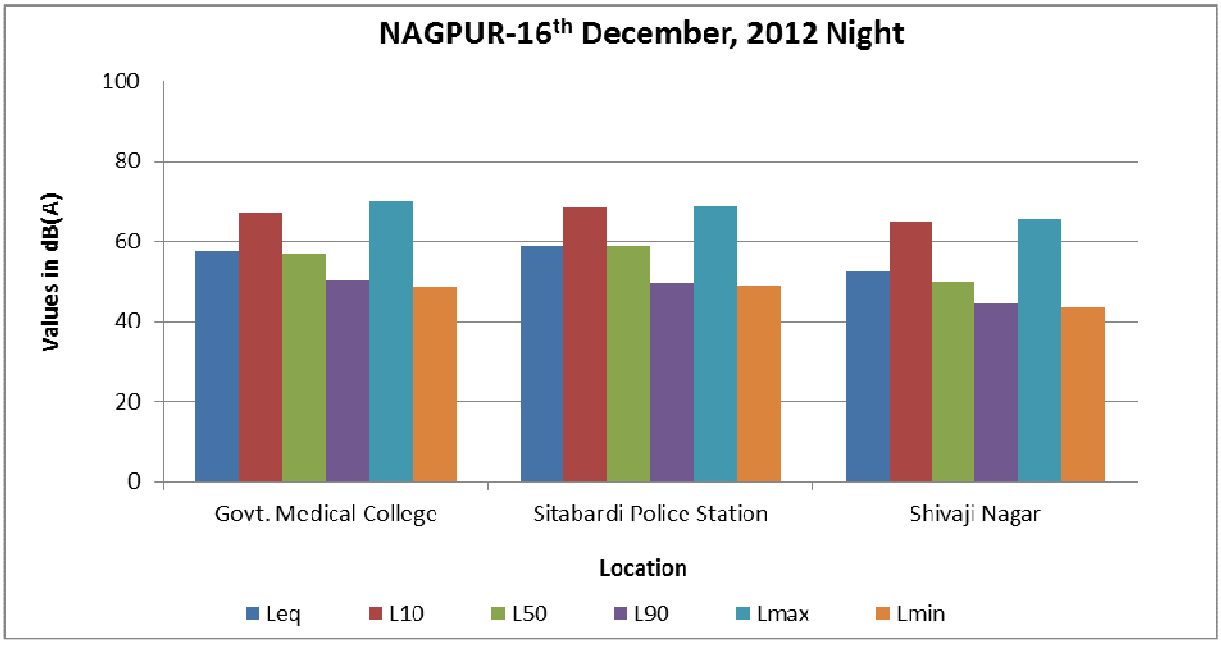

Fig 4.2.5(d): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in Nagpur on 16th December, 2012 at Night Time

Figure 4.2.5(c) shows that the ambient noise levels (Leq) during day time of 16th De cember ranged between 64.9 dB(A) at Shivaji Nagar to 72.8 dB(A) at Sitabardi Police Station during day time. However at night time (fig 4.2.5(d)), noise levels (Leq) ranged between 48.1 dB(A) at Govt. medical college to 65.8 dB(A) at Sitabardi.

