Review of Traffic Noise Pollution: Case Study of India

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ABSTRACT

Sound causing disturbance to the living beings by being loud and displeasing in nature is termed as ‘Noise’. Noise pollution is the uproar triggering noise which causes harm to the activities of the human as well as animal life. Noise originates from various sources like machines, transport systems, traffic, construction works, etc. Poorly done urban planning can also be a cause for noise. Noise can have inimical effects on human health and causes a feeling of displeasure, irritation, and disturbance. Noise related hazards which occur for a long span affect the hearing ability of any individual exposed to it. Also, exposure to the high noise level can cause excessive stress on human beings affecting their auditory and nervous system. The noise coming from the traffic is considered as an environmental health problem. The traffic noise problem is an increasing problem in today’s world. In India, the traffic conditions are usually heterogeneous in nature. The conditions of traffic jams and sudden interruptions are very common in our country. Due to various reasons such as the heavy flow of traffic, very high speeds, large number of cars, buses, trucks, and scooters, irregular stopping of the vehicles at various locations rather than a desired stopping point results to traffic jams and hence contributes to the problem of noise pollution. Besides, in India, roads are narrow and the vehicles do not ply separately on the lanes, thus causing sudden increment and decrement in noise as vehicles approach each other or move away from each other. The objective of this research is to provide a perception about current situation of noise levels produced by various vehicles and traffic across various cities present in India, along with countless origins and effects of noise pollution. An attempt is made to make people aware about status of noise present highlighting their effects on environment along with the various ways of overcoming this situation.

Keywords: Noise, traffic, heterogeneous mixture Exposure,

1. INTRODUCTION

Noise can be labelled as unwanted because it affects an individual both physiologically and psychologically by interfering with the individual’s social ability. Noise is disturbing and is not liked because it is a nuisance, displeasing, distracting, interruptive in nature.

Noise pollution is the disturbing loud sound caused in the environment by various machines, vehicles, factories, etc, which threaten the health and well being of humans as well as animals. The mostly disturbing type of noise is the environmental noise or community noise. Community noise includes noise from rails, roads, air traffic, industries, and construction places, public works. Many measures have been taken over the last few years so that the impact of noise pollution because of the transport is reduced. The increase in the population results in an increase in the expose of the population to the increased level of noise.

For the people living in cities the growing rate of the pollutions like air, water, road noise, etc has posed as a new threat. The quality of living in the cities in the developing nations is decreasing gradually due to the increase in vehicles, construction and the population. An increased population leads to an increase in the intensity of traffic , thus increasing the traffic noise level. For the urban planners and the environment engineers, the big challenge is to overcome the road traffic noise. Noise produced due to moving traffic is considered as second most biggest problem after air pollution as per world health organization as it is affecting health the most . Majorly all the individually living in the world are unaware about the fact that the vehicular cars double the noise they as the vehicles used to produce some 40 years ago
This condition is worsening in majorly all cities thereby increasing chances of traffic stress among individuals which are major cause for stroke and heart related diseases.

Numerous researches have been carried out on the subject of noise pollution on roads caused by moving traffic and how it affects health of the living beings, physical and psychological effects, and individuals’ performance, diseases like hypertension, ailments related to heart, etc. Noise is a sound which is not wanted and causes social disturbance, stress, disorders of sleep, changes in hormones, increase in blood pressure, and also affects the quality of life.

In this study an analysis of the noise from the vehicular traffic during the peak hours of morning and evening is done. Data has been recorded in a random manner according to the variations in the conditions of traffic flow. Sound level meter has been used for measurement of noise parameters.

The study provides the data of the community noise levels measured in fast developing urban areas of India.

2. EFFECTS OF NOISE
[2] Noise affects both health and behavior of a living being. Unwanted sound is called noise. This unwanted noise affects and damages both psychological and physiological health. Noise can cause an annoying feeling and make him aggressive. Also, it causes effects like increasing levels of stress, sleep disturbances, hypertension, hearing loss and other harmful effects. High levels of noise lead to cardiovascular effects and if exposed to high levels cause an increase in the blood pressure and stress can also increase.

