

# Assessment of Noise Pollution in Hyderabad city, Sindh, Pakistan

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**Abstract**— Hyderabad is second largest city in Sindh province of Pakistan. In recent years, rising level of transportation such as tempos, rickshaws, four wheelers, two wheelers and heavy vehicles is one of the major source of noise pollution that impact the quality of life across the city. In the present study, noise levels were measured in different areas of Hyderabad city viz., commercial, residential, and silence area on different time and date by using Sound Level Meter SL- 4010. The highest noise level was recorded at commercial and residence area City Gate Hotel (88-114.4 dB), (80.0-110.0 dB at Bhitai Town; 85.1-103.2 dB at Tower Market. The results show that sound levels are much higher than the standard sound level (55-75dB) for the residence and commercial area respectively, which is considered a hazard of noise, may induce hearing loss, headache, annoyance and other adverse effects on the health of the residence and shopkeepers. Various mitigation measures have been taken by Environment Protection agency (EPA), Sindh, Pakistan to keep the noise level within the prescribed standards.

**Index Terms**— Noise pollution, transportation, Residential zone, Commercial zone, Shopkeepers, Hyderabad.

## 1. INTRODUCTION

The development made for the comforts of human have made this environment impure and contaminated. The ever-increasing population, industrialization and urbanization have polluted this globe heavily.[1-5] The important resources like air, water and soil have been contaminated by the release of toxic substances on one hand on the other hand the development activities also make the lives of the people miserable through nuisance. [4] One of such nuisance is the generation of higher sound levels, which our ear is unable to bear. Sound is the form of energy giving the sensation of hearing and is produced by longitudinal mechanical waves in matter including solid, liquid and transmitted by oscillation of atoms and molecules of matter. Noise is an unwanted sound without

agreeable musical quality otherwise sound and noise can be taken to mean the same thing Noise levels are measured in decibels (dB). One decibel is the threshold of hearing. Approximately 60 dB is the level of normal talking. Noise pollution is the problem of recent past due to the advancement of science and technology.[6-12] Noise as pollutant produces contaminated environment, which becomes a nuisance and effects of health of a person, his activities and mental abilities.[13-15] So noise pollution is unwanted sound released in the atmosphere notwithstanding the adverse effects it may have on living things. Noise is the type of atmospheric pollution. It is shadowy public enemy whose growing menace increased in the modern age of industrialization and technological ad-

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vancement. Although a soft sound in the form of music and dance stimulates brain activities, removes boredom and fatigue but its excessiveness may prove detrimental to living beings.[16] Researchers have proved that a loud noise creates tiredness, irritation and impairs brain activities so as to reduce thinking and working abilities. Noise pollution was previously confined to a few special areas like factory or railway station, but today it engulf every nook and corner of the globe, reaching its peak in urban areas. Automobiles, industries, rail engines, aero planes, loud speakers etc are the main ear contamination of the city area. The regular rattling of engines and intermittent blowing of horns emanating from the automobiles do not allow us to have any respite from irritant noise. However, the noise pollution's most apparent victims today are the residents in whose neighborhood the noise is generated.

Here we study the noise pollution level in Hyderabad city. The city of Hyderabad is situated on the left bank of river Indus and is the second largest city of sindh province in Pakistan. It has population of about 4.5 million according to the 2012 census of Pakistan. To respond the rapid increase of urban population in recent years, the city of Hyderabad has attempted to improve the means and facilities to maintain the environmental conditions in the urban areas. Being a populous city, it has to provide transportation facility to its inhabitants. Therefore heavy traffic such as tempos and trucks, rickshaws, mini buses, coaches, four wheelers, two wheelers and heavy vehicles ply on the roads. The moving of these vehicles generates noise higher in levels. The levels become higher when this traffic passes through the busy commercial streets surrounded by high rise buildings on both sides. In the present study, the extent of noise pollution in Hyderabad city and the exposure of residents to noise pollution during peak hours have been assessed. Several noise pollutions studies for bigger cities were carried out. All these reported existence of high noise level due to automobiles and vehicles in those places. No study for Hyderabad has been carried so far and hence the present study has been undertaken.