6) Kolhapur

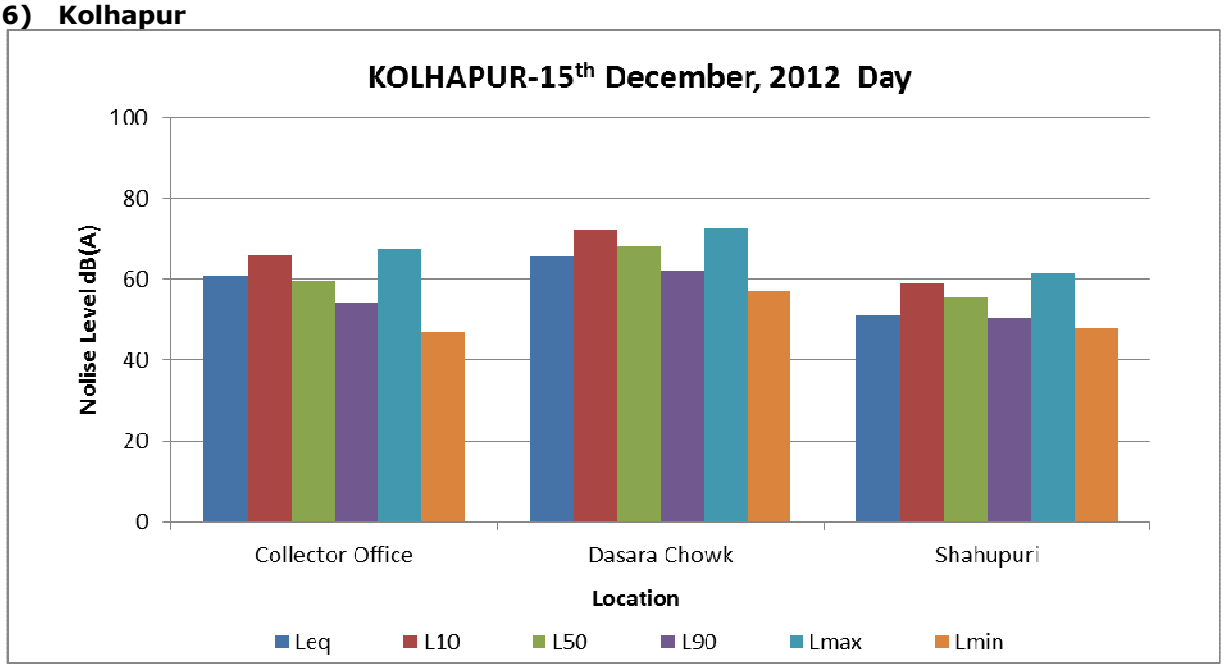

Fig 4.2.6(a): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in Kolhapur on 15th December, 2012 at Day Time