Increased levels of noise can cause immune system changes. Defect related to birth have been linked with the exposure of noise. Also, the noise can also increase stress and workplace related accident rates and other difference in behavior. Hearing damage is an established effect which is caused by a long and continuous exposure of intense sounds.

Noise affects the wildlife in many ways. The effects of noise on wildlife includes; auditory and physiological damages, and changes in behavior. The effects of noise are further categorized as: primary effects and secondary effects. The direct physical results caused to the animals are the primary effects and the alteration which indirectly occurs amid the animal and environment are categorized as secondary effects.

Noise is the disturbance caused in the environment and noise is increasing at an alarming rate becoming a major threat to the living beings. Due to the increase in pollution numerous effects are caused on the environment. Living beings are exposed to rising and dangerous levels of noise. Exposing continuously to a noise of volume more than 70 decibels leads to permanent damage to hearing. This can also lead to increasing heart beat, blood pressure, blood cholesterol, damage to respiratory system and digestive system. Stress disorders are also caused by constant exposure to noise, which further develops to ulcers and high blood pressure. It also causes mental illness and loss of productivity. Noise pollution also affects the quality of crops, damages nervous system of animals, weakens buildings, bridges and monuments.

3. OBJECTIVES OF THE RESEARCH
   1. To identify the various sources of pollution caused by noise in the country.
   2. To study how impact of noise pollution affects various living beings.
   3. To study the various diseases caused by the exposure of noise.
   4. To find the solutions for prevention against noise pollution.

4. MEASUREMENT OF SOUND LEVELS:
[9] For the measurement of noise the standard used is decibel. Zero of a decibel scale is at threshold of hearing, i.e., the lowest sound that is heard. According to research a whisper is at 20dB, a quiet workplace is at 40dB, normal conversation is done at 60dB, and the painful sound is at 80dB.
Effects | Primary | Secondary
--- | --- | ---
**Auditory** | Loss of hearing | Change in relationship of prey and predator

*Threshold shift:*
- **Temporary threshold shift:** temporary loss of hearing
- **Permanent threshold shift:** permanent hearing loss

**Physiological** | Stress, metabolism and hormonal change | Weakening of immune system, function reduction

**Behavioral** | Masking of signal, behavior avoidance | Reduction of population, loss of habitat

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[4]Noise is an ambient pollutant of air. For prevention in this respect, standards have been laid, The Environment (Protection) Act, 1986 and Model rules of the Factories Act, 1948 for purpose of safety and occupational health concerns.

[10]Central Pollution Control Board constituted National Committee of Experts on Noise Pollution Control. This Committee recommends standards for noise in air for automobiles, domestic appliances and construction equipment, which are notified under The Environment (Protection) Act, 1986 as under:

<table>
<thead>
<tr>
<th>Area Code</th>
<th>Category of Area</th>
<th>Limits in dB(A)</th>
<th>Leq</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Day time</td>
<td>Night time</td>
</tr>
<tr>
<td>A</td>
<td>Industrial area</td>
<td>75</td>
<td>70</td>
</tr>
<tr>
<td>B</td>
<td>Commercial area</td>
<td>65</td>
<td>55</td>
</tr>
<tr>
<td>C</td>
<td>Residential Area</td>
<td>55</td>
<td>45</td>
</tr>
<tr>
<td>D</td>
<td>Silence Zone</td>
<td>50</td>
<td>40</td>
</tr>
</tbody>
</table>

Due to an increase in the road traffic, because of the fast developments, expansion of economy, travel, tourism. Researches were carried out for the traffic noise pollution caused in India. An analysis of the noise caused by traffic and the impact caused by it on the life quality in the major areas of the country was made.

