"STUDY OF NOISE LEVEL IN NAGDA CITY"

A DISSERTATION WORK
MAJOR PROJECT REPORT

Submitted in Partial fulfillment for the award of

POST GRADUATE DEGREE
OF
MASTER OF TECHNOLOGY
IN
(ENVIRONMENTAL SCIENCE AND ENGINEERING)

Submitted By
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CERTIFICATE

This is to certify that the dissertation entitled **"STUDY OF NOISE LEVEL IN NAGDA CITY"** being submitted by **DILEEP SOLANKI** (Enroll No-MUR2206440) in partial fulfillment of the requirement for the award of M.Tech. degree in **ENVIRONMENTAL SCIENCE AND ENGINEERING** from Mewar University, Gangarar, Chittorghar (RAJ) is a record of work done by him under my guidance.

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I hereby declare that the work entitled **"STUDY OF NOISE LEVEL IN NAGDA CITY"** is being submitted in partial fulfillment of the requirements for the award of the degree of **MASTER OF TECHNOLOGY** in **ENVIRONMENTAL SCIENCE AND ENGINEERING,** is an authentic record of my own work carried under the guidance of **Prof. ADESH KUMAR** department of **ENVIRONMENTAL SCIENCE AND ENGINEERING, MEWAR UNIVERSITY GANGRAR, CHITTORGHAR (RAJASHTAN)**

I also declare that' "A check for Plagiarism has been carried out for the thesis work and the report is being attached herewith.

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ABSTRACT

Noise pollution is recognized as a major problem for the quality of life in urban areas all over the world. Increasing industrialization, urbanization, and commercialization of urban areas contribute to rising noise pollution levels. Traffic is the main source of noise. Noise pollution is considered an environmental stressor, becoming a global issue, especially in developing countries like India. Noise as a pollutant produces a contaminated environment, which becomes a nuisance and affects a person's health, activities, and mental abilities. Today, one of the major environmental pollutants due to anthropogenic activities is noise pollution.

Nagda city, located in the Indian state of Madhya Pradesh, is known for its historical significance and rapid development. The city's population is approximately 1.40 lakhs, and it has experienced significant growth in industrialization, traffic, and urbanization, leading to increasing noise levels. The present study is concerned with assessing ambient noise levels in different zones of Nagda city in May and June 2023. Noise level measurements were conducted at 10 different locations across distinct zones (residential zone and silence zone) of Nagda. The recorded noise data were interpreted using parameters such as Leq, L10, L50, L90, and LNP.

The Leq values at different hours and locations were compared with the prescribed standards of the Central Pollution Control Board (CPCB). It was observed that in all the study areas, sound levels were significantly above the maximum permissible limits during peak hours. This study reveals that different areas of Nagda city are highly exposed to noise pollution, highlighting the need for suitable control measures to reduce noise levels.

Keywords: Noise Pollution, Sound Level Meter, Noise Parameter, Residential Zone, Silence Zone, Nagda City.

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INTRODUCTION

1.1 BACKGROUND

Sound is the vibration in the air that reach our ear. Where noise is unwanted or excessive sound. In developing country like INDIA experience several environmental problems. These environmental problems include air, water, and noise pollution. Out of three, noise pollution is one of a major concern for people residing in urban areas. The factor contributing high noise levels are increase in population and increase in the traffic volume. Traffic noise emerges as a new headache for people residing near highways.

1.2 IMPORTANCE OF STUDY

Nagda is an industrial town in Ujjain district of the Indian state of Madhya Pradesh. It lies in the administrative headquarters of the city of Ujjain, in the Malwa region of western Madhya Pradesh. It is situated on the bank of the Chambal River.

Presently, Nagda is a major industrial town with a manufacturing unit of Viscose Fibre, a Thermal Power Plant, and a Chemical Plant. Nagda is a major ISO granted Railway Junction on the Delhi–Mumbai railway line. The town is exactly 694 km from both Delhi and Mumbai.

Before Nagda was an industrial town, its location near the Chambal with ample land available, along with its location between two of India's biggest markets (Delhi and Mumbai) attracted Ghanshyam Das Birla to set up a major facility. Today Grasim's industrial unit at Nagda is the largest manufacturer of Viscose staple fibre in Asia and coloured fibre in the world.

1. The evaluate the environmental noise level in the different zone of Nagda city in term of:

(a**)** **L**eq (Equivalent nose level); represents steady noise level

(b) **L**$_{90}$ (Represent mostly prevalent sound level that encountered at 90% of total time).

(c) **L**$_{50}$ (Represent an average noise level that prevail for 50%of the total time.

(d) **L**$_{10}$ (Represent mostly peak noise level that last for 10% of total time)

(e) **L**NP (Noise pollution level)

2. To assess and rate noise exposure in different urban zone of the city.
3. To compare noise level with prescribed standard of CPCB aimed to evaluate the ambient noise quality status in and around the study area.
4. Suggesting the possible remedial measure for management of noise.
5. To compare noise level in different zone of Gwalior city with noise level of other similar cities.
6. To find impact of high noise level to human health including non-auditory effects.

1.3 OBJECTIVE

The main objectives of the present study have been presented as follows.

- To quantify the levels of noise pollution in Nagda city.
- To compare the result with WHO standards for noise specification.
- To draw the noise profile of different zone of Nagda city at various hours of the day.
  Between means of sound pressure level during morning, noon, evening.

CHAPTER-2

NOISE POLLUTION

Noise Pollution: Definition, Sources and Effects of Noise Pollution!

2.1Definition:

Sound, a normal feature of our life, is the means of communication and entertainment in most animals, including human beings. It is also a very effective alarm system. A low sound is pleasant whereas a loud sound is unpleasant and is commonly referred to as 'noise'. Noise can be defined as an unpleasant and unwanted sound. Whether a given sound is as pleasant as music or as unpleasant as noise depends on its loudness, duration, rhythm and the mood of the person. But loudness is definitely the most significant criterion which converts sound into noise. Exposure to loud noise is indeed annoying and harmful too.

Noise is a physical form of pollution and is not directly harmful to the life supporting systems namely air, soil and water. Its effects are more directly on the receiver i.e. man. Noise pollution is the result of modern industrialized urban life and congestion due to over population.

Even though noise pollution is not fatal to human life, yet its importance cannot be overlooked because repeated exposure to noise reduces the sleeping hours and productivity or efficiency of a human being. It affects the peace of mind and invades the privacy of a human being. The importance of noise pollution as environmental problem is being recognized as the ill effects of noise on human health and environment are becoming evident with each passing day.

2.2 Sources of Noise Pollution:

Major causes / sources of noise pollution are:

(I) **Industrial Sources**: Progress in technology (industrialization) has resulted in creating noise pollution. Textile mills, printing presses, engineering establishments and metal works etc. contribute heavily towards noise pollution. In industrial cities like Nagpur, Chandigarh, Ghaziabad etc., often the industrial zones are not separated from the residential zones of the city especially in the case of small scale industries.

These operate from workshops located on the ground floors of the residential areas and cause annoyance, discomfort and irritation to the residents exposed to the noise that is inevitably produced. The situation is much better in modern planned cities like Ludhiana where the industrial area is kept away from the residential areas and both are separated from each other by a sufficiently wide green belt.

(ii) Transport Vehicles:

Automobile revolution in urban centers has proved to be a big source of noise pollution. Increasing traffic has given rise to traffic jams in congested areas where the repeated hooting of horns by impatient drivers pierce the ears of all road users.

Noise from airplanes constitutes an increasing serious problem in big cities like Delhi & Mumbai. Airport situated in the vicinity of population centers and the air planes pass over residential areas. Heavy trucks, buses trains, jet-planes, motor-cycles, scooters, mopeds, jeeps—the list of vehicles is endless but the outcome is same — noise pollution.

(iii) Household:

The household is an industry in itself and is a source of many indoor noises such as the banging of doors, noise of playing children, crying of infants, moving of furniture, loud conversation of the inhabitants etc. Besides these are the entertainment equipment in the house, namely the radio, record-players and television sets. Domestic gadgets like the mixer-grinders, pressure cookers, desert coolers, air- conditioners, exhaust fans, vacuum cleaners, sewing and washing machines are all indoor sources of noise pollution.

(iv) Public Address System:

In India people need only the slightest of an excuse for using loud speakers. The reason may be a religious function, birth, death, marriage, elections, dem-onstration, or just commercial advertising. Public system, therefore, contributes in its own way towards noise pollution.

(v) Agricultural Machines:

Tractors, thrashers, harvesters, tube wells, powered tillers etc. have all made agriculture highly mechanical but at the same time highly noisy. Noise level 90 dB to 98 dB due to running of farm machines have been recorded in the state of Punjab.

(vi) Miscellaneous Sources:

The automobile repair shops, construction-works, blasting, bulldozing, stone Crushing etc. are other sources of noise pollution.

2.3 Effects of Noise:

Noise is generally harmful and a serious health hazard. It has far-reaching consequences and has many physical, physiological as well as psychological effects on human beings.

(i) Physical Effects:

The physical manifestation of noise pollution is the effect on hearing ability. Repeated exposure to noise may result in temporary or permanent shifting of the hearing threshold of a person depending upon the level and duration of exposure. The immediate and acute effect of noise pollution is impairment of hearing (i.e. total deafness.)

Human ears have sensory cells for hearing. If these cells are subjected to repeated sounds of high intensity before they have an opportunity to recover fully, they can become permanently damaged leading to impairment of hearing. Besides the sensory cells, the delicate tympanic membrane or the ear drum can also be permanently damaged by a sudden loud noise such as an explosion.

(ii) Physiological Effects:

The physiological manifestations of noise pollution are several as mentioned below:

(a) Headache by dilating blood vessels of the brain.

(b) Increase in the rate of heart-beat.

(c) Narrowing of arteries.

(d) Fluctuations in the arterial blood pressure by increasing the level of cholesterol in the blood.

(e) Decrease in heart output.

(f) Pain in the heart.

The psychological manifestations of noise pollution are:

(a) Depression and fatigue which considerably reduces the efficiency of a person.

(b) Insomnia as a result of lack of undisturbed and refreshing sleep

(c) Straining of senses and annoyance as a result of slow but persistent noise from motorcycles, alarm clocks, call bells, telephone rings etc.

(d) Affecting of psychomotor performance of a person by a sudden loud sound

(e) Emotional disturbance

For a talkative person, the most important effect of noise pollution would invariably be that noise interferes with our conservation. So, noise is annoying and the annoyance depends on many factors not merely the intensity of the sound but also repetition, because even a sound of small intensity (e.g. dripping tap or clicking of clock) may become annoying, simply by repetition.

Some of the well- known effects of noise on human beings and the relation of noise pollution level and its harmful effects are respectively.

2.4 Noise Pollution Level and its Harmful Effects:

Level (in dB)	Effects
up to 23 ……..	No disturbance
30—60 ……..psychological	Stress, tension, (illness, heart attract) effects especially at upper range.
60—90 ……..psychological and	Damage to health, vegetative (disturbance in stomach-gall function, pains in muscles, high blood pressure, disturbance in sleeping)
60—120 ……	Damages to health and ontological (ear diseases) ef-fects
Above 120 …….	Painful effects in long run.

CHAPTER - 3
LITERATURE REVIEW

3.1 INTRODUCTION

This part furnishes the spectator with a concise prologue to environmental noise and noise pollution. The reasons for activity noise are taken a gander at, and in addition the effect noise has on people.

3.2 ENVIORNMENTAL NOISE

Noise is characterized as unwanted sound. Encompassing noise or environmental noise is unwanted or unsafe open air sounds made by human exercises, including noise emitted through method for transport (e.g. street traffic, air traffic) and noise from locales of modern action.