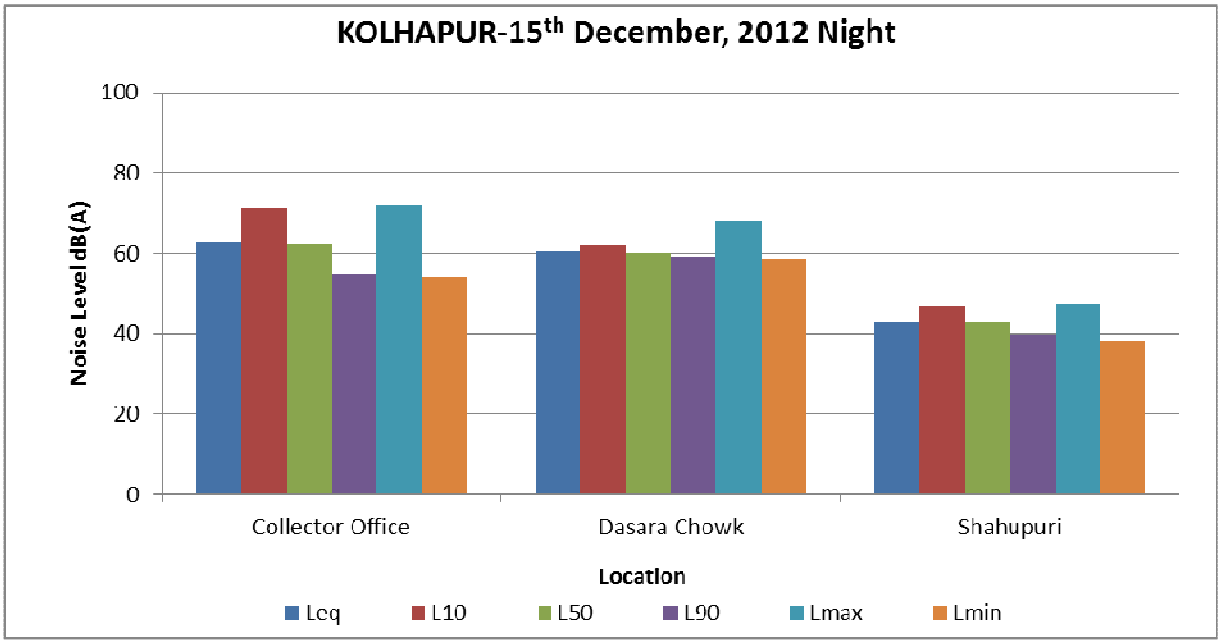

Fig 4.2.6(b): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in Kolhapur on 15th December, 2012 at Night

Figure 4.2.6(a) shows that the ambient noise levels (Leq) during day time of 15th December ranged between 55.6 dB(A) at Collec tor Office to 71.9 dB(A) at Shahupuri during day time. Also at night time (Fig 4.2.6(b)), noise levels (Leq) ranged between 48.4 dB(A) at Collector Office and 53.3dB(A) at Shahupuri.

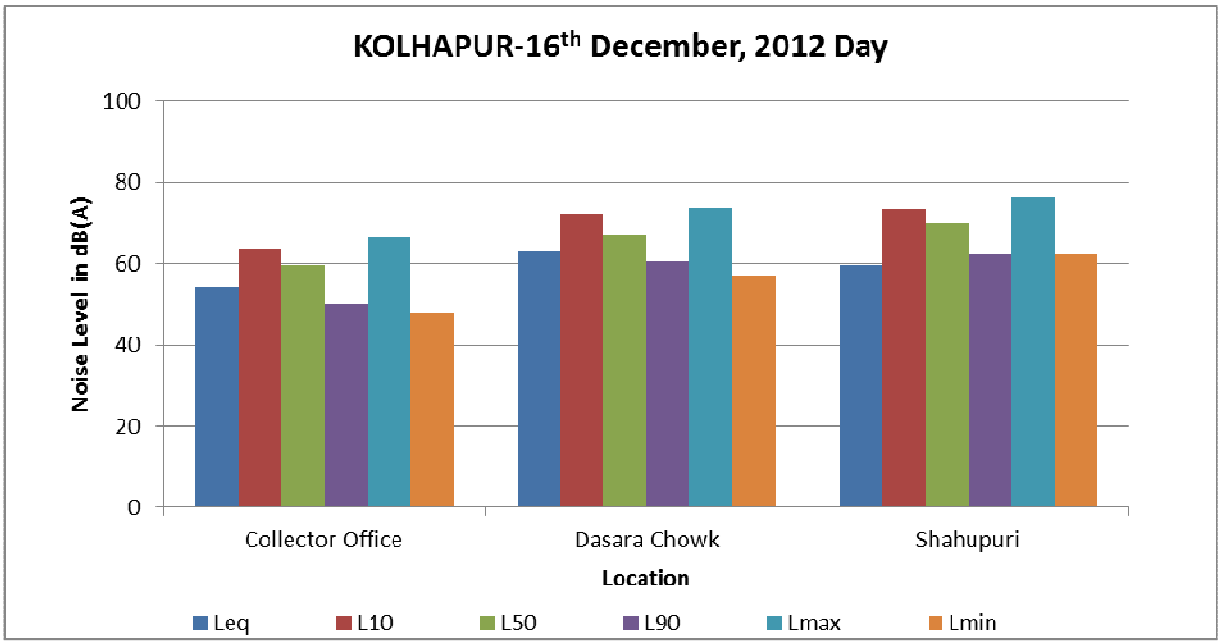

Fig 4.2.6(c): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in kolhapur on 16th December, 2012 at Day Time

