



A COMPREHENSIVE REVIEW OF ADVERSE EFFECT OF NOISE POLLUTION ON HUMAN HEALTH AND ITS PREVENTION

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ABSTRACT

Noise pollution is one of the man-made environmental hazards that is given the least attention. Now a day, noise pollution is not a new problem for common man, especially in most of the industrial towns and metropolitans cities. Noise pollution means any sound that is undesired by the recipient. The effect of sound on human depends upon its frequency. Human ear is known to be sensitive to an extremely wide range of intensity varied from 0 to 180 db. There are two sources of noise pollution viz internal and external source of noise pollution. Prolonged exposure to the noise causes permanent loss of hearing and high blood pressure. The objective of this research work is to know about the various ways of generation of noise, their effects on human health and educate people about its prevention and control of noise pollution.

KEYWORDS: Enviromantal Hazards, Human, Ear, Pollution, High Blood Pressure.

INTRODUCTION

The term noise is resultant from Latin word “Nausea” indicating “unwanted sound” Noise pollution is a chief problem in cities around the world. Noise is defined as incorrect sound in the incorrect place at the incorrect time. World Health Organization defined noise pollution is unwanted or excessive sound that can have deleterious effects on human health and environmental quality. Human is living in a progressively loud atmosphere. The 20 centuries has been described as the “Century of Noise”. Noise pollution is one of the environmental nuisances created by urbanization.^[1] Noise pollution is not appear to be harmful as other form of pollution it is gradually becoming global form of pollution and affects human health and well-being as well on as ecological eminence.^[2] Florence Nightingale documented noise as a health threat in 1859 when she wrote “Unnecessary sound is the most cruel abuse of care which can be imposed either the sick or the well”.^[3] The noise is usually machine created that interrupts activity of human life. It is a rising ecological problem that is increasingly becoming an omnipresent yet unnoticed form of pollution not only in developed countries but also in the developing countries.^[4] Due to exposure of noise people are suffering from difference kinds of diseases like Hearing Impairment, Interference with spoken communication, Sleep disturbances, cardiovascular disturbances, Annoyance etc.^[5]

SOURCES OF NOISE POLLUTION

The major sources of noise can be broadly divided into two: external and internal sources.

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Chief sources of noise can be divided into two categories

1. External and
2. Internal sources.

External Sources of Noise

- Noise from traffic and automobiles.
- Noise from industries like quarries and mining industries.
- Noise from pedestrians; noise from religious institutions like churches and temples.
- Noise from advertising agents and hawkers.
- Noise from rallies like political campaigns.

Internal Sources of Noise

- Door slam
- Footfall (especially in multi-storey buildings)
- Conversation
- Radio and television sets
- Fans and air-conditioners
- Home appliances and motorised appliances such as power generating sets.^[6]

IMPACT OF NOISE POLLUTION ON HUMAN HEALTH

These are as follows

- Prolonged exposure to the noise causes permanent loss of hearing.
- Stress- cause reduction in efficiency at work.
- High blood pressure.
- Loss of sleep.
- Annoyance.
- Noise within home makes disturbance and loss of privacy.

The effect of noise is hard to measure because tolerance levels among different population and categories of noise vary considerably. Indiscriminate use of buzzers by the vehicles are found to be one of the main contributors. Noise pollution can also bother natural wild life and ecological system endangering the environmental sustainability.^[7]

Adverse Effect of Noise on Human Health

The WHO has documented seven categories of adverse health effects of noise pollution on humans.

The WHO has recognized seven categories of adverse effects of noise pollution on human health. These are come from the WHO Guideline on Community Noise pollution.^[8]

Loss of Hearing from Exposure to Noise

An individual exposed to a very loud noise such as a blast of firecracker at close range may leads to sudden and irreversible loss of hearing.^[9] This type of loss also called as acoustic trauma, is not a common way in which humans lose their hearing. Measurable impairment of hearing ability begins in the frequencies from 4 to 6 kilo. hertz (kHz); as an individual's exposure to noise continues, hearing loss increases in magnitude and encompasses more frequencies. This impairment of hearing is usually not noticed by the patient until it involves the frequencies considered most important for the understanding of speech (0.5 to 3 KHZ) By this time, significant damage has already been done in the cochlea and hearing loss in the high frequencies often exceeds 50 decibels^[10] Even more disquieting are results from our work with nimm1s which show that significant sensory cell degeneration can occur in the cochlea with noise exposures that initially do not produce any hearing loss. Therefore, the risk of sensory cell degeneration (and eventual permanent hearing loss) from seemingly innocuous noise exposures is much greater than was previously thought.^[11]

Preventing Noise-Induced Hearing Loss

Hearing loss is preventable due to the exposure of loud sound. To reduce the noise-induced hearing loss in adults and children can do the following:

- Recognize that noise-induced hearing loss can lead to pain or ringing in the ears (tinnitus), erudition hitches, communication hitches, distorted or muffled

hearing and an inability to hear some environmental sounds and warning signals.