Environmental noise pollution is a danger to the wellbeing and prosperity-of human- kind. It is

More serious and far reaching than at any other time, and it will keep on increasing in size and

Seriousness by virtue of present societal patterns to be specific populace development what's

More urbanization. Its seriousness will escalate, in connection with the increment in the

Utilization of dynamically all the more capable, changed, and exceedingly portable wellsprings of

Noise. Noise levels will likewise keep on ring with supported development in highway, rail, and

Air traffic, the major wellsprings of environmental noise.

Environmental noise population is not a totally new sensation, yet rather an issue that has

Become slowly with time. Despite the fact that environmental noise is

fundamentally an urban

Issue, the noise of machines that humankind demands building is progressively bringing noise

Population to the few staying wild asylums on the planet. Environmental noise population may

Not represent the danger of quick annihilation that atomic war does, yet one ought to manage as a

Top priority that the impacts are the same and almost as enduring.

1) There is an increment in the amount of vehicles.

2) Noise, dissimilar to air and water pollution, can't be outwardly decided and takes off no unmistakable record of its vicinity.

3) Noise is innately a specialized issue which the standard national has extraordinary trouble in understanding. While humankind does not comprehend the complex make-up of noise pollution, it is by the by evident that noise is a type of pollution that is requests therapeutic activity by government.

3.3 NOISE POLLUTION

The words that are continually heard in the media and scholastic rounds are "climate change and global warming". These words are connected with studies focused around carbon dioxide discharges and over the top high temperature. As per man made considering, for the most part,

People don't accept that the noise sways upon the earth. They accept that honestly normal air poisons have more compelling results for the planet rather than noise.

3.4 CAUSES OF TRAFFIC NOISE

Noise comes from many sources: one of significant source is from transportation. Noise comes from three sources (a) the friction between vehicle tyres and road (b) the engine and (exhaust).

The level of highway traffic noise depends on:

(a) Speed of the traffic

(b) Traffic volume

3.5 EFFECTS OF NOISE ON HUMAN BEINGS

Physical effects of noise

Noise of a high intensity volume will cause either temporary or permanent damage to our hearing. The sciences behind these injuries are well understood.

High volume of sound will give rise to noise-induced hearing deficits that can be experienced in various situations. Considering the significant variations in human ear sensitivity to noisy environment, it could cause hearing impairment, and this hazardous nature of noisy

Environment is termed as “damage risk”. The risk is considered negligible when the equivalent sound level is less than 75dB for an exposure period of 8 hours.

Physiological Effects

Noise may cause temporary stress reactions (increasing the heart rate and blood pressure), and produce negative effects on our coordination system and respiratory systems. Noise can cause persistent increase in blood pressure after a long term exposure to noise. A few studies were made on general population comparing the physiological behavior of those living in noisy street to those living in Quiet Street. The result show that an increase in blood pressure in those people living in noisy street.

3.6 OTHER LITERATURES COVERED

- Lucknow,INDIA : 2006

The name of this study is Profile of noise pollution in Lucknow city and its impact on environment.

This research was done by G.C. Kisku, Kailash Sharma, M.M. Kidwai, S. C. Barman, A.H. Khan, Ramesh Singh, Divya Mishra and S.K. Bhargava to make a noise modelling study of Lucknow during day and night time .This research is based on relating the traffic flow to the noise produced by different vehicles.

- Verginia : 2007

Highway Noise Reduction Experiment, was done by Virginia Transportation Research Council

(VTRC), in conjunction with The Virginia Transportation Tech Institute. The specific objective were to quantify the reduction in noise emanating from the state's interstate highways attribute to various types of evergreen trees commonly found in Virginia, and to measure the reduction in road noise achievable from the use of quiet pavement. There was a minimal noise reduction that could be attributed to the coniferous trees. The quiet pavement section tested had a noise level higher than that of intermediate pavement, but less than that of standard asphalt pavement and concrete pavement.

- STUDY OF NOISE POLLUTION DURING HAJJ SEASON 1427 H

This study was done by Abdulaziz Al-Zahrani ,Hazim Al-Hazimi ,Rami Menkabo ,Meshal Al-Malki ,Muhammed Al-Mutairi ,Mutaz Qutob at Sha'aban 1428 H August 2007 D. Main objective of this research was to evaluate the noise level in holy cities Mina valley and Arafat area during hajj season in 1427 H. The measured sound pressure level at different places were compared with world health organization standard.

- Lisbon Airport: 2012

This research was done by Pablo Gauna Medrano, to generate noise contour from measured data at Lisborn airport. The noise contours were calculated from flight reports and data from the Aircraft manufacturers. The measures were taken on typical hour basis, depends on type of aircraft and part of the day. The calculus of the noise contours was based on the noise levels

produced by each plane in each point of a grid so as to sum all the values and interpolate the contours.

- Springfield, Illinois: 2011

This research was done by Illinois Department of Transportation Division of Highways Bureau of Design and Environment to prepare a Highway Traffic Noise Assessment manual. This manual describes the technique and procedure to analyze and report the impacts of traffic noise, describes to provide noise barriers and abatements in order to mitigate noise, and describes the feasibility of noise barriers.

Chapter-4

METHODOLOGY

Modern life has given noise pollution and major cities of India have a very high level of noise pollution. Nagda is biggest city of Madhya Pradesh where urbanization and industrialization causes heavy noise pollution. This study was divided in main division in of literature, observation, analysis of data and suggested remedial measures for management of noise. Out of which collection of data and analysis from the major part of research. It is necessary to measure noise parameter for evolution of ambient noise quality of city.

4.1 STUDY AREA

The Nagda city is located is between latitude 23.4561^0 N and longitude 75.4227^0 E in central part of India The city is spread over 796.81 sqkm area and inhabited by the population of 1.40 lakh. Nagda is contributing in country defense by having gun carriage factory, ordinance factory Gulbrandson , Chemical factory foundry, 506 army workshop and central ordnance depot. Nagda is zonal headquarter of WCR and also a national highway NH-44 pass through Nagda. Nagda situated on bank of river Chambal. The habitation in Nagda is highly diversified. Beside the general requirement of calamity in some of the areas are highly noisy whereas some areas are reasonably calm. To study the intensity of noise pollution in commercial, residential and silence zone of Nagda city

monitoring of noise level will be conducted as per guideline of the central pollution control board (CPCB) India Total 10 location identified prior to monitoring that are listed below.

Table 4.1 : - list of location which have to survey

Zone	Location Taken
Residential	**1.**Birla Gram
	2. Durgapura
	3. Chemical Colony
	4. Goll Market
	5. Atal Garden
Silence	**1.**Janseva Hospital
	2. Grasim School Campus
	3.Court Area
	4. Takravda
	5.SFD Colony

4.2 Instrumentation

INTRODUCTION-

The SLM100 Sound Level Meter has been designed for ease in field operation. All features considered essential for field surveys have been included. The SLM100 is a "Type 2" Integrating Sound Level Meter designed to meet the requirements of IS 15575 (Part1) 2005. The instrument has a frequency weighting of "A" type and allows the user to select Slow or Fast mode of measurement. A built-in Data Logger can record all the important Sound Level parameters in Non-Volatile Flash memory for 24 hours making detailed field data collection very simple. Each record consists of the LEQ, MIN and MAX Sound Pressure Level and Sound Exposure Level (SEL) observed during the recording interval.

Special Features:

- Simple to operate instrument gives readings of Sound Pressure Level (SPL), LEQ and SEL on a digital display
- Frequency Weighting "A type" and Time Weighting for SLOW and FAST mode provided as per requirements of BIS 15575 (Part1) 2005
- Data recording facility with multiple file storage
- Sufficient memory to record 24 hour data at 1 minute intervals – capable for remote monitoring
- Data transfer to PC via RS 232 port for detailed Analysis and report preparation
- Windows based software to analyze data and prepare reports
- 16 Character by 2 line digital display allows the instrument to give suitable prompts

uilt-in Real Time Clock maintains a Date and Time stamp in the recorded

- **Accuracy / Class:** Type II designed for field use Conforming to BIS 15575 (Part1) 2005
- **Measurement range:**34 to 134 dBA in three 50 dB overlapping ranges
- **Error indication:** Over Range, Under Range and Low Battery
- **Frequency Weighting:**"A" type as per IS 15575 (Part1) 2005
- **Time Weighting:** SLOW and FAST as per IS 15575 (Part1) 2005
- **Measurements:** Sound Pressure Level (SPL), MIN SPL, MAX SPL, LEQ, Sound Exposure Level (SEL) and run time continuously available on the display by selecting appropriate display screen
- **Display:**LCD 16 Character, 2 Line Display with 0.1 DB resolution

Operation Modes:

Continuous and Recording

In Continuous Mode SLM100 displays the current SPL level, LEQ, SEL etc. for the duration of current session of operation.

In Recording Mode, current values of above parameters are displayed on the screen and LEQ, MIN SPL, MAX SPL, and SEL values integrated over a minute are recorded in the built-in data logger. The SLM100 allows the user to record multiple files making it possible to make a detailed survey at several locations before downloading data to a PC for Analysis

- **Memory Capacity:** In built data logger can store more than 24 hours data (at 1 minute intervals) in non-volatile Flash Memory
- **Data Download:** In-built RS232 Serial Port for direct interface to a PC
- **Software:** Windows compatible Software that allows data download to a PC and makes the data available in an Excel Spreadsheet for analysis and report preparation
- **Battery:** A re-chargeable NiMH battery pack allows operation for 10 hours or more. A built-in battery status facility allows the user to check useable battery hours and automatically prompts the user when the battery is running low. To prevent battery damage the instrument will automatically shut-down when the battery voltage drops to a pre-set level

4.2 Noise Measurements

Sound level will be measured by following standard procedure prescribed by The SLM100 Sound Level Meter measured from 34-134 dB between 8AM to 9PM during working day. Standard noise level for different location during day and night time is followed according to CPCB guideline. Our monitoring period comprise of 12 hr. of day time (i.e.8am to 9am,9am to 10am, 10am to 11am, 11am to 12pm, 12pm to 01pm, 01pm to 2pm, 2pm to 3pm, 3pm to 4pm, 4pm to 5pm, 5pm to 6pm,6pm to7pm,7pm to 8pm, 8pm to 9pm). Ambient sound levels are being compared with prescribed standards of CPCB (Central Pollution Control Board) India. The national ambient air quality standard in respect of noise as specified under the noise pollution (regulation and control) rule 2000 is referred for present study various noise descriptors such as Leq , L_{10}, L_{50}, L_{90} , L_{NP} has been evaluated to reveal the extent of noise pollution.

Leq-it is energy mean of the noise level over a specified period.

L_{10}- indicates respectively the level exceeded for 10% of time in a recorded noise level for a given interval.

L_{50}- indicates respectively the level exceeded for 50% of time in a recorded noise level for a given interval.

L_{90}- indicates respectively the level exceeded for 90% of time in a recorded noise level for a given interval.

LNP- Noise pollution level LNP =Leq + (L_{10}-L_{90})

4.3 Observation and Calculation

The study is conducted over 10 important stations which are located in different zone (Residential zone and silence zone) of Nagda city.