## 2. Materials and Methods

Noise measurements were determined by using "Digital sound survey meter" i.e. Sound Level Meter SL- 4010. The data were collected on different timings morning, afternoon, evening and night time. The data were collected near commercial, residential, educational and silent zones. For the recording of noise levels the meter will be brought towards the noise generating sources and will be hold for 25 to 30 minutes for recording of the reading. For precise determination of both lower and higher noise levels indicated by the meter will be re-recorded and collected data will be compared with NEQS for noise pollution. Across-sectional study has been conducted involving 100 randomly selected residences (age between 20-55 years). A comprehensive questionnaire was formulated to assess the subjective information. The information was collected through personal interviews and meetings. The questionnaire included age, noise exposure, working hours, use of protective measures, noise annoyance and awareness about NIHL. Furthermore, statements of the questionnaire were translated into three different languages i.e. English, Urdu and Sindhi and distributed among the local residences and shopkeepers in respected area for their awareness.

## 3. Noise Level Standards

The Environment Protection Agency Pakistan (EPA) has notified ambient air quality standards for noise (which has been included as an air pollutant. The permissible noise levels in Commercial, residential, and silence zone during day time are given in Table 1. The day time is from 6:00 A.M. to 9 P.M. Silence zone is defined as an area up to 100 m around such premises as hospitals, educational institutes, and courts. The silence zone is to be declared by competent authority. Use of vehicular horns, loud speakers, and bursting of crackers are to be banned in such zones.

**Table 1.** Ambient noise standard prescribed by EPA

S.No	Area	Standard day time (06A.M -09A.M)
1	Commercial Area	65

2	Residential Area	55
3	Silence zone	50

#### 4. Results and Discussions:

The World Health Organization has fixed 75dB as a permissible noise level guideline. The recorded noise levels indicate that the level is higher at sampling points where the flow of traffic is very high and road is congested. The noise levels considerably increased when lots of vehicles are playing and it reduces when traffic flow is reduced. The recorded data indicates that at some sampling points, the noise level is considerably higher. These points include:

##### 4.1. Residential Area

The prescribed limit for the residential area is 55 dB during day time. None of the selected places of the residential zones in Hyderabad recorded less than 55 dB. All the places had values that ranged between 80-100dB at all places. Use of horns and traffic congestion is the main cause of noise pollution in these areas.

- i. **Naseem Nagar Bridge:** The reason behind higher noise pollution levels at this point seems to be due to flow of large number of vehicles from four directions. Here the four searters in particular and rikshaws in general are the major sources that produce higher noise levels (Table-2).

**Table 02.** Noise Levels @ Naseem Nagar Bridge

S. No	Date	Min. Level (dB)	Max. Level (dB)	Time (AM)
1	06-02-2015	80	94	9.45
2	07-02-2015	81	92	8.45
3	09-02-2015	80	94	8.45
4	11-02-2015	82	96	8.20
5	12-02-2015	85	95	8.20

6	13-02-2015	88	93	9.45
7	18-02-2015	84	94	9.45
8	19-02-2015	82	93	9.45
9	20-02-2015	88	93	9.45
10	26-02-2015	81	95	9.45
11	27-02-2015	84	93	9.45

- ii. **Bhitai Town:** This area is close to the super highway. At this point the traffic ply on four directions. This place is center for all types of vehicles which travel from all over the Pakistan to the Karachi city and also from Hyderabad city to jamshoro city. (Table-3).