- Recognize the sources of flamboyant sounds (such as gas-powered lawnmowers, power tools, gunfire, or music) that can contribute to hearing loss and try to diminish the exposure.
- The following behaviours should be adopted to protect their hearing loss:
 - Avoid the acquaintance of extremely loud sounds.
 - The volume of music systems should be turn down.
 - When possible move away from the source of loud sounds.
 - Use hearing protection devices when it is not feasible to avoid exposure to loud sounds or reduce them to a safe level
- About potential hearing loss done hearing assessment by a licensed audiologist.^[12]

Cardiovascular Disturbances

Noise elevate of stress hormone levels and oxidative stress. These factors can elevate the cardiovascular risk factor due to the development of vascular dysfunction and high blood pressure. A noise pollution has temporary and permanent effects on human's health.^[13] Noise acts as a nonspecific biologic stressor eliciting reactions that prepare the body for a fight response. Noise can stimulate both endocrine and autonomic nervous system responses that disturb the cardiovascular system and became the risk factor for cardiovascular disease. Acute exposure to noise activates nervous and hormonal responses leading to temporary increases in blood pressure, heart rate, and vasoconstriction (long-term daily exposure to noise levels above 65 dB and acute exposure to noise levels above 80 to 85 dB). Studies shows that individuals exposed to occupational or environmental noise of sufficient intensity and duration increases heart rate, peripheral resistance, increases blood pressure, increases blood viscosity and levels of blood lipids causes shifts in electrolytes and increases levels of epinephrine, norepinephrine, and cortisol. Sudden unexpected noise evokes reflex responses as well.^[14] Noise that does not inhibit the sleep of subjects may be still incite autonomic responses and emission of epinephrine, norepinephrine, and cortisol. These responses suggest that one can never completely get used to night-time noise.^[15] Reversible physiologic changes produced due to the exposure of temporary noise. Though noise exposure of sufficient intensity, duration, and unpredictability aggravates changes that may not be gladly reversible. The studies on the effects of environmental noise have shown an association between noise exposure and cardiovascular disease and it shows that the risk for noise-induced cardiovascular disease may be small.^[8] Blood pressures and levels of stress-induced hormones are elevated in those Children who live in noisy environments.^[5]

Disturbances in mental health

It is to be supposed that Noise pollution is not a cause of mental illness but it is considered that it accelerates and

intensify the progress of latent mental disorders. Noise pollution may contribute to the following adverse effects related to mental health:

- Anxiety.
- Stress.
- Nervousness.
- Nausea.
- Headache.
- Emotional instability.
- Argumentativeness.
- Sexual impotence.
- Changes in mood.
- Increase in social conflicts.
- Neurosis.
- Hysteria and
- Psychosis.

Children, elderly and those with underlying depression are particularly susceptible to these effects.^[16]

Sleep disturbances

Noise pollution is a main cause of sleep disturbances. Continuous sleep is known to be a prerequisite for good physiological and mental functioning in healthy persons. noise pollution during sleep causes

- Increased blood pressure.
- Increased heart rate.
- Increased pulse amplitude, vasoconstriction, cardiac arrhythmias.
- Increased body movement.

These effects do not decrease over time. Secondary effects include

- Fatigue.
- Depressed mood.
- Decreased performance.

Combinations of noise and vibration have a significant detrimental effect on health, even at low sound pressure levels.^[17]

Negative social behaviour and annoyance reactions

Annoyance means Feeling of irritation related with any agent or condition believed by an individual to unpleasantly effects on him or her. Annoyance significantly increased when noise is escorted by vibration or by low frequency components. The term annoyance does not cover the wide range of negative reactions associated with noise pollution these include annoyance, displeasure, withdrawal, helplessness, misery, anxiety, distraction, agitation. Social and behavioural effects are complex, subtle and indirect. These effects include changes in everyday behaviour, changes in social behaviour and changes in social indicators and changes in mood. Noise above 80 dB is consistently associated with decreased helping behaviour and increased aggressiveness.^[18]

Impaired task performance

Noise pollution impairs task performance, increases faults and decreases inspiration. Reading devotion, problem resolution and reminiscence are most strongly affected by noise. Noise produces negative after-effects on performance, particularly in children it appears that the longer the exposure, the greater the damage.^[19]

Prevention and Control of Noise Pollution

For the control and prevention of the noise pollution public awaking is very essential. Most of the persons in India have lack of knowledge about the noise pollution and its controlled. In this respect television, wireless, cyberspace and newspapers should give a campaign for wide publicity.