Photos

TABLE NO. 4.2
NOISE LEVEL dB OBSERVED AT BIRLA GRAM 8-9AM

Minute	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	
10sec	61.8	60.8	58.2	56.9	59.4	60.2	59.6	65.4	58.4	58.2	
20sec	57.8	65.6	64.3	64.3	63.2	60.4	63.8	60	58.4	61.2	
30sec	63	60	62.6	63.1	61.1	59	63.8	57	58.4	61.6	
40sec	56.4	62.5	62.8	61.2	61.5	66	63	60	58.9	62.8	
50sec	62.8	71.4	58.4	65.4	59.6	65.5	60.8	58	58	67.7	
60sec	57.3	61.2	61.7	58.5	62.3	60.9	63.7	61	60.7	63.2	
Leq dB	59.8	63.5	61.3	61.5	61.1	61.8	62.4	60.3	58.8	62.4	**61.2**

NOISE LEVEL DISTRIBUTION BIRLA GRAM 8-9AM

S.N	Noise Level dB Ln	Range	Time of Gauging (min)	Cumulative Time of Gauging	Cumulative % Time of Gauging	% of Time when the noise level exceeds the stated value
1	**58.8**	**1**	**1**	**1**	**10**	**90**
2	**59.8**	**1**	**1**	**2**	**20**	**80**
3	**60.3**	**1**	**1**	**3**	**30**	**70**
4	**61.1**	**1**	**1**	**4**	**40**	**60**
5	**61.3**	**1**	**1**	**5**	**50**	**50**
6	**61.5**	**1**	**1**	**6**	**60**	**40**
7	**61.8**	**1**	**1**	**7**	**70**	**30**
8	**62.4**	**1**	**1**	**8**	**80**	**20**
9	**62.4**	**1**	**1**	**9**	**90**	**10**
10	**63.5**	**1**	**1**	**10**	**100**	**0**

TABLE NO.4.3
NOISE LEVEL dB OBSERVED AT BIRLA GRAM 9-10 AM

Minute	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	
10sec	73.5	64.4	66	70.1	67.1	62.2	65.4	69.3	66.5	75.1	
20sec	71.6	68.6	71.3	65.6	65.4	63.5	71.2	64.4	72.2	74.2	
30sec	72.2	66.5	67.9	66.8	65.3	66.4	65.1	62.6	64.5	70.1	
40sec	63.6	67.2	74.2	65.7	77.8	70.5	64.4	66.3	67.3	68.1	
50sec	62.9	63.1	68.6	78.2	75.8	71.3	73.3	73.2	60.4	70.85	
60sec	72.4	65.3	64.2	62.6	68.9	67.1	68.2	65.5	67.7	66.4	
Leq dB	69.3	65.8	68.7	68.1	69.5	66.8	67.9	66.8	66.4	70.7	68

NOISE LEVEL DISTRIBUTION BIRLA GRAM 9-10 AM

S.N	Noise Level dB Ln	Range	Time of Gauging (min)	Cumulative Time of Gauging	Cumulative% Time of Gauging	% of Time when the noise level exceeds the stated value
1	**65.8**	**1**	**1**	**1**	**10**	**90**
2	**66.4**	**1**	**1**	**2**	**20**	**80**
3	**66.8**	**1**	**1**	**3**	**30**	**70**
4	**66.8**	**1**	**1**	**4**	**40**	**60**
5	**67.9**	**1**	**1**	**5**	**50**	**50**
6	**68.1**	**1**	**1**	**6**	**60**	**40**
7	**68.7**	**1**	**1**	**7**	**70**	**30**
8	**69.3**	**1**	**1**	**8**	**80**	**20**
9	**69.5**	**1**	**1**	**9**	**90**	**10**
10	**70.7**	**1**	**1**	**10**	**100**	**0**

TABLE NO.4.4
NOISE LEVEL dB OBSERVED AT BIRLA GRAM 10-11 AM

Minute	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	
10sec	66.2	70.2	62.7	64.1	68.8	65.6	65.2	61.3	64.6	63	
20sec	67.8	67.4	67.8	62.1	75.5	64.9	62.6	60.4	64.9	63.4	
30sec	63.7	68.3	69.1	68.5	66.2	61.2	61.2	67.3	61.3	60.2	
40sec	62.6	71.1	73.2	61.0	68.5	65.0	64.1	62.3	65.1	64.9	
50sec	63.5	66.3	65.7	69.9	60.5	69.4	66.6	59.4	62.7	64.8	
60sec	66.5	67.5	66.1	75.4	62.5	64.3	72.1	62.3	60.4	65.5	
Leq dB	65.3	68.5	68.8	69.8	69.8	65.8	67.0	63.0	63.5	63.9	**66.5**

NOISE LEVEL DISTRIBUTION BIRLA GRAM 10-11 AM

S.N	Noise Level dB Ln	Range	Time of Gauging (min)	Cumulative Time of Gauging	Cumulative% Time of Gauging	% of Time when the noise level exceeds the stated value
1	**63.0**	**1**	**1**	**1**	**10**	**90**
2	**63.5**	**1**	**1**	**2**	**20**	**80**
3	**63.9**	**1**	**1**	**3**	**30**	**70**
4	**65.3**	**1**	**1**	**4**	**40**	**60**
5	**65.8**	**1**	**1**	**5**	**50**	**50**
6	**67.0**	**1**	**1**	**6**	**60**	**40**
7	**68.5**	**1**	**1**	**7**	**70**	**30**
8	**68.8**	**1**	**1**	**8**	**80**	**20**
9	**69.8**	**1**	**1**	**9**	**90**	**10**
10	**69.8**	**1**	**1**	**10**	**100**	**0**

TABLE NO. 4.5
NOISE LEVEL dB OBSERVED AT BIRLA GRAM 11-12 AM

Minute	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	
10sec	65.1	65.8	61.2	62.2	68.8	64.6	65.2	61.3	63.6	63.0	
20sec	66.2	62.4	64.8	61.1	75.5	64.9	62.6	60.4	64.9	63.4	
30sec	62.4	64.3	63.1	65.5	66.2	61.2	61.2	67.3	61.3	60.2	
40sec	61.6	66.2	70.1	61.0	68.5	65	64.1	62.3	65.1	64.9	
50sec	63.5	62.3	73.7	65.2	60.5	69.4	66.6	59.4	62.7	64.8	
60sec	64.5	61.5	62.1	71.5	62.5	64.3	72.1	62.3	60.4	65.5	
Leq dB	63.8	63.7	64.1	64.4	69.5	64.9	67.0	63.0	62.4	63.9	**64.7**

NOISE LEVEL DISTRIBUTION BIRLA GRAM 11-12 AM

S.N	Noise Level dB Ln	Range	Time of Gauging (min)	Cumulative Time of Gauging	Cumulative% Time of Gauging	% of Time when the noise level exceeds the stated value
1	**62.4**	**1**	**1**	**1**	**10**	**90**
2	**63.0**	**1**	**1**	**2**	**20**	**80**
3	**63.7**	**1**	**1**	**3**	**30**	**70**
4	**63.8**	**1**	**1**	**4**	**40**	**60**
5	**63.9**	**1**	**1**	**5**	**50**	**50**
6	**64.1**	**1**	**1**	**6**	**60**	**40**
7	**64.4**	**1**	**1**	**7**	**70**	**30**
8	**64.9**	**1**	**1**	**8**	**80**	**20**
9	**67.0**	**1**	**1**	**9**	**90**	**10**
10	**69.8**	**1**	**1**	**10**	**100**	**0**

TABLE NO. 4.6
NOISE LEVEL dB OBSERVED AT BIRLA GRAM 12-1 PM

Minute	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	
10sec	66.2	68.2	62.7	64.1	68.8	65.6	63.2	61.3	64.6	63.0	
20sec	67.2	66.3	67.8	62.1	75.5	64.9	61.6	60.4	64.9	63.4	
30sec	63.7	68.3	69.1	68.5	66.2	61.2	60.2	67.3	61.3	60.2	
40sec	62.6	71.1	73.0	61.0	68.5	65.0	62.1	65.1	65.1	64.9	
50sec	63.5	65.3	65.7	69.9	60.5	69.4	64.6	62.7	62.7	64.8	
60sec	66.5	66.5	66.1	75.4	62.5	64.3	70.1	60.47	60.4	65.5	
Leq dB	65.3	67.6	67.4	66.8	67	65.8	63.6	62.8	63.5	63.6	**65.3**

NOISE LEVEL DISTRIBUTION BIRLA GRAM 12-01 PM

S.N	Noise Level dB Ln	Range	Time of Gauging (min)	Cumulative Time of Gauging	Cumulative% Time of Gauging	% of Time when the noise level exceeds the stated value
1	**62.8**	**1**	**1**	**1**	**10**	**90**
2	**63.5**	**1**	**1**	**2**	**20**	**80**
3	**63.6**	**1**	**1**	**3**	**30**	**70**
4	**63.6**	**1**	**1**	**4**	**40**	**60**
5	**65.3**	**1**	**1**	**5**	**50**	**50**
6	**65.8**	**1**	**1**	**6**	**60**	**40**
7	**66.8**	**1**	**1**	**7**	**70**	**30**
8	**67.0**	**1**	**1**	**8**	**80**	**20**
9	**67.4**	**1**	**1**	**9**	**90**	**10**
10	**67.6**	**1**	**1**	**10**	**100**	**0**

TABLE NO. 4.7
NOISE LEVEL dB OBSERVED AT BIRLA GRAM 2-3 PM

Minute	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	
10sec	61.4	62.8	59.2	56.9	59.6	60.5	59.6	65.5	58.7	58.2	
20sec	58.5	66.6	66.3	63.2	60.9	65.8	59.5	58.4	58.8	61.7	
30sec	61.1	64.2	65.6	63.1	61.1	59.0	63.8	57.8	58.4	61.6	
40sec	55.3	65.5	64.8	61.2	61.5	66.0	63.0	60.0	58.9	62.9	
50sec	62.8	74.1	62.2	65.4	59.6	65.6	60.8	58.4	59.4	67.7	
60sec	58.3	61.9	62.4	58.5	62.3	59.2	61.3	56.6	60.5	60.6	
Leq dB	59.5	65.8	63.4	61.3	60.9	63.7	61.6	59.4	59.1	63.2	**61.7**

NOISE LEVEL DISTRIBUTION BIRLA GRAM 2-3 PM

S.N	Noise Level dB Ln	Range	Time of Gauging (min)	Cumulative Time of Gauging	Cumulative% Time of Gauging	% of Time when the noise level exceeds the stated value
1	**59.1**	**1**	**1**	**1**	**10**	**90**
2	**59.5**	**1**	**1**	**2**	**20**	**80**
3	**60.7**	**1**	**1**	**3**	**30**	**70**
4	**60.9**	**1**	**1**	**4**	**40**	**60**
5	**61.3**	**1**	**1**	**5**	**50**	**50**
6	**61.6**	**1**	**1**	**6**	**60**	**40**
7	**63.2**	**1**	**1**	**7**	**70**	**30**
8	**63.4**	**1**	**1**	**8**	**80**	**20**
9	**63.7**	**1**	**1**	**9**	**90**	**10**
10	**65.8**	**1**	**1**	**10**	**100**	**0**

TABLE NO. 4.8
NOISE LEVEL dB OBSERVED AT BIRLA GRAM 3-4 PM

Minute	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	
10sec	62.4	60.8	59.1	57.9	59.6	60.5	58.2	65.5	58.4	58.2	
20sec	58.5	66.6	64.3	63.2	60.9	65.8	59.8	58.4	59.7	61.7	
30sec	64.2	60.2	62.6	63.1	61.1	59.0	63.4	57.8	57.8	61.6	
40sec	58.4	62.5	63.8	61.2	61.5	66.0	66.4	60.0	61.2	62.9	
50sec	62.8	72.1	61.2	65.4	59.6	65.6	64.3	58.4	60.2	67.7	
60sec	57.3	61.9	58.4	57.5	62.3	59.2	66.2	56.6	58.2	60.6	
Leq dB	60.6	64.0	61.5	61.3	60.9	62.5	63.0	59.4	59.3	62.1	**61.4**