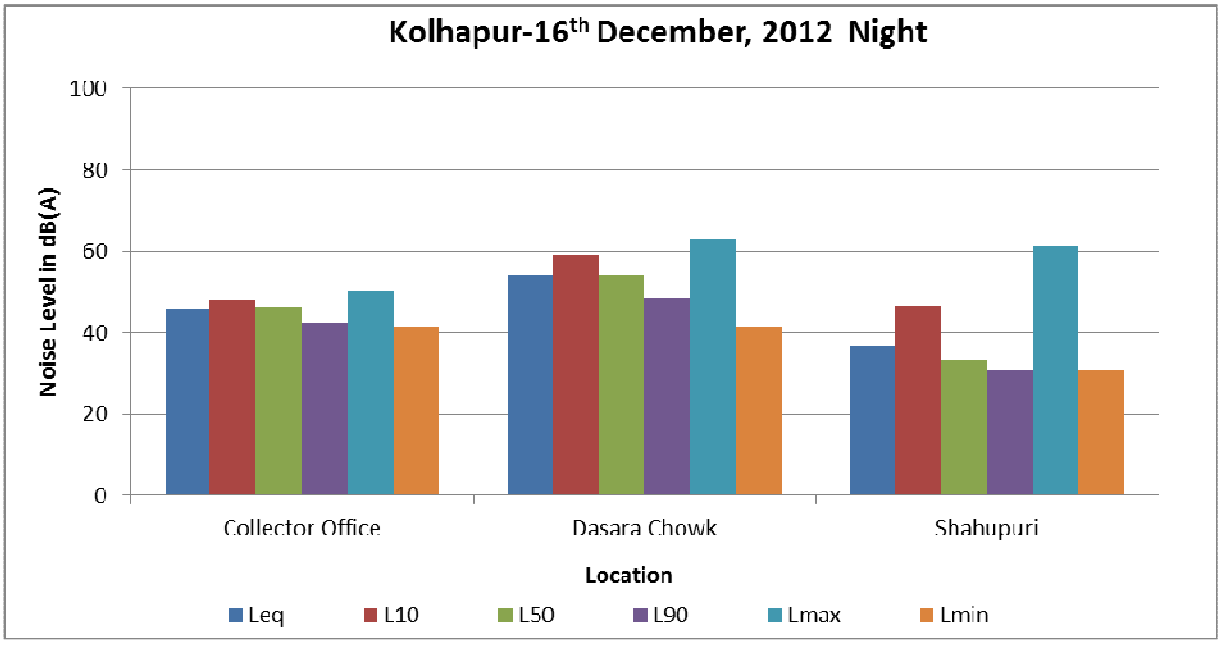

Fig 4.2.6(d): Graphical Representation of L_{eq},L_{10},L_{50},L_{90},L_{max} & L_{min} in Kolhapur on 16th December, 2012 at Night

Figure 4.2.6(c) shows that the ambient noise levels (Leq) during day time of 16th December ranged between 55.5 dB(A) at Collector Office to 71.0 dB(A) at Shahupuri during day time and at night time (fig 4.2.6(d)), noise levels (Leq) ranged between 49.2 dB(A) at collector office to 53.0 dB(A) at Shahupuri.

4.3 Day-Night Noise Levels according to area:

The day night equivalent (L_{dn}) noise levels were calculated and are compared with L_{max}, L_{min} and the maximum permissible limit of the area as shown in table 4.3(a) and 4.3(b)

Table 4.3(a): Noise Levels as on 15th December, 2012:

Area	Location	L_{dn} dB(A)	L_{max} dB(A)	L_{min} dB(A)	Maximum Permissible Limit in dB(A)
MUMBAI					
Silence	High Court	71.1	80.8	64.0	50
	Mumbadevi Temple	68.0	74.4	62.8	50
	Borivali National Park	71.1	80.1	55.0	50
Residential	An top Hill	71.1	81.1	64.5	55
	Shivaji Park, Dadar	66.1	77.9	57.3	55
Commercial	Santacruz Airport	73.6	81.5	64.5	65
	Vashi Naka	68.8	76.3	60.9	65
	Ghatkopar (W)	79.1	86.7	69.9	65
Industrial	Goregaon (E)	70.3	85.5	61.0	75
	Charkop, Kandivali	67.6	82.9	56.6	75
PUNE					
Silence	Pune University	74.2	78.1	71.2	50
Residential	Kakade Angan	70.9	75.1	69.0	55
Commercial	Nucleus Mall	74.1	78.9	70.8	65
NASHIK					
Residential	Pandit Colony	66.8	79.4	52.2	55
Residential	Pavan Nagar	72.8	91.4	61.1	55
Commercial	Dwarka Circle	77.9	89.9	72.2	65
AURANGABAD					
Silence	Ghati Hospital	64.8	72.3	60.7	50
Residential	CIDCO N-4	62.4	67.9	58.6	55
Commercial	Nirala Bazaar	67.4	73.2	63.2	65
NAGPUR					
Silence	Medical College	63.6	70.8	61.2	50
Residential	Shivaji Nagar	64.4	69.3	61.4	55
Commercial	Sitabardi	69.7	73.9	67.4	65
KOLHAPUR					
Silence	Dasara Chowk	60.8	68.7	50.8	50
Residential	Collec tor Office	54.4	65.8	45.2	55
Commercial	Shahupuri	67.7	79.8	52.9	65

Table 4.3(b): Noise Levels as on 16th December, 2012:

Area	Location	L_{dn} dB(A)	L_{max} dB(A)	L_{min} dB(A)	Maximum Permissible Limit in dB(A)
MUMBAI					
Silence	High Court	63.3	76.1	51.4	50
	Mumbadevi	64.0	71.0	55.6	50
	National Park	64.8	80.5	55.5	50
Residential	An top Hill	66.8	74.6	59.8	55
	Shivaji Park	65.4	72.4	58.2	55
Commercial	Airport	72.4	76.7	66.4	65
	Vashi Naka	68.1	78.0	51.3	65
	Ghatkopar	75.9	80.0	68.0	65
Industrial	Goregaon	65.6	76.4	50.2	75
	Charkop	65.1	74.2	55.3	75
PUNE					
Silence	University	73.8	76.7	71.4	50
Residential	Kakade Angan	68.5	74.8	65.8	55
Commercial	Nucleus Mall	73.5	76.8	69.5	65
NASHIK					
Residential	Pandit Colony	67.3	73.2	62.3	55
Residential	Pavan Nagar	68.4	75.3	62.5	55
Commercial	Dwarka Circle	71.7	75.9	67.0	65
AURANGABAD					
Silence	Ghati Hospital	59.7	65.4	53.0	50
Residential	CIDCO No.-4	61.8	65.2	56.4	55
Commercial	Nirala Bazaar	66.4	70.2	60.8	65
NAGPUR					
Silence	Medical College	56.6	60.8	51.9	50
Residential	Shivaji Nagar	60.8	70.1	59.5	55
Commercial	Sitabardi	69.3	74.6	71.3	65
KOLHAPUR					
Silence	Dasara Chowk	56.9	63.2	48.8	50
Residential	Collec tor Office	52.4	60.8	46.5	55
Commercial	Shahupuri	62.0	74.0	48.6	65

4.4 Comparative Study

It is observed from the results that, the noise levels mostly were exceeding the permissible limit during the both days on 15th (working day) & 16th (holiday) December, 2012 in all the six Metropolitan Cities of Maharashtra as shown in the table 4.4.1 given below:
The detailed comparison of Noise level results during last year result are as follows

Table 4.4.1: Noise Levels as on 12th December 2010, 18th December 2011 & 16th December, 2012 during Day Time