**Table 03.** Noise Levels @ By Pass Bhitai Town

S.No	Date	Min. Level (dB)	Max. Level (dB)	Time (AM)
1	06-02-2015	79	105	10.05
2	07-02-2015	84	104	9.10
3	09-02-2015	80	105	9.10
4	11-02-2015	83	106	8.40
5	12-02-2015	88	104	8.45
6	13-02-2015	85	107	10.05
7	18-02-2015	84	105	10.05
8	19-02-2015	89	109	10.05
9	20-02-2015	87	106	10.05
10	26-02-2015	86	103	10.05
11	27-02-2015	88	106	10.05
12	28-02-2015	84	110	10.05

- iii. **City Gate Hotel:** This point is center of incline. Here the noise pollution levels are higher as the engines of four searters in particular and rikshaws in general exert great pressure to run on the inclined road. The other main reason behind higher levels of noise may be due to narrow road and existence of multi storied buildings around the road (Table-4).

**Table 04.** Noise Levels @ City Gate Hotel

S. No	Date	Min. Level (dB)	Max. Level (dB)	Time (AM)
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1	06-02-2015	93	104	10.50
2	07-02-2015	88	114	9.40
3	09-02-2015	90	102	9.45
4	11-02-2015	91	106	9.25
5	12-02-2015	95	101	9.30
6	13-02-2015	90	102	10.50
7	18-02-2015	91	104	10.50
8	19-02-2015	94	105	10.50
9	20-02-2015	94	105	10.50
10	26-02-2015	91	103	10.50
11	27-02-2015	89	102	10.50
12	28-02-2015	90	103	10.50

iv. **Tower Maket:** This area is main commercial area and residential area. This area is called center of Hyderabad city and oldest area of city. At these points the levels are higher due to the vehicles crowded and narrow roads. Main reason of noise is high flow of traffic i.e. buses, coasters, rickshaws etc that is why they produce higher noise levels (Table-5).

**Table 05.** Noise Levels @ Tower Maket

S.No	Date	Min. Level (dB)	Max. Level (dB)	Time (AM)
1	06-02-2015	85	99	11.50
2	07-02-2015	86	100	10.20
3	09-02-2015	83	98	10.20
4	11-02-2015	85	101	10.30
5	12-02-2015	87	98	10.25
6	13-02-2015	84	101	11.50
7	18-02-2015	88	99	11.50

#### 4.2. Commercial zone:

All the places under commercial zone recorded fairly higher noise level than the prescribed limit. The average noise levels at Hala Naka Hyderabad ranged between 84.00- 90.00 dB and it was between 85.00- 90.00 dB at Liberty chowk. The noise levels in Tilk Incline were extremely high more than 100 dB.

**Table 06.** Noise Levels @ Hala Naka Hyderabad

S.No	Date	Min. Level (dB)	Max. Level (dB)	Time (AM)
1	07-02-2015	80	95	10.00
2	09-02-2015	86	101	10.00
3	11-02-2015	86	103	10.00
4	12-02-2015	88	99	10.00
5	13-02-2015	85	100	11.20
6	18-02-2015	89	98	11.20
7	19-02-2015	87	102	11.20
8	20-02-2015	89	97	11.20
9	26-02-2015	88	101	11.20
10	27-02-2015	90	100	11.20
11	28-02-2015	86	99	11.20

This area is main commercial area of Hyderabad. The other main reason behind higher levels of noise is due to narrow road, inclined of the road and existence of multi storied buildings around the road (Table-8). Shopkeepers and vendors who spend most of the time in these places are exposed to these high level noise and hence will have problems associated with noise pollution.

**Table 07.** Noise Levels @ Liberty chowk

S.No	Date	Min. Level (dB)	Max. Level (dB)	Time (AM)
1	07-02-2015	92	97	10.55
2	09-02-2015	86	101	10.55
3	11-02-2015	85	102	11.15
5	12-02-2015	89	101	11.15
5	13-02-2015	87	103	11.30
6	18-02-2015	90	99	11.30

7	19-02-2015	87	103	11.30
8	20-02-2015	84	100	11.30
9	26-02-2015	87	98	11.30
10	27-02-2015	87	100	11.30
11	28-02-2015	87	102	11.30

8	20-02-2015	89	100	11.50
9	26-02-2015	90	97	11.50
10	27-02-2015	85	101	11.50
11	28-02-2015	88	101	11.50