NOISE LEVEL DISTRIBUTION BIRLA GRAM 3-4 PM

S.N	Noise Level dB Ln	Range	Time of Gauging (min)	Cumulative Time of Gauging	Cumulative% Time of Gauging	% of Time when the noise level exceeds the stated value
1	**59.3**	**1**	**1**	**1**	**10**	**90**
2	**59.4**	**1**	**1**	**2**	**20**	**80**
3	**60.2**	**1**	**1**	**3**	**30**	**70**
4	**60.9**	**1**	**1**	**4**	**40**	**60**
5	**61.3**	**1**	**1**	**5**	**50**	**50**
6	**61.5**	**1**	**1**	**6**	**60**	**40**
7	**62.1**	**1**	**1**	**7**	**70**	**30**
8	**62.5**	**1**	**1**	**8**	**80**	**20**
9	**63.0**	**1**	**1**	**9**	**90**	**10**
10	**64.0**	**1**	**1**	**10**	**100**	**0**

TABLE NO.4.9
NOISE LEVEL dB OBSERVED AT BIRLA GRAM 4-5 PM

Minute	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	
10sec	61.2	62.8	60.2	56.9	60.6	62.5	60.6	66.5	61.2	62.3	
20sec	57.5	66.6	65.3	63.2	62.9	64.8	64.2	68.4	64.4	64.7	
30sec	64.6	62.2	64.6	63.1	61.4	64.2	64.8	58.2	62.3	67.9	
40sec	58.3	62.5	65.8	61.2	62.6	68.2	65.2	61.4	61.6	62.6	
50sec	62.8	71.2	62.2	65.4	59.6	66.6	67.8	60.2	63.4	67.7	
60sec	58.3	62.9	60.4	58.5	61.3	66.2	64.3	58.4	68.4	68.6	
Leq dB	60.4	64.7	63.0	61.3	61.4	65.4	64.4	62.1	63.5	65.6	**63.1**

NOISE LEVEL DISTRIBUTION BIRLA GRAM 4-5 PM

S.N	Noise Level dB Ln	Range	Time of Gauging (min)	Cumulative Time of Gauging	Cumulative% Time of Gauging	% of Time when the noise level exceeds the stated value
1	**60.4**	**1**	**1**	**1**	**10**	**90**
2	**61.3**	**1**	**1**	**2**	**20**	**80**
3	**61.4**	**1**	**1**	**3**	**30**	**70**
4	**62.1**	**1**	**1**	**4**	**40**	**60**
5	**63.0**	**1**	**1**	**5**	**50**	**50**
6	**63.5**	**1**	**1**	**6**	**60**	**40**
7	**64.4**	**1**	**1**	**7**	**70**	**30**
8	**64.7**	**1**	**1**	**8**	**80**	**20**
9	**65.4**	**1**	**1**	**9**	**90**	**10**
10	**65.6**	**1**	**1**	**10**	**100**	**0**

TABLE NO. 4.10
NOISE LEVEL dB OBSERVED AT BIRLA GRAM 5-6 PM

Minute	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	
10sec	63.6	64.2	62.2	62.5	60.6	60.2	62.3	62.4	60.8	67.3	
20sec	65.8	62.4	65.3	64.8	64.2	65.3	64.7	61.4	65.6	68.3	
30sec	64.2	63.5	64.6	64.2	64.8	64.6	67.9	63.1	60.0	65.2	
40sec	70.2	61.3	68.9	68.2	65.2	65.8	62.6	62.3	62.5	67.1	
50sec	69.6	66.4	66.2	66.6	67.8	62.2	67.7	66.4	71.1	67.7	
60sec	71.1	67.5	69.4	66.2	64.3	60.4	68.6	69.5	61.9	66.3	
Leq dB	67.4	64.2	66.1	65.4	64.4	63.0	65.6	64.1	63.6	67.0	**65.1**

NOISE LEVEL DISTRIBUTION BIRLA GRAM 05-06PM

S.N	Noise Level dB Ln	Range	Time of Gauging (min)	Cumulative Time of Gauging	Cumulative% Time of Gauging	% of Time when the noise level exceeds the stated value
1	**63.0**	**1**	**1**	**1**	**10**	**90**
2	**63.6**	**1**	**1**	**2**	**20**	**80**
3	**64.1**	**1**	**1**	**3**	**30**	**70**
4	**64.2**	**1**	**1**	**4**	**40**	**60**
5	**64.4**	**1**	**1**	**5**	**50**	**50**
6	**65.4**	**1**	**1**	**6**	**60**	**40**
7	**65.6**	**1**	**1**	**7**	**70**	**30**
8	**66.1**	**1**	**1**	**8**	**80**	**20**
9	**67.0**	**1**	**1**	**9**	**90**	**10**
10	**67.4**	**1**	**1**	**10**	**100**	**0**

TABLE NO. 4.11
NOISE LEVEL dB OBSERVED AT BIRLA GRAM 6-7 PM

Minute	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	
10sec	63.4	62.4	70.1	62.2	60.9	63.3	64.4	64.3	64.7	66.8	
20sec	63.6	71.5	66.2	64.9	66.0	66.8	64.2	68.4	71.4	64.7	
30sec	62.5	62.3	72.1	65.9	62.8	72.4	72.4	67.7	65.8	65.2	
40sec	71.4	68.2	68.6	65.2	61.5	65.6	69.2	69.8	67.9	68.5	
50sec	63.2	68.4	64.1	63.3	74.2	62.8	68.3	72.1	67.4	69.0	
60sec	62.8	67.4	68.9	61.5	66.5	65.2	67.8	75.4	65.4	64.4	
Leq dB	64.4	66.6	68.3	63.8	65.3	67.6	67.7	69.6	67.1	66.4	**66.6**

NOISE LEVEL DISTRIBUTION BIRLA GRAM 06-07 PM

S.N	Noise Level dB Ln	Range	Time of Gauging (min)	Cumulative Time of Gauging	Cumulative% Time of Gauging	% of Time when the noise level exceeds the stated value
1	**63.8**	**1**	**1**	**1**	**10**	**90**
2	**64.4**	**1**	**1**	**2**	**20**	**80**
3	**65.3**	**1**	**1**	**3**	**30**	**70**
4	**66.6**	**1**	**1**	**4**	**40**	**60**
5	**66.8**	**1**	**1**	**5**	**50**	**50**
6	**67.6**	**1**	**1**	**6**	**60**	**40**
7	**67.7**	**1**	**1**	**7**	**70**	**30**
8	**67.7**	**1**	**1**	**8**	**80**	**20**
9	**68.3**	**1**	**1**	**9**	**90**	**10**
10	**69.6**	**1**	**1**	**10**	**100**	**0**

TABLE NO. 4.12
NOISE LEVEL dB OBSERVED AT BIRLA GRAM 7-8 PM

Minute	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	
10sec	61.2	60.8	61.7	56.9	61.6	60.5	59.6	65.5	62.3	85.2	
20sec	61.8	65.6	64.3	63.2	62.9	65.8	59.5	58.4	61.7	61.7	
30sec	62.0	60.0	64.6	63.1	63.2	59.0	63.8	57.8	59.2	61.6	
40sec	59.3	62.5	66.6	61.2	63.7	66.0	63.0	60.0	64.7	62.9	
50sec	64.8	71.1	67.2	65.4	61.2	65.6	60.8	58.4	67.4	67.7	
60sec	59.7	61.9	61.4	58.5	62.3	59.2	61.3	56.4	57.2	60.6	
Leq dB	61.4	63.6	64.3	61.3	62.4	62.7	61.3	59.4	62.0	62.1	**62.0**

NOISE LEVEL DISTRIBUTION BIRLA GRAM 07-08 PM

S.N	Noise Level dB Ln	Range	Time of Gauging (min)	Cumulative Time of Gauging	Cumulative% Time of Gauging	% of Time when the noise level exceeds the stated value
1	**59.4**	**1**	**1**	**1**	**10**	**90**
2	**61.3**	**1**	**1**	**2**	**20**	**80**
3	**61.3**	**1**	**1**	**3**	**30**	**70**
4	**61.4**	**1**	**1**	**4**	**40**	**60**
5	**62.0**	**1**	**1**	**5**	**50**	**50**
6	**62.1**	**1**	**1**	**6**	**60**	**40**
7	**62.4**	**1**	**1**	**7**	**70**	**30**
8	**63.6**	**1**	**1**	**8**	**80**	**20**
9	**63.7**	**1**	**1**	**9**	**90**	**10**
10	**64.3**	**1**	**1**	**10**	**100**	**0**

TABLE NO. 4.13
NOISE LEVEL dB OBSERVED AT BIRLA GRAM 8-9 PM

Minute	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	
10sec	68.2	61.8	60.7	58.7	60.2	59.7	61.5	60.6	67.2	62.4	
20sec	63.2	62.6	61.2	61.7	61.7	63.8	63.3	67.7	61.4	71.5	
30sec	64.8	59.1	62.4	60.2	59.3	58.9	65.2	61.6	64.3	62.3	
40sec	63.6	61.5	61.7	62.7	58.7	62.6	65.9	62.9	64.6	68.2	
50sec	66.6	70.2	62.2	63.7	60.1	65.8	64.9	61.7	61.7	67.3	
60sec	62.8	64.3	64.1	65.6	61.2	60.2	62.2	58.2	66.6	68.4	
Leq dB	64.8	64.9	62.0	62.1	60.2	61.8	63.8	62.1	64.3	66.6	**63.2**

NOISE LEVEL DISTRIBUTION BIRLA GRAM 08-09 PM

S.N	Noise Level dB Ln	Range	Time of Gauging (min)	Cumulative Time of Gauging	Cumulative% Time of Gauging	% of Time when the noise level exceeds the stated value
1	**60.2**	**1**	**1**	**1**	**10**	**90**
2	**61.8**	**1**	**1**	**2**	**20**	**80**
3	**62.0**	**1**	**1**	**3**	**30**	**70**
4	**62.1**	**1**	**1**	**4**	**40**	**60**
5	**62.1**	**1**	**1**	**5**	**50**	**50**
6	**63.8**	**1**	**1**	**6**	**60**	**40**
7	**64.3**	**1**	**1**	**7**	**70**	**30**
8	**64.8**	**1**	**1**	**8**	**80**	**20**
9	**64.9**	**1**	**1**	**9**	**90**	**10**
10	**66.6**	**1**	**1**	**10**	**100**	**0**

TABLE NO 4.14

Noise parameter (Leq, L_{10}, L_{50}, L_{90}, and LNP) at Birla Gram at different time interval

LOCATION	TIME	Leq	L_{10}	L_{50}	L_{90}	LNP
VINAY NAGAR	8AM-9AM	61.2	62.4	61.3	58.8	64.8
	9AM-10AM	68.0	69.5	67.9	65.8	71.7
	10AM-11AM	66.5	69.8	65.8	63.0	73.3
	11AM-12PM	64.7	67.0	63.9	62.4	69.3
	12PM-01PM	65.3	67.4	65.3	62.8	69.9
	02PM-03PM	61.7	63.7	61.3	59.1	66.3
	03PM-04PM	61.4	63.0	61.3	59.3	65.1
	04PM-05PM	63.1	65.4	63.0	60.4	68.1
	05PM-06PM	65.1	67.0	64.4	63.0	69.1
	06PM-07PM	66.6	68.3	66.8	63.8	71.1
	07PM-08PM	62.0	63.7	62.0	59.4	66.3
	08PM-09PM	63.2	64.9	62.1	60.2	67.9

In the same way noise parameter of all other location of commercial zone, residential zone and silence zone of Nagda city are calculated and summarized as result in next chapter.

CHAPTER-5
RESULT AND DISCUSSION

Residential Area

Table 5.1: Noise parameters (Leq, L_{10}, L_{50}, L_{90}, and LNP) at different monitored location of Residential zone at different time interval.