1. Minimization of noisy activities

Minimize noisy activities such as drilling, grinding or hammering during the middle of the day rather than early morning or late afternoon.^[20]

2. Elimination of noisy activities

Noisy activities and equipment should be eliminated from your premises where possible. Some noisy events and procedures can be carried out off site in a more appropriate location. Update your apparatus and change old noisy equipment with new quieter equipment. Some noisy activities can be removed all together such as turning off truck engines rather than allowing them to idle for long periods.^[20]

3. Control of the produced noise

Target the source that produced noise, the path which the noise travels or the location where the noise is heard should be controlled. Absorption covers surrounding walls, benches and objects with material that absorbs sound such as foam, rubber, adhesive cork or fiberglass wool. Machinery that produced the noise should be cover. Separate the noise producing machinery from other equipment. Vibration dampening prevents equipment vibrating as much by making the equipment stiffer. This may be done by adding extra support frames to mounted equipment. Use the sound absorbing obstacles between the noise sources. Barriers, screens, partitions and natural objects can all reduce noise which is heard outside the buildings. Enclosures isolate noisy activities in one sealed room. Heavy drapes on window or room with no windows are best and keep the door shut.^[20]

4. Isolation of noise sources

The source of noise should be controlled along with its transmission path. Small portion of sound energy from source goes to the individual through. Wall partitions and doors possess good insulation properties. Most sound waves are reflected bouncing back and forth from wall and other obstacles in an enclosed space with each impact the noise gets weaker. Acoustic material lined on walls and ceilings can reduce noise levels within a room for a small area. For large rooms it is not usually the best

method because acoustic absorption is most effective when it is located near the source. It is most suitable method to enclose the individual machines or setup acoustic barriers close to them.^{[21][22]}

5. Personal isolation form noise source

Personal hearing protectors (earplugs and earmuffs) should be properly selected and carefully fitted. In case of noise produced by a machine volume reduction can be achieved by the reduction of its speed. The important property of solid-state plasma is that it retains its own properties and yet attains the plasma state due to the presence of free carriers inside the medium. The elastic properties of solid-state plasma medium determine the mode of propagation and speed of sound through it, the suppression of noise is possible by using solid state plasma medium.^{[21][22]}

6. Green belt development

Green belt development can attenuate the sound levels. The degree of attenuation varies with species of greenbelt. The statutory regulations direct the industry to develop greenbelt four times the built-up area for attenuation of various atmospheric pollutants, including noise Using protection equipment Protective equipment usage is the ultimate step in noise control technology. The first step in the technique of using defensive equipment is to gauge the intensity of the problem, identification of the suffer and his exposure to the noise levels. For the regulatory standards pertaining to time of exposure the maximum noise levels allowed in a workspace environment. The usage of defensive apparatus and the worker's exposure to the high noise levels can be minimized by rotating the job between the workers working at a particular noise source or isolating a person, the adverse impacts can be reduced. Regulations prescribe that, noise level of 90 dB (A) for more than 8 hr continuous exposure is forbidden. Persons who are working under such circumstances will be exposed to occupational health hazards. The schedule of the workers should be planned in such a way that they should not be over exposed to the high noise levels. Control of noise has been covered in three major legislations: Factories Act 1948, Motor Vehicles Act 1988 and Environment Protection Act 1986.^{[21][22]}

Noise Reduction Measures

Noise can be reduced by following measures.

- 1) Introduction of alternate fuelled vehicles like CNG/LPG.
- 2) Placement of Sign board along with specification of noise limit.
- 3) Educating the people: public awareness of the hazards of noise should be aroused. Also, peoples should be made aware regarding the Legislation to Control Noise Pollution.
- 4) Plantation should be encouraged in all areas.
- 5) Construction of porous roads should be encouraged.^[23]

CONCLUSION

This paper explores the sources, effects and suggestions for controlling the excessive noise. Automobiles, industries, public address system turns out to be major sources of noise pollution. In our daily activity knowingly or unknowingly every one of us contribute to create noise pollution. Noise pollution adversely affects the human being leading to irritation, loss of concentration, loss of hearing. Efforts shall be made to identify the sources of noise pollution and the reasons for increase of noise levels. Efforts shall be made to reduce the undesired noise levels from noise generating sources. This leads to marginal reduction of noise levels at the source.

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