[6]Identification of the intensity of traffic and measurement of noise level at some selected sites was done. The noise levels which were recorded were found to be much higher than the allowed level and as such can cause illness related to health and psychology to an individual. Due to the traffic congestion which may be caused due to various factors, pollution of air is caused and as such agents are produced which are responsible for many health hazards. The congestion may be caused due to inadequate capacity, lack of pedestrian pavements, bicycles, and public transport like auto rickshaws, taxis, private buses, which contribute 30% or more to the traffic congestion. If the management of traffic is done properly then a lot of time can be saved and it can also lessen the congestion caused by the traffic. People living in slums experience pollution which affects them more; they also face threat of getting killed or getting injured by improper management of traffic. There is a need to make the people aware about the traffic noise pollution from the start.
Effects caused by noise pollution both physiological and psychological are given as under:

1) Human health, efficiency of an individual and comfort are affected by noise pollution. This causes blood vessels to contract, skin becomes pale, adrenaline hormone is secreted excessively ion the blood vessels causing a rise in the blood pressure.

2) Nervous breakdown is caused; tension and insanity can also be caused.

3) Effects of noise include fright, stress, and anxiety. These reactions can cause a change in the hormone content in the blood, due to which there is an increase in the heart beat, contraction of blood vessels, dilation of pupil of eye.

4) The most immediate and acute effect of noise is the impairment of hearing, which diminishes by the damage of some part of auditory system. When exposed to very loud and sudden noise acute damage occurs to the eardrum. Prolonged exposure to noise of certain frequency pattern will lead to chronic damage to the hair cells in the inner ear.

5) Temporary Threshold Shift is a condition in which temporary loss of hearing occurs at 4000-6000Hz. At 100dB permanent loss of hearing occurs. This is known as Permanent Threshold Shift. There may also be trauma, caused by high levels of noise.

6) Effects like neurosis, tension, hypertension, sweating, lightheadedness; ulcers, etc are some of the physiological effects of noise pollution.

7) Noise acts as an interference with communication.

8) A change in breathing magnitude is accounted by excessive noise. Also, blood gets thickened by the excessive noise.

9) Chronic headaches, irritation, work disturbances are caused by noise pollution. The overall workibg efficiency also is affected.

10) Loud noise produces startle effect causing damage to the brain known as sonic boom. These booms cause damage physically the property, i.e., cause breakage of windows.

5. METHODOLOGY

The study done is an empirical study of the various metro political cities of India. The samples show the expansion of the cities and the pollution caused by them in different months and years. As per National Environment Policy, NEP-2006, section 5.2.8, ambient noise has been included as a environment quality parameter. The study has been done at 35 locations in 9 cities viz, Mumbai, Kolkata, Delhi, Chennai, Hyderabad, Bangalore, Lucknow. This study presents an evaluation of the traffic noise disturbance caused in various cities and its effects on quality of life. In this study an effort is made to compare the noise level in some main areas of India during the morning hour and evening hour traffic using sound level meter. The noise level also varies according to the no of vehicles passing so the total vehicles were also recorded during the study. The readings were taken during early hours of the day (6.30 AM to 9.30 AM) and during evening rush hours (6.30 AM to 9.30 AM) and with those readings comparison of noise level are done.

The following parameters like

1. Total vehicle volume per hour
2. Atmospheric temperature
3. Relative humidity.
4. Type of vehicles crossing the area during the study.
5. Noise level in the particular area
A brief study at each of the places carried out is given below:

5.1 NOISE MONITORING AT DELHI
Delhi, capital of India lies in the northern region of India. It has an area of about 1480 square kilometers, which makes it one of the largest cities in terms of area. It’s the fifth most populated area in the world. In 2015 the total numbers of vehicles registered in the state were around 90,00,000 including light and heavy vehicles and 2-wheelers. The vehicles and the industries are the major sources of pollution in the state. Five monitoring stations were set up in Delhi.
5.2 NOISE MONITORING AT MUMBAI, THANE, NAVI MUMBAI

Mumbai, capital of Maharashtra, lies on the west coast of the country is a natural harbor. It’s spread over an area of around 650 sq.km. It’s the eighth populated city and has a population of around 13,00,000. Five monitoring stations were set up in the areas.
5.3 NOISE MONITORING AT LUCKNOW

Lucknow, capital of Uttar Pradesh lies in the northern part of the country. It’s the eighth populated city of India. The city has an area of 2600 sq km. In Lucknow five monitoring stations were set up.