ZONE	DATE	LOCATION	TIME	Leq	L_{10}	L_{50}	L_{90}	LNP
Residential zone	1/05/2023	BIRLA GRAM	**8AM-9AM**	61.2	62.4	61.3	58.8	64.8
			9AM-10AM	68.0	69.5	67.9	65.8	71.7
			10AM-11AM	66.5	69.8	65.8	63.0	73.3
			11AM-12PM	64.7	67.0	63.9	62.4	69.3
			12PM-01PM	65.3	67.4	65.3	62.8	69.9
			02PM-03PM	61.7	63.7	61.3	59.1	66.3
			03PM-04PM	61.4	63.0	61.3	59.3	65.1
			04PM-05PM	63.1	65.4	63.0	60.4	68.1
			05PM-06PM	65.1	67.0	64.4	63.0	69.1
			06PM-07PM	66.6	68.3	66.8	63.8	71.1
			07PM-08PM	62.0	63.7	62.0	59.4	66.3
			08PM-09PM	63.2	64.9	62.1	60.2	67.9
	4/05/2023	DURGAPURA	**8AM-9AM**	59.6	62.5	56.6	55.8	66.3
			9AM-10AM	61.3	62.4	59.1	56.6	67.1
			10AM-11AM	57.6	58.2	56.3	55.9	59.9
			11AM-12PM	60.2	62.3	59.2	56.4	66.1
			12PM-01PM	61.5	63.4	58.2	56.6	68.3
			02PM-03PM	60.8	61.3	58.9	57.5	64.6
			03PM-04PM	60.5	60.9	58.2	56.2	65.2
			04PM-05PM	61.2	61.9	59.2	58.7	64.4
			05PM-06PM	60.5	61.5	59.8	56.3	65.7
			06PM-07PM	61.1	62.8	60.3	56.7	68.0
			07PM-08PM	63.5	66.5	62.3	58.2	71.8
			08PM-09PM	64.3	66.4	62.5	59.6	71.1
	8/05/2023	CHEMICAL COLONY	**8AM-9AM**	66.3	65.9	62.3	56.2	76.0
			9AM-10AM	69.5	72.3	65.4	60.7	81.1
			10AM-11AM	72.3	71.8	69.3	66.5	77.6
			11AM-12PM	70.2	72.6	68.1	64.9	77.9
			12PM-01PM	71.3	72.6	67.5	62.4	81.5
			02PM-03PM	61.3	63.5	57.4	52.3	72.5
			03PM-04PM	62.3	65.4	61.9	56.8	70.9
			04PM-05PM	66.5	67.8	64.2	58.4	75.9
			05PM-06PM	67.4	67.4	64.2	58.9	76.0
			06PM-07PM	70.2	71.6	66.5	63.8	78.0

			07PM-08PM	68.2	70.6	66.9	64.8	74.0
			08PM-09PM	70.8	72.1	65.7	58.5	84.4
	09/05/2023	GOLL MARKET	**8AM-9AM**	60.5	63.5	59.8	56.2	67.8
			9AM-10AM	67.8	68.9	64.5	62.8	73.9
			10AM-11AM	73.5	77.8	67.1	62.9	88.4
			11AM-12PM	67.8	70.2	64.2	61.9	76.1
			12PM-01PM	68.9	71.5	65.8	62.7	77.6
			02PM-03PM	64.8	62.8	60.3	59.4	68.2
			03PM-04PM	67.5	67.9	65.2	60.8	74.8
			04PM-05PM	67.2	68.2	65.4	65.9	69.5
			05PM-06PM	73.5	69.4	65.2	63.0	79.9
			06PM-07PM	69.2	71.5	68.9	63.7	77.0
			07PM-08PM	71.3	74.5	69.5	63.4	82.4
			08PM-09PM	72.1	70.4	67.8	63.5	79.0
	16/05/2023	ATAL GARDEN	**8AM-9AM**	60.2	64.4	60.2	57.0	67.6
			9AM-10AM	64.3	66.0	65.8	59.2	71.1
			10AM-11AM	66.4	69.2	65.8	62.8	72.8
			11AM-12PM	71.2	71.5	64.8	62.0	80.7
			12PM-01PM	71.2	70.4	65.9	61.8	79.8
			02PM-03PM	65.8	63.4	62.8	54.9	74.3
			03PM-04PM	66.8	68.4	63.5	60.7	74.5
			04PM-05PM	66.9	68.7	68.7	59.2	76.4
			05PM-06PM	70.2	74.5	67.9	62.8	81.9
			06PM-07PM	69.8	70.2	68.7	65.2	74.8
			07PM-08PM	69.3	72.8	68.1	58.4	83.7
			08PM-09PM	69.0	72.1	68.3	65.8	75.3

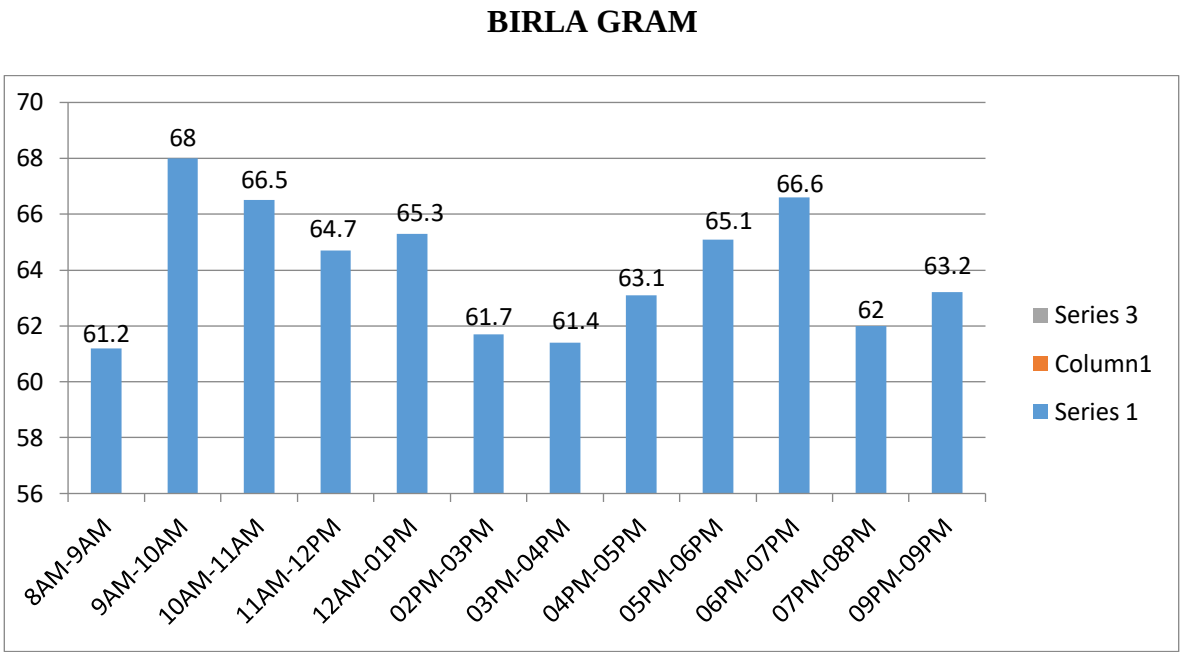

Fig 5.1: Temporal distribution of equivalent noise level Leq dB near Birla Gram

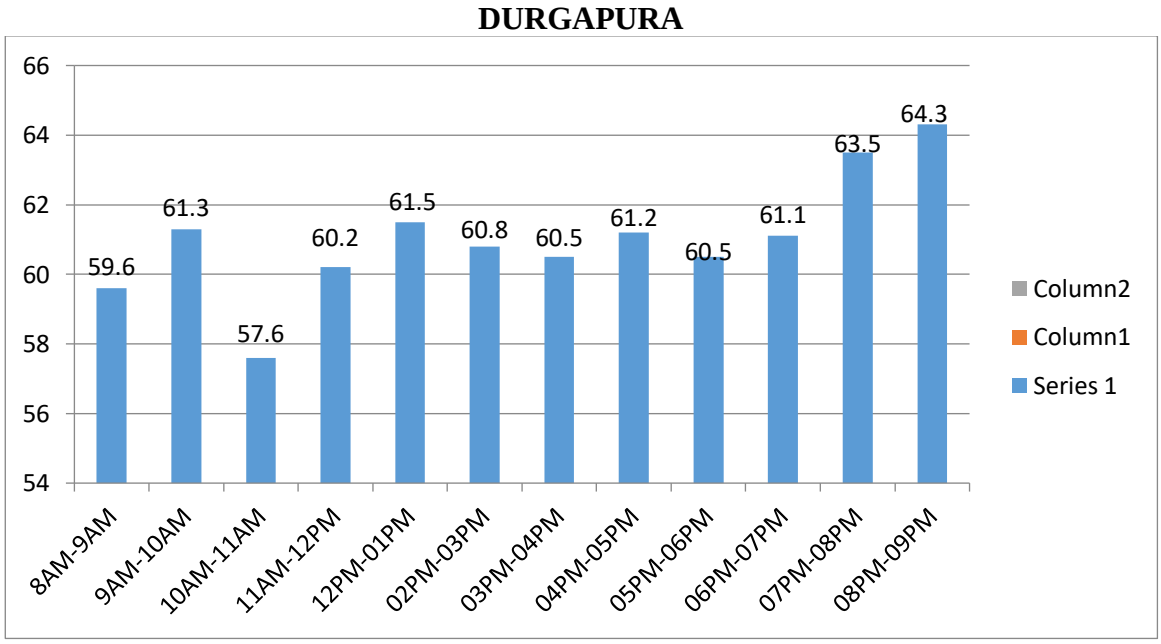

Fig 5.2: Temporal distribution of equivalent noise level Leq dB near Durgapura

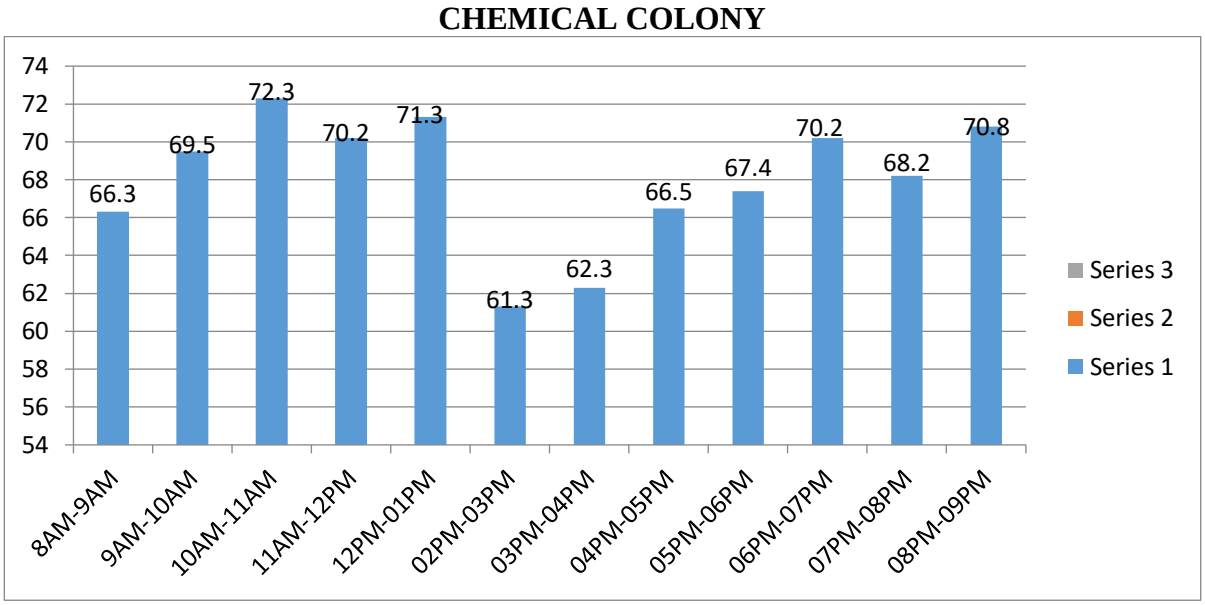

Fig 5.3: Temporal distribution of equivalent noise level Leq dB near Chemical Colony