Area	Location	Sunday, 12th December, 2010 (Holiday) L_{eq} dB(A)	Sunday, 18th December, 2011 (Holiday) L_{eq} dB(A)	Sunday, 16th December, 2012 (Holiday) L_{eq} dB(A)	Maximum Permissible Limit in dB(A)
MUMBAI					
Silence	High Court	67.6	53.4	72.7	50
	Mumbadevi	68.3	71.7	67.6	50
	National Park	76.9	68.6	72.4	50
Residential	An top Hill	58.6	67.4	72.5	55
	Shivaji Park	59.6	63.9	73.7	55
Commercial	Airport	74.6	67.0	74.2	65
	Vashi Naka	81.0	70.6	71.0	65
	Ghatkopar	76.3	75.0	80.5	65
Industrial	Goregaon	75.2	59.5	75.2	75
	Charkop	68.1	68.8	68.0	75
PUNE					
Silence	University	62.7	54.2	74.8	50
Residential	Kakade Angan	70.0	63.3	71.7	55
Commercial	Nucleus Mall	56.4	53.8	74.4	65
NASHIK					
Residential	Pandit Colony	71.7	72.2	69.0	55
Residential	Pavan Nagar	63.8	67.6	69.3	55
Commercial	Dwarka Circle	69.1	71.8	73.6	65
AURANGABAD					
Silence	Ghati Hospital.	56.8	59.0	67.4	50
Residential	CIDCO N-4	63.5	62.5	67.3	55
Commercial	Nirala Bazaar	57.9	61.0	71.1	65
NAGPUR					
Silence	Medical College	61.5	61.4	65.1	50
Residential	Shivaji Nagar	70.8	73.8	64.9	55
Commercial	Sitabardi	66.4	65.7	72.8	65
KOLHAPUR					
Silence	Dasara Chowk	60.8	60.3	55.5	50
Residential	Collec tor Office	65.5	64.8	71.0	55
Commercial	Shahupuri	51.0	64.6	62.9	65

Table 4.4.2: Noise Levels as on 12th December 2010, 18th December 2011 & 16th December 2012 during Night Time

Area	Location	Sunday, 12th December, 2010 (Holiday) L_{eq} dB(A)	Sunday, 18th December, 2011 (Holiday) L_{eq} dB(A)	Sunday, 16th December, 2012 (Holiday) Leq dB(A)	Maximum Permissible Limit in dB(A)
MUMBAI					
Silence	High Court	59.9	47.2	54.0	40

Area	Location	Sunday, 12th December, 2010 (Holiday) L_{eq} dB(A)	Sunday, 18th December, 2011 (Holiday) L_{eq} dB(A)	Sunday, 16th December, 2012 (Holiday) Leq dB(A)	Maximum Permissible Limit in dB(A)
	Mumbadevi	51.8	71.6	60.3	40
	National Park	71.9	68.1	57.2	40
Residential	An top Hill	52.4	67.3	61.1	45
	Shivaji Park	48.5	55.4	57.1	45
Commercial	Airport	73.2	64.2	70.6	55
	Vashi Naka	69.8	67.6	65.2	55
	Ghatkopar	67.1	69.9	71.4	55
Industrial	Goregaon	53.0	40.1	55.9	70
	Charkop	52.0	63.9	62.1	70
PUNE					
Silence	University	54.0	46.3	72.8	40
Residential	Kakade Angan	73.8	57.8	65.2	45
Commercial	Nucleus Mall	58.3	47.1	72.5	55
NASHIK					
Residential	Pandit Colony	69.5	70.3	65.7	45
Residential	Pavan Nagar	62.3	66.2	67.6	45
Commercial	Dwarka Circle	67.6	69.0	69.8	55
AURANGABAD					
Silence	Ghati Hospital.	50.5	50.5	52.1	40
Residential	CIDCO N-4	60.2	60.9	56.4	45
Commercial	Nirala Bazaar	56.4	57.3	61.7	55
NAGPUR					
Silence	Medical College	57.1	54.0	48.1	40
Residential	Shivaji Nagar	61.3	63.6	56.7	45
Commercial	Sitabardi	54.6	52.1	65.8	55
KOLHAPUR					
Silence	Dasara Chowk	62.6	55.6	57.2	40
Residential	Collec tor Office	60.5	55.6	53.0	45
Commercial	Shahupuri	43.1	57.1	61.4	55