**Table 09.** Noise Levels @ Bacha Khan Chowk

S.No	Date	Min. Level (dB)	Max. Level (dB)	Time (PM)
1	07-02-2015	88	94	12.45
2	09-02-2015	92	101	12.45
3	11-02-2015	86	102	1.15
4	12-02-2015	87	101	1.15
5	13-02-2015	88	99	2.00
6	18-02-2015	88	100	2.00
7	19-02-2015	89	101	2.00
8	20-02-2015	86	98	2.00
9	26-02-2015	84	99	2.00
10	27-02-2015	85	97	2.00
11	28-02-2015	85	101	2.0

- i. **Hala Naka Hyderabad:** The reason behind higher noise pollution levels at this point seems to be due to flow of large number of heavy vehicles such as passenger coaches, trawlers trucks, four searters and rikshaws (Table-6).
- ii. **Liberty chowk:** At this point the traffic ply on three directions but the reason behind higher levels of noise may be due to narrow road and haeavy flow of all types of vehicles (Table-7).
- iii. **Tilk Incline:** This is main commercial and also resident area of Hyderabad city. We have noticed high level of noise in this area narrow road, inclined of the road and existence of multi storied buildings around the road (Table-8).
- iv. **Bacha Khan Chowk:** Rikshaws and Suzuki are the main reason to create noise pollution in this area (Table-9).
- v. **Gharib Nawaz Bridge:** The reason behind higher noise pollution levels at this point seems to be due to flow of large number of vehicles from five directions. Here the four searters in particular and rikshaws in general are the major sources that produce higher noise levels (Table-10).

**Table 08.** Noise Levels @ Tilk Incline

S.No	Date	Min. Level (dB)	Max. Level (dB)	Time (AM)
1	07-02-2015	90	92	11.20
2	09-02-2015	87	100	11.20
3	11-02-2015	87	101	11.45
4	12-02-2015	88	100	11.40
5	13-02-2015	88	100	11.50
6	18-02-2015	90	101	11.50
7	19-02-2015	85	102	11.50

**Table 10.** Noise Levels @ Gharib Nawaz Bridge

S.No	Date	Min. Level (dB)	Max. Level (dB)	Time (PM)
1	07-02-2015	90	97	1.00
2	09-02-2015	90	104	1.00
4	11-02-2015	91	104	1.40
3	12-02-2015	88	104	2.15
4	13-02-2015	87	104	2.15
5	18-02-2015	92	107	2.15
6	19-02-2015	90	105	2.15
7	20-02-2015	90	104	2.15
8	26-02-2015	90	105	2.15
9	27-02-2015	90	103	2.15

10	28-02-2015	88	105	2.15
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## 5. Effects of noise pollution on resident and shopkeepers:

Noise being one of the main pollutants of environmental carries its adverse effects on human health by way of causing various hazards depending upon its frequency, intensity and duration. These health hazards can be summarized as follows.

- i. Temporary hearing loss.
- ii. Permanent hearing loss.
- iii. Cardiovascular system and blood pressure.
- iv. Annoyance.
- v. Sleeping disturbance.
- vi. Loss of efficiency

i. **Temporary Hearing Loss:** The temporary hearing loss is physiological phenomenon referred to as a temporary loss of hearing (temporary threshold shift), which is reversible. When the normal hear is exposed to noise at damaging intensities for sufficiently long period of time, a temporary depression of hearing results and disappear after a rest of few minutes or hours.