Figure yearly average trend of 5 stations of Lucknow

<table>
<thead>
<tr>
<th>Stations</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
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<tbody>
<tr>
<td>Talkatora (I)</td>
<td>63</td>
<td>55</td>
<td>61</td>
<td>64</td>
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<tr>
<td>Hajrat Gunj (C)</td>
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<td>58</td>
<td>64</td>
<td>72</td>
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<tr>
<td>Indira Nagar (R)</td>
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<tr>
<td>Gomti Nagar (S)</td>
<td>71</td>
<td>61</td>
<td>68</td>
<td>63</td>
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</tbody>
</table>
5.4 NOISE MONITORING AT HYDERABAD

It's located in southern side of the country and has an area of around 700 sq km. the population is around 7,000,000.

<table>
<thead>
<tr>
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<th>2013</th>
<th>2014</th>
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<tbody>
<tr>
<td></td>
<td>Day Time</td>
<td>Night Time</td>
<td>24 Hr Avg</td>
<td>Day Time</td>
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<tr>
<td>Abids (C)</td>
<td>72</td>
<td>63</td>
<td>70</td>
<td>72</td>
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<tr>
<td>Pun jagutta (C)</td>
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<tr>
<td>Jee dimetla (I)</td>
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<td>56</td>
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<td>63</td>
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<td>Zeeo (S)</td>
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<td>Jublee Hills (R)</td>
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</tbody>
</table>
5.5 NOISE MONITORING AT BANGALORE

It’s the capital of Karnataka and lies in the Deccan Plateau, it has an area of around 750 square kilometers and population of 10,200,000.
### Yearly Avg. Sound level of 05 stations of Bengaluru

<table>
<thead>
<tr>
<th>Stations</th>
<th>2011</th>
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<th>2013</th>
<th>2014</th>
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<tr>
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<td>BTM (R)</td>
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</tbody>
</table>

5.6 **NOISE MONITORING AT CHENNAI**

Chennai is capital of Tamil Nadu and lies in south of India. It has an area of around 426 square kilometers. Its current population is around 4,800,000.
Kolkata is the capital of West Bengal and has an area of around 1480 square kilometers. It is bounded by Bangladesh and Bay of Bengal.

5.7 NOISE MONITORING AT KOLKATA
Kolkata is the capital of West Bengal and has an area of around 1480 square kilometers. It is bounded by Bangladesh and Bay of Bengal.
6. CONCLUSION

Through the results obtained in the study it’s very evident that the various cities are suffering from severe noise pollution due to the vehicular traffic. This is mainly caused by congested traffic area, unplanned road network, reduced one way traffic, unplanned urban sprawl etc. In many areas the level of noise is excessive, more than 85dB which is most common in cities during peak hours of traffic.

Through the results obtained in the study it’s very evident that the city is suffering from severe noise pollution due to the vehicular traffic, industries contribute less concerned with increase in noise pollution. This is mainly attributed towards congested traffic area, unplanned road network, reduced one way traffic, construction of silence zone in the main area of the city, unplanned urban sprawl etc.

Noise interferes at three levels in activities of humans;
1. The mechanism of hearing
2. The biological mechanism and functioning of the body
3. The subject’s sociological behavior.

Noise affects performance, physiology and psychology of an individual. Loud noise causes nervous disorder, high blood pressure, headaches, loss of memory. The effects of noise pollution on psychology are as follows:
A. Reduction of efficiency of a person, weariness, depression.
B. Chronic sleeplessness
C. Strain is caused on senses
D. Causes frustration and causes difficulty in concentrating, restlessness, physical tiredness and mental tiredness.

Noise, causes annoyance and irritation, losing of interest and affecting of work performance. Noise can improve or it can decline efficiency of work subject to the intensity, time duration, and frequency, etc.

7. REFERENCES


17) Anon., The Ambient Air Quality Noise Standards in respect of Noise, as per the GOI, MoE & F Notification Environment (Protection) Act, 1986 as amended in (2002) issued by CPCB Chennai


20) Anon., Noise : A Leaflet Published by Steel Authority of India Limited.( 2005 )