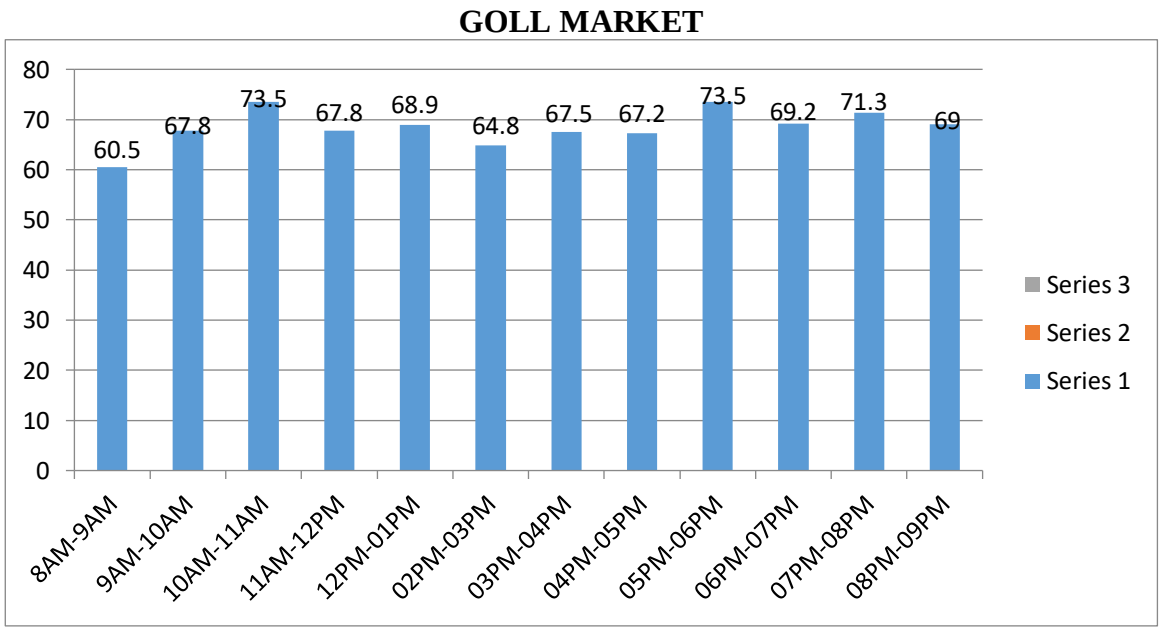

Fig 5.4: Temporal distribution of equivalent noise level Leq dB near Goll Market

ATAL GARDEN

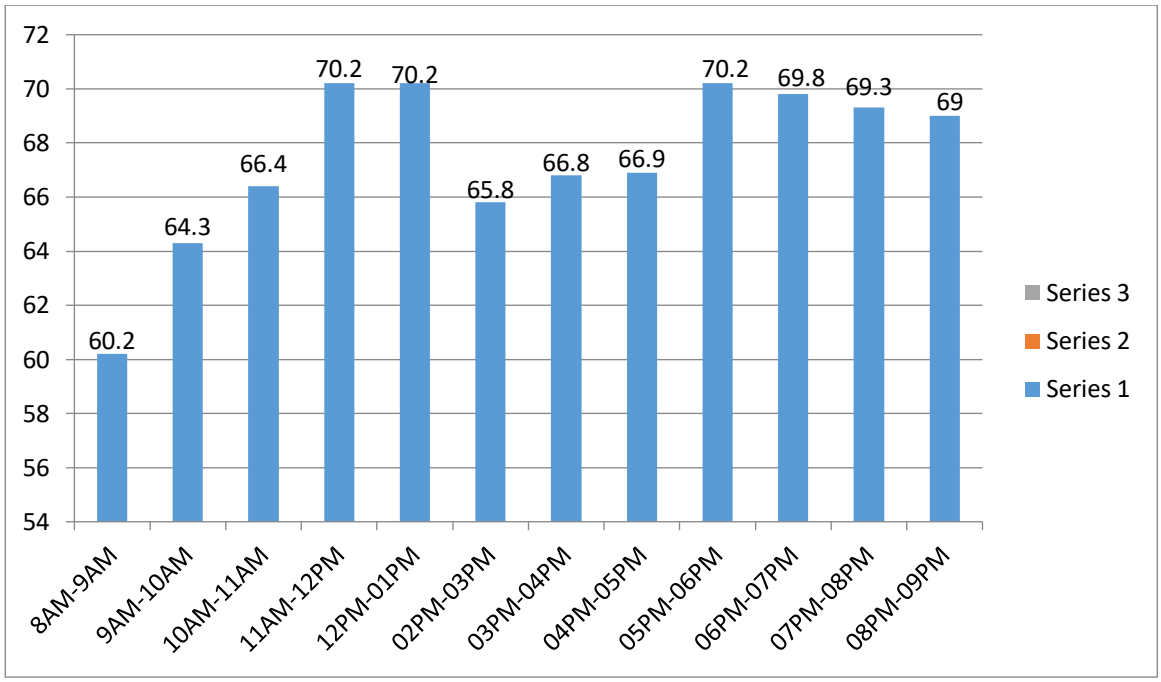

Fig 5.5: Temporal distribution of equivalent noise level Leq dB near Atal Garden Area

Silence Area

Table 5.2: Noise parameters (Leq, L10, L50, L90, and LNP) at different monitored location of Residential zone at different time interval.

ZONE	DATE	LOCATION	TIME	Leq	L_{10}	L_{50}	L_{90}	LNP
SILENCE ZONE	1/06/2023	JANSEVA HOSPITAL	**8AM-9AM**	58.5	57.6	56.2	59.8	56.3
			9AM-10AM	60.2	61.1	58.6	56.9	64.4
			10AM-11AM	64.2	66.5	62.5	59.0	71.7
			11AM-12PM	65.2	66.9	64.2	59.0	73.1
			12PM-01PM	62.5	66.3	58.2	58.1	70.7
			02PM-03PM	63.1	65.2	61.8	58.7	69.6
			03PM-04PM	55.3	58.4	56.1	52.9	60.8
			04PM-05PM	63.2	63.5	59.1	56.8	69.9
			05PM-06PM	65.1	65.9	65.8	64.8	66.2
			06PM-07PM	61.7	62.8	63.7	60.4	64.1
			07PM-08PM	59.3	62.5	56.8	48.6	73.2
			08PM-09PM	58.6	60.4	56.8	48.2	70.8
	05/06/2023	GRASIM SCHOOL CAMPUS	**8AM-9AM**	49.7	47.9	46.3	45.8	51.8
			9AM-10AM	56.2	60.0	64.1	49.1	67.1
			10AM-11AM	60.2	62.4	56.9	56.1	66.2
			11AM-12PM	59.7	61.8	57.1	53.8	67.9
			12PM-01PM	58.1	61.2	55.3	53.7	65.6
			02PM-03PM	59.4	60.2	58.1	54.1	65.5
			03PM-04PM	49.1	51.3	48.1	47.4	53.0
			04PM-05PM	50.1	53.0	49.7	47.1	56.0
			05PM-06PM	51.6	53.4	49.6	46.1	63.9
			06PM-07PM	49.1	50.1	49.7	45.3	53.9

			07PM-08PM	49.9	50.6	47.1	45.8	54.7
			08PM-09PM	56.1	60.2	52.8	50.7	65.6
	07/06/2023	COURT AREA	**8AM-9AM**	67.5	71.0	68.3	63.1	75.4
			9AM-10AM	73.9	75.9	74.5	71.0	78.8
			10AM-11AM	77.0	79.0	72.8	68.0	88.0
			11AM-12PM	76.1	78.6	75.2	73.1	81.6
			12PM-01PM	77.1	78.9	76.8	73.1	82.9
			02PM-03PM	73.5	75.1	72.8	70.0	78.6
			03PM-04PM	77.2	78.8	76.1	72.5	83.5
			04PM-05PM	76.8	78.1	75.1	70.5	84.4
			05PM-06PM	75.6	76.3	74.0	72.5	79.4
			06PM-07PM	75.1	76.6	75.8	74.5	77.2
			07PM-08PM	74.8	82.1	75.2	72.3	84.6
			08PM-09PM	73.1	72.5	69.8	68.1	77.5
	09/06/2023	TAKRAVDA	**8AM-9AM**	59.8	61.5	58.3	56.7	64.6
			9AM-10AM	66.1	63.8	62.4	58.1	71.9
			10AM-11AM	60.2	61.5	58.7	56.7	65.0
			11AM-12PM	60.2	61.8	61.7	58.1	63.9
			12PM-01PM	59.3	61.0	59.1	67.8	52.5
			02PM-03PM	61.7	62.3	59.1	67.5	56.5
			03PM-04PM	61.0	62.3	65.0	56.3	65.9
			04PM-05PM	60.4	60.1	56.9	55.2	65.3
			05PM-06PM	58.3	60.1	58.3	56.4	62.0
			06PM-07PM	59.1	61.7	57.9	56.9	63.9
			07PM-08PM	60.7	61.2	58.9	57.1	64.8
			08PM-09PM	59.1	60.4	57.8	59.1	60.4
	12/06/2023	SFD COLONY	**8AM-9AM**	61.6	58.1	56.1	53.6	66.2
			9AM-10AM	63.1	64.5	63.1	57.8	69.8
			10AM-11AM	65.4	66.5	65.2	61.0	70.9
			11AM-12PM	64.1	65.5	64.2	62.2	67.4
			12PM-01PM	66.2	66.4	66.1	63.8	68.8
			02PM-03PM	64.2	65.1	64.8	61.8	67.5
			03PM-04PM	65.1	67.5	64.3	60.9	71.7
			04PM-05PM	62.3	63.1	60.5	59.3	66.1
			05PM-06PM	62.1	65.2	60.4	59.1	68.2
			06PM-07PM	60.1	62.8	61.4	60.7	62.2
			07PM-08PM	63.1	63.9	62.5	61.9	65.1
			08PM-09PM	55.6	57.6	54.3	50.1	63.1