ii. **Permanent Hearing Loss:** Noise induced permanent threshold shift is an irreversible loss of hearing that is caused by prolonged noise exposure. Prolonged exposure to excessive noise produces varying degree of inner ear damage, which is initially reversible. When a stage is reached at which hearing loss no longer returns to its original level that is called noise induced hearing loss or permanent threshold shift. Permanent threshold shift is a gradual irreversible damage to the nerves in the inner ear. It begins with a drop in sensitivity around 4 KHZ (ear most sensitive frequency) at which the maximum energy of noise lies. Generally this type of deafness is a case of occupational hearing loss by extended noise exposure. It is well known that extremely loud noises injures the ear. Sound greater than 140 dB can cause total deafness, rupture of the eardrums of damage to inner ear. Few hours of exposures to sound around 90 dB can cause a temporary shift in the threshold of hearing. If such stimuli are continued for greater than 8 to 12 hours, recovery may not take place within 24 hours of cessation. For comfortable hearing one needs sound at level of 55 dB and for relaxed conservation a background of 45 Db or less.

iii. **Cardiovascular System and Blood Pressure:** Noise may affect the rate of heartbeat, it may either increase or decrease depending on the type of noise. Sudden changes in sound level or sound spectrum also modify heart rates.

Noise generally cause heart output to decrease as well as an increase, or fluctuations in arterial blood pressure and vasoconstrictions or peripheral blood vessels. Sound cause disturbance in emotions. The emotion provoking stimuli causes increase in heart rate blood pressure and oxygen consumption. There is quantitative relation between the degree of emotions provoked and the magnitude of cardiovascular in sleep shows rise in serum cholesterol level, which is one of the risk factors in precipitating coronary heart disease. Sudden emotional upset can even leads to cardiac arrhythmia's in case of coronary artery disease.

iv. **Annoyance:** Noise annoyance may be defined as a feeling of displeasure evoked by noise. The annoyance including capacity of a noise depends upon many of its physical characteristics including its intensity, spectral characteristics and variations of these with time. The annoyance caused by noise is an individual psychological reaction and depends a great deal upon the physical status, mental attitudes and personal motivation of the person being annoyed. These factors are difficult to predict and defy objective measurement. In general, noise of high intensity, high frequency and intermittence tend to be more annoying but there are large individual differences in reaction.

i. **Sleeping Disturbance:** Noise may lead to sleep disturbance or awakening. Sleep disturbance even though it may not lead to full awakening, is frequently cited as main cause of annoyance. Depth of sleep is affected by noise and period of very deep sleep may be reduced in length by impulsive noise. Apparently, noise not only effects depth of sleep but also the type of sleep.

ii. **Loss of Efficiency:** The noise directly diminishes efficiency that lead to increased liability to accident and provides a persistently favorable background for the development of nervous and mental disorders of many kinds.

## 6. Conclusion:

The honking of horns, poor road conditions, flow of ill maintained vehicles, and encroachments find on road sides that cause traffic congestion were found to be the reasons for high noise level in hyderabad city. People in general, patients and students in particular are highly exposed to noise level. Residential areas are too exposed to the high noise level. The study also concludes that the

- i. Majority of the people are not aware about the safety protective equipments.
- ii. Mostly people belong to business and are less educated even under primary or middle and are not fully aware of the hazardous effects of noise.
- iii. Almost all the people are highly exposed to high noise levels [ $>80$  dB, without proper ear protection.
- iv. The shopkeepers should be motivated to use PPE and educated for NIHL and other non auditory affects of noise exposure.

## 7. Suggestions:

Following measures need to be taken to tackle the situation:

- i. Implementation of permissible noise level given in National Environmental Quality Standards to control the rising problems of noise pollution by Environmental protection Agency jointly with traffic police and related departments.
- ii. The use of pressure horns should be completely banned and periodic plan be chalked out by environmental protection agency jointly with traffic police and concerned departments for confiscation of horns during surprise checkups (say twice and thrice a week at different traffic routes).
- iii. Proper maintenance of roads
- iv. The heavy traffic should be banned from entering in the city premises.
- v. The owners of three wheelers be educated and motivated by awareness for the replacement of noisy silencers.
- vi. Construction of high rise buildings should be banned along the traffic flow routes.
- vii. The authorities are approached for removal of encroached areas along the traffic routes as this also results in congestion of smooth moving of vehicles.
- viii. Planting of recommended plant species.

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