Table 4.4.3 Noise Levels as on 13th December 2010, 19th December 2011 & 15th December 2012 during Day Time

Area	Location	Monday, 13th December, 2010 (Working Day) L_{eq} dB(A)	Monday, 19th December, 2011 (Working Day) L_{eq} dB(A)	Monday, 15th December, 2012 (Working Day) L_{eq} dB(A)	Maximum Permissible Limit in dB(A)
MUMBAI					
Silence	High Court	71.1	69.0	74.8	50
	Mumbadevi	67.7	70.6	70.5	50
	National Park	81.3	65.2	72.5	50
Residential	An top Hill	59.4	65.7	73.3	55
	Shivaji Park	59.5	63.9	68.4	55
Commercial	Airport	72.2	71.1	74.8	65
	Vashi Naka	83.3	73.1	70.1	65
	Ghatkopar	75.4	74.1	81.0	65
Industrial	Goregaon	74.7	69.5	73.8	75
	Charkop	73.8	69.1	69.0	75
PUNE					
Silence	University	58.5	57.5	74.6	50
Residential	Kakade Angan	61.2	61.4	71.9	55
Commercial	Nucleus Mall	53.4	56.3	74.4	65
NASHIK					
Residential	Pandit Colony	74.7	72.3	67.3	55
Residential	Pavan Nagar	66.2	69.2	71.1	55
Commercial	Dwarka Circle	67.9	67.4	78.0	65
AURANGABAD					
Silence	Ghati Hospital.	60.5	63.0	67.3	50
Residential	CIDCO N-4	65.5	67.1	64.1	55
Commercial	Nirala Bazaar	58.4	63.3	68.4	65
NAGPUR					
Silence	Medical College	61.5	61.9	65.7	50
Residential	Shivaji Nagar	70.8	71.8	66.1	55
Commercial	Sitabardi	66.4	63.6	70.9	65
KOLHAPUR					
Silence	Dasara Chowk	60.8	63.1	63.9	50
Residential	Collec tor Office	65.5	69.0	55.6	55
Commercial	Shahupuri	51.0	69.7	71.9	65

Table 4.4.4: Noise Levels as on 13th December 2010, 19th December 2011 & 15th December 2012 during Night Time

Area	Location	Monday, 13th December, 2010 (Working Day) L_{eq} dB(A)	Monday, 19th December, 2011 (Working Day) L_{eq} dB(A)	Monday, 15th December, 2012 (Working Day) L_{eq} dB(A)	Maximum Permissible Limit in dB(A)
MUMBAI					
Silence	High Court	62.7	59.9	53.3	40
	Mumbadevi	62.9	51.8	56.2	40
	National Park	67.2	71.9	71.5	40
Residential	An top Hill	57.0	52.4	59.0	45
	Shivaji Park	52.3	48.5	53.2	45
Commercial	Airport	56.9	73.2	71.6	55
	Vashi Naka	65.3	69.8	65.5	55
	Ghatkopar	75.8	67.1	71.3	55
Industrial	Goregaon	67.9	53.0	52.1	70
	Charkop	68.7	52.0	58.7	70
PUNE					
Silence	University	71.5	55.9	72.4	40
Residential	Kakade Angan	70.0	46.6	65.0	45
Commercial	Nucleus Mall	73.6	47.2	71.7	55
NASHIK					
Residential	Pandit Colony	65.9	74.9	66.7	45
Residential	Pavan Nagar	62.4	62.4	68.0	45
Commercial	Dwarka Circle	65.1	69.4	72.1	55
AURANGABAD					
Silence	Ghati Hospital.	52.1	51.1	51.8	40
Residential	CIDCO N-4	48.9	59.7	54.1	45s
Commercial	Nirala Bazaar	59.0	55.0	61.7	55
NAGPUR					
Silence	Medical College	64.3	57.4	49.7	40
Residential	Shivaji Nagar	70.1	59.0	56.7	45
Commercial	Sitabardi	66.7	52.5	63.5	55
KOLHAPUR					
Silence	Dasara Chowk	50.3	62.6	51.0	40
Residential	Collec tor Office	49.3	60.5	48.4	45
Commercial	Shahupuri	52.7	43.1	53.3	55