JANSEVA HOSPITAL

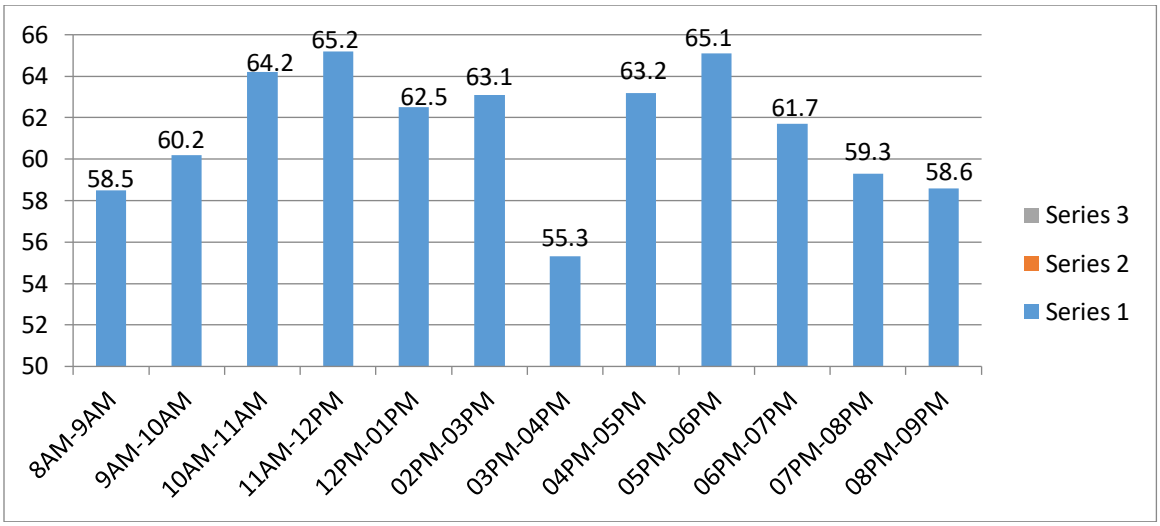

Fig 5.6: Temporal distribution of equivalent noise level Leq dB Janseva Hospital

GRASIM SCHOOL CAMPUS

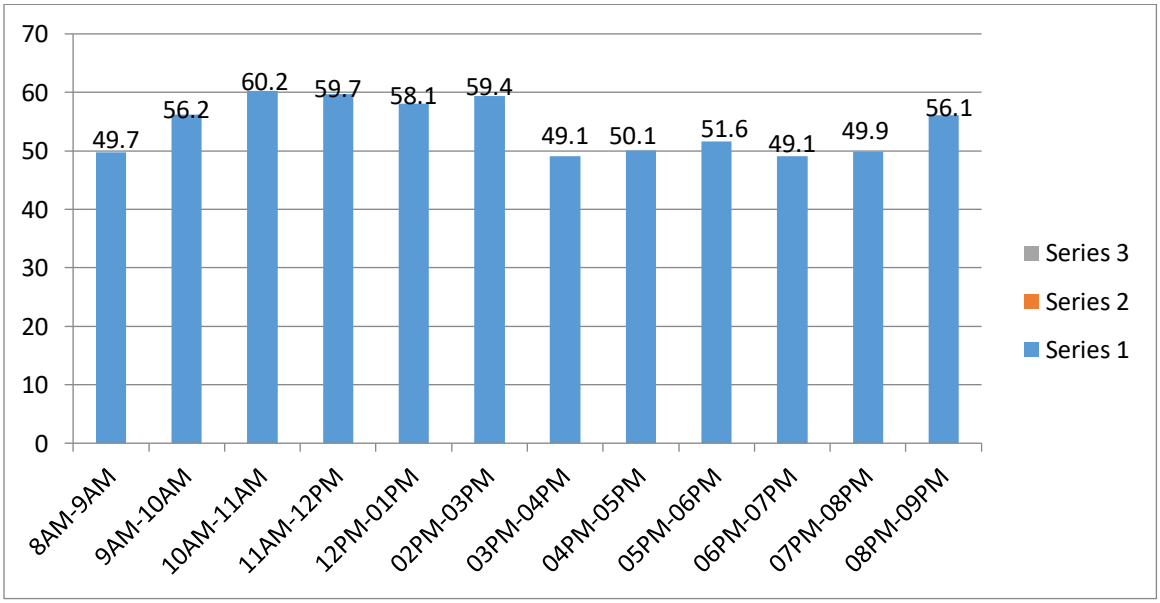

Fig 5.7: Temporal distribution of equivalent noise level Leq dB Grasim School Campus

COURT AREA

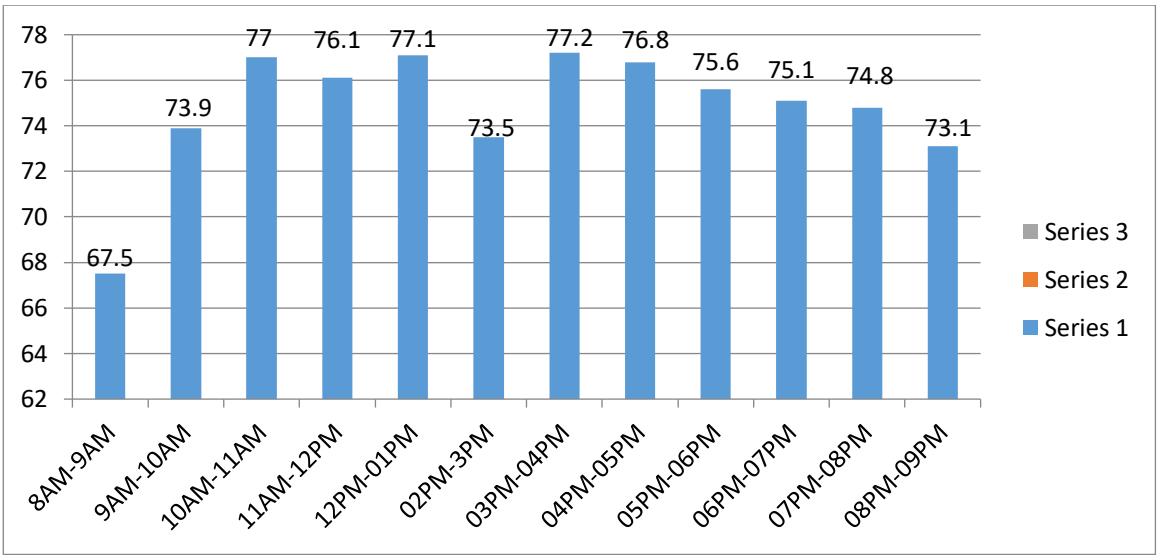

Fig 5.8: Temporal distribution of equivalent noise level Leq dB Court Area

TAKRAVDA

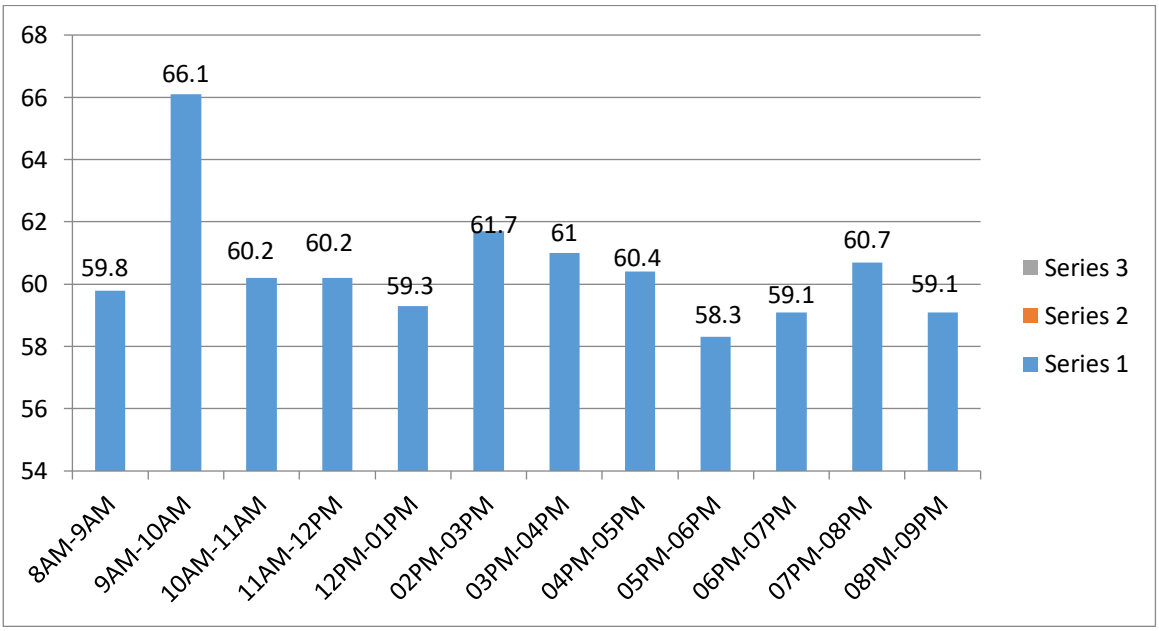

Fig 5.9: Temporal distribution of equivalent noise level Leq dB Takravda

SFD COLONY

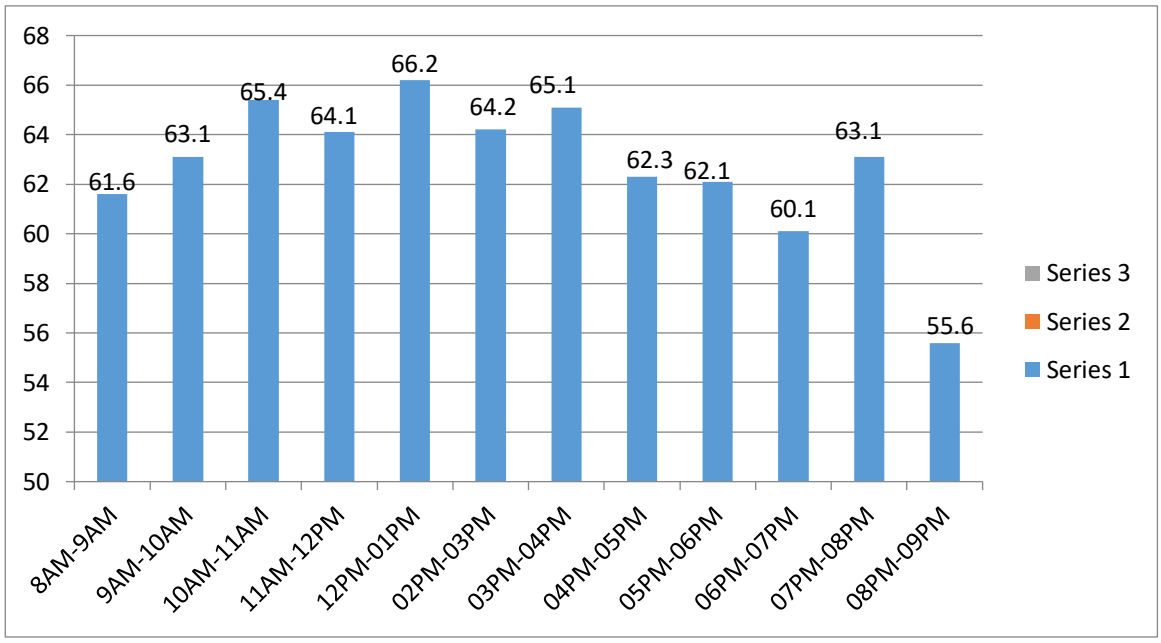

Fig 5.10: Temporal distribution of equivalent noise level Leq dB SFD Colony

Table 5.3: Comparison of maximum observed Noise level (Leq) in dB with standard value

Location	Category of area	Maximum Observed value Leq dB		Standard value Leq dB	
		Day Time	Night Time	Day Time	Night Time
Birla Gram	Residential	68.0	66.6	55	45
Durgapura	Residential	61.5	64.3	55	45
Chemical Colony	Residential	72.3	70.8	55	45
Goll Market	Residential	73.5	72.1	55	45
Atal Garden	Residential	71.2	69.8	55	45
Janseva Hospital	Silence	65.2	61.7	50	40
Grasim School Campus	Silence	60.2	56.1	50	40
Court Area	Silence	77.2	75.1	50	40
Takravda	Silence	61.7	60.7	50	40
SFD Colony	Silence	66.2	63.1	50	40

Comparison of day time observed Leq with Standards

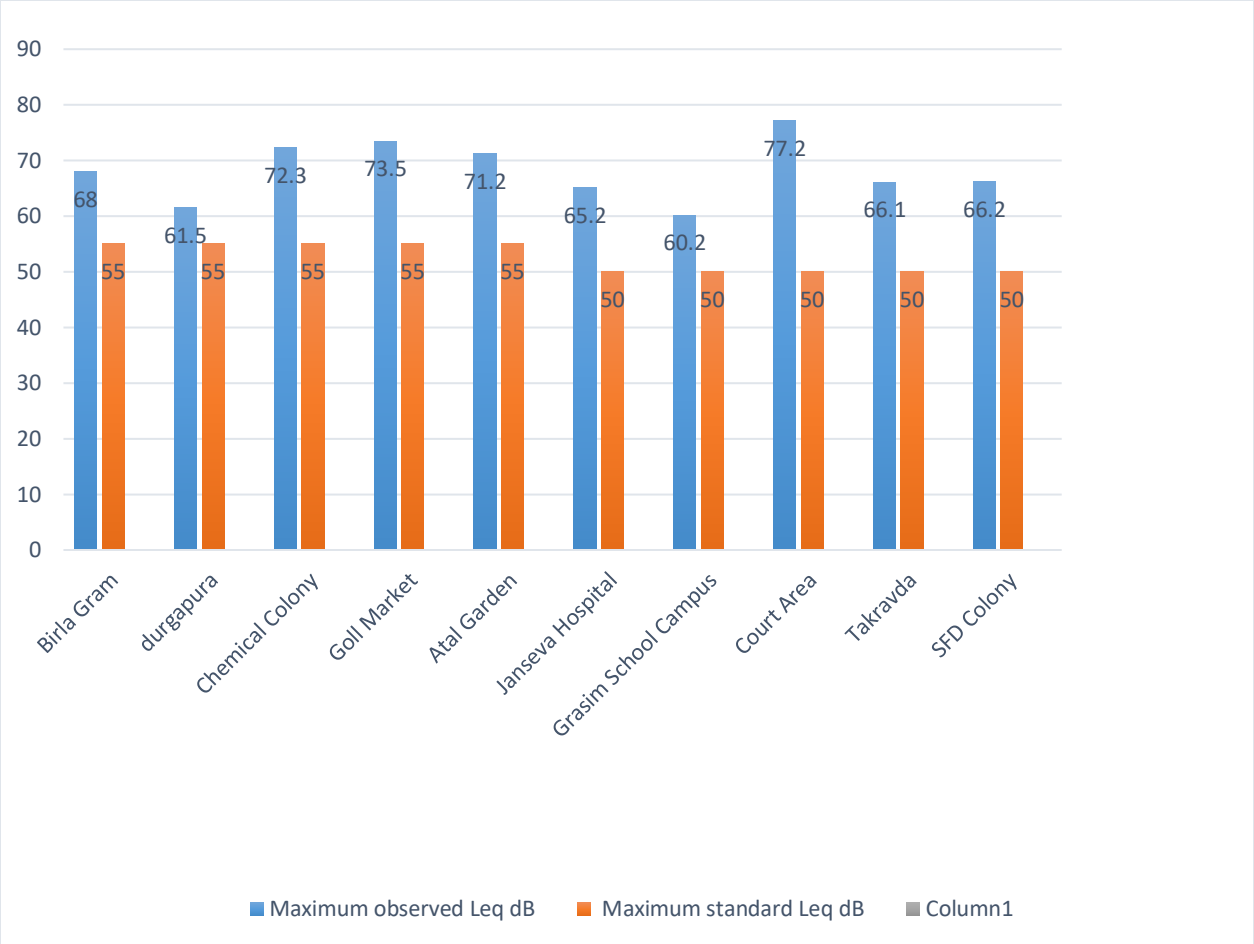

Fig 5.11: Comparison of day time maximum observed noise level (Leq) in dB with standard value

Comparison of day time observed Leq with Standards

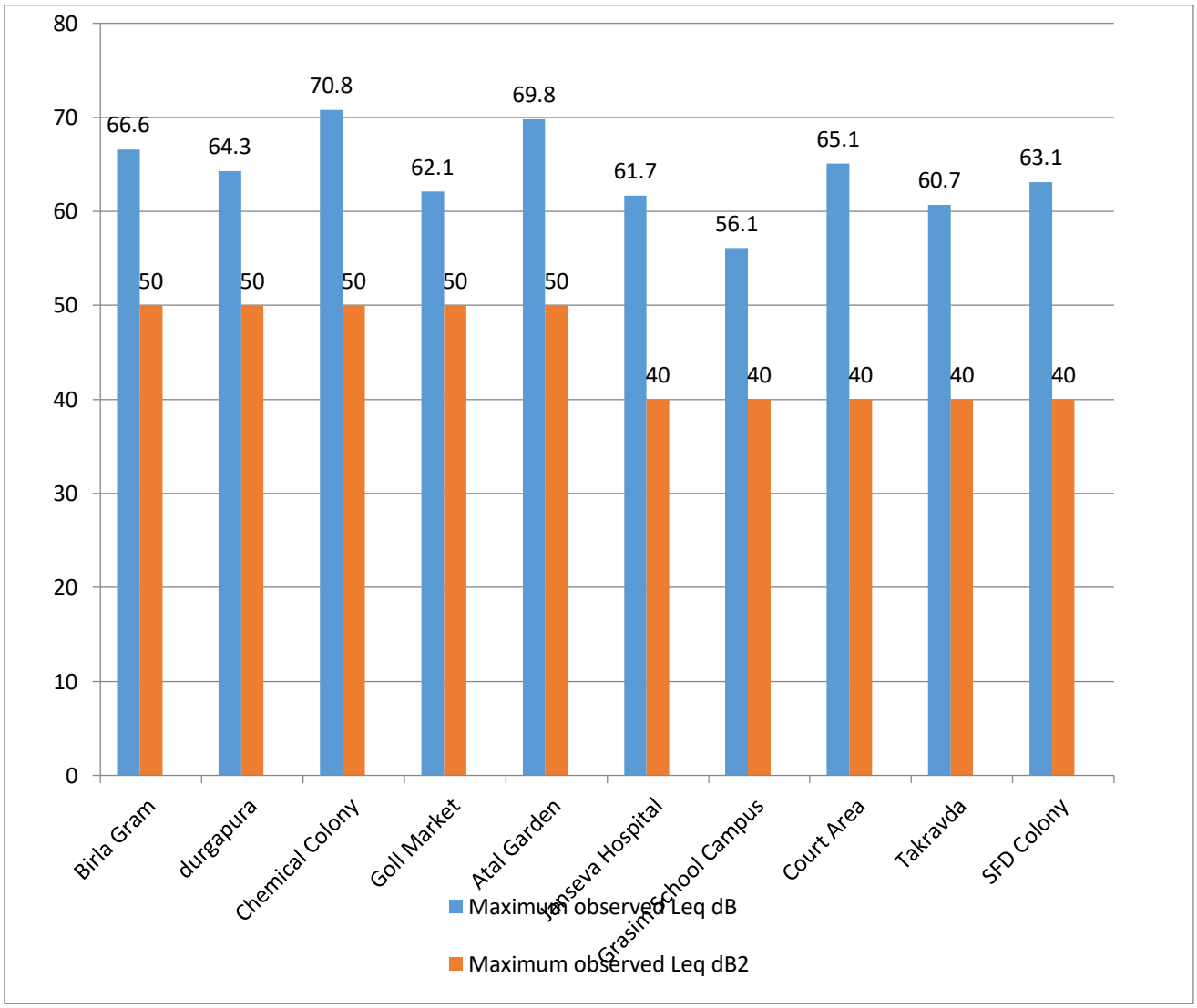

Fig 5.12: Comparison of night time maximum observed noise level (Leq) in dB with standard value

Result Discussion

Residential area

In Residential area shown in table-5.1 and Fig 5.1-5.5 and 5.11 Minimum and Maximum Equivalent sound pressure level between 57.6 dB to 73.5 dB Equivalent Noise level in all the residential area exceeded the standard value of 55 dB during daytime and 45 dB during night time.

Wright town area is found to have the maximum Equivalent Noise level 73.5 dB during day time (5-6 pm). Maximum equivalent Noise level observed in day time at Birla Gram, Durgapura, Chemical Colony, Goll Market and Atal Garden are 68.0 dB ,61.5 dB,72.3 dB, 73.5 dB and 71.5 dB respectively. Maximum equivalent noise level observed in night time at Birla Gram, Durgapura, Chemical Colony, Goll Market and Atal Garden are 66.6 dB, 64.3 dB, 70.8 dB, 62.1 dB and 69.8 dB respectively. The main reasons of noise in residential area traffic movement at vehicles horn, household equipment and construction work.

Silence area

In Silence area as shown in table 5.2 and Fig 6-10 and 5.12 Minimum and Maximum Equivalent sound pressure level ranges between 49.1 dB to 77.2 dB. Equivalent Noise level in all the silence area much have above the standard value of 50 dB, during day time and 40 dB during night time. Maximum equivalent noise level observed in day time at Janseva Hospital, Grasim School Campus, Court Area, Takravda and SFD Colony are 65.2 dB, 60.2 dB, 77.2 dB, 61.7 dB and 66.2 dB.respestively. Maximum equivalent noise level observed in night time at Janseva Hospital, Grasim School Campus, Court Area, Takravda and SFD Colony are 61.7 dB, 56.1 dB, 65.1 dB,60.7 dB, and 63.1 db. Respectively. Thus it is seen noise pollution is exceeded permissible limit at each location during day and night time. The Court Area, SFD Colony and Janseva Hospital found to be highly noise polluted.

CHAPTER-6
CONCLUSION AND FUTURE SCOPE

6.1 Conclusion

The investigations reveal that the Nagda cities are highly exposed to noise pollution. Rapid urbanization and heavy traffic flow and vehicle horn are the main reason that poses noise pollution in the town. Hence to keep the noise level with in the acceptable limit the following noise control measure should be followed.

1. Movement of vehicles on the inner arterial roads should be restricted.
2. The vehicles should not generate noise more that limit prescribed by the Regulatory Authorities.
3. Heavy vehicles movement near residential and silence area should be rusticated.
4. The noisiest three wheeler tempo should be banned.
5. There should be restriction on the use of horn by vehicles passing by the residential area.
6. Commercial activities should not be permitted in residential area and silence area.
7. Houses should not be preferable located near the main road. Attention should be given to the architectural layout of residential localities so as to reduce the travel of noise from one house to another.
8. There should be plenty of trees and bushes in open space between houses and roads.
9. Use of loud speaker should be reduced.
10. Playing of noise generating devices in houses should be preferable low volume.
11. Diesel generator sets and pumps used in multistoried buildings should have proper noise.
12. Houses should be located for away from the roads.

Noise at receiver end can be controlled by adopting hearing protector. The prime function of ear protector is to reduce the noise level at the wearers ears to within safe limits. The uses of ear plugs ear muffs are necessary. Attention must be given to hygiene discomfort and other medical problems that may arise through their use. Noise control can also be done by treatment of noise path. In this some barriers are placed in between the source and receiver. Use of sound absorbent in ordinary buildings should also be encouraged. Appropriate planning of city, sufficient road facilities for easy easy movement of traffic reduce vehicular movement, proper maintenance of road and vehicle, street side noise barriers and plantation will be solution of such type noise pollution. People Corporation, participation and awareness in the matter of environment, Eco-city planning and application of laws effectively may play important role in prevention and control of noise. Necessary preventive measures must be taken by the appropriate authority to implement the Noise pollution (Regulation and Control) Rules 2000 in time bound manner. Professionals, such as town planners, architect, and environmental engineers should have the problem of environmental noise pollution in mind when setting new roads, shopping center, schools, hospitals, and houses.

Preparation of noise maps for city is the one of most valuable step to decrease nose pollution in Nagda. Noise maps are very powerful tools for communicating result of assessment of environmental noise to the general public and for the government (local and national) to devise noise correction measure. The noise map itself, with the values of descriptors, provides baseline data for planner, engineers and other professional and researcher for the planning and execution of their projects.

At last it can be concluded that this issue can be resolved if people become aware of long term ill effects of noise pollution.

As it is a short term assessment of noise pollution problems in the town, further study may also be required to address the effect of noise pollution in the Nagda city.

6.2 Future Scope

1. At present work it was used limited location i.e 15 it may be considered some more location of different zone for better noise map of the city.

2. As it is a short term assessment of noise pollution problems in the town, further study may also be required to address the chronic effect of noise pollution in the Nagda city.

3. Traffic noise is the main source of noise pollution in Nagda city. Study for remedial measures to be determined in the heavy traffic zone is required.

4. Study of noise pollution during Festivals like Ganeshotsava, Dashera and Diwali can also is studied as noise level increases during these seasons.

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