Comparison study of last year's noise levels and this year's noise levels shows that there is decrease in noise levels at very less number of locations this year.
Study shows that noise levels decreased at day as well as at night time at only Mumbadevi location of Mumbai, Pandit Colony of Nashik, and Shivaji Nagar of Nagpur.

5. CONCLUSION

The study reveals that Noise levels at many locations exceeded the noise norms laid down for respective zones (Industrial, Commercial, Residential or Silence). Also, increasing trends in noise levels are observed at most of the locations this year as compared to last year. This indicates anthropogenic activities including traffic movement has increased in urban area which is contributing ambient noise levels. The ambient noise levels should be reduced or controlled with more awareness among public, especially in silence zone and other areas.

Table 5.1: Detailed list of Locations

S.No.	City	Location	Area
1.	Mumbai	High Court	Silence
		Mumbadevi temple	
		Borivali National Park	
		An top Hill	Residential
		Shivaji Park, Dadar	
		Santacruz Airport	Commercial
		Vashi Naka, Chembur	
		Ghatkopar (W)	
		Charkop, Kandivali (W)	Industrial
		Goregaon (E)	
2.	Pune	Pune University	Silence
		Nucleus Mall	Commercial
		Kakade Angan	Industrial
3.	Nashik	Dwarka Circle	Commercial
		Pandit Colony Near NMC	Residential
		Pavan Nagar CIDCO	
4.	Aurangabad	Ghati Hospital	Silence
		Nirala bazaar	Commercial
		CIDCO N-4	Residential
5.	Nagpur	Government Medical College	Silence
		Sitabardi Police Station	Commercial
		Shivaji Nagar	Residential
6.	Kolhapur	Collec tor Office	Residential
		Dasara Chowk	Silence
		Shahupuri	Commercial

6. DEFINITIONS

A-Weighting
"A-weighting" is the frequency weighting characteristic as specified in IEC 123 or IEC 179 and intended to approximate the relative sensitivity of the normal human ear to different frequencies (pitches) of sound.

A-weighted Sound Pressure Level
The "A-weighted sound pressure level" is the sound pressure level modified by application of the A-weighting. It is measured in dBA, A-weighted, and denoted as dBA.

Decibel
The "decibel" is a dimensionless measure of the sound level or sound pressure level; see sound pressure level.

Equivalent Sound Level
The "equivalent sound level" sometimes denoted L_{eq} is the value of the constant sound level which would result in exposure to the same total A–weighted energy as would the specified time–varying sound, if the constant sound level persisted over an equal time interval. It is measured in dBA.

Fast Response
"Fast response" is a dynamic characteristic setting of sound level meter meeting the applicable specifications.

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.

L_{10}
The level that were exceeded during 10% of the measuring time in dB (A)

L_{50}
The level that were exceeded during 50% of the measuring time in dB (A)

L_{90}
The level that were exceeded during 90% of the measuring time in dB (A).

Percentile Sound Level
The "X percentile sound level", designted Lx, is the sound level exceeded x percent of a specified time period, It is measured in dBA.

Sound
"Sound" is an oscillation in pressure, stress, particle displacement or particle velocity, in a medium with internal force (e.g. elastic viscous), or the superposition of such propagated oscillations, which may cause an auditory sensation.

Sound Level Meter
A "sound level meter" is n instrument which is sensitive to and calibrated for the measurement of sound.

Sound Pressure Level
The "Sound Pressure level" is twenty times the logarithm to the base 10 of the ratio of the effective pressure (P) of a sound to the reference pressure (Pr) of 20 μPa. Thus the sound pressure level in dB = 20 log10 P/Pr.