

Chapter 12

Noise pollution sources in India and their effect on human health

Fuentes de contaminación acústica en la India y su impacto en la salud humana

Sahdev^{1,*}, Neelkamal sahu²,

^{1,2}School of Studies in Environmental Science in Pt. Ravishankar Shukla University, Amanaka, Raipur, Chhattisgarh 492010

Email- *sahdevsahurkb@gmail.com, neelsahu912@gmail.com

ABSTRACT

Noise pollution is a growing problem in India. Noise pollution in India This problem is increasing continuously in some such states. Since the beginning of Covid-19 here, people have spent time in their homes and have used many electronic items like earphones, MP3, TV, etc., which has affected their health. Many electronic devices used for human convenience, sounds of industries, sounds of vehicles, appliances used in homes, generators used in fields, etc. are sources of constant noise. This is having an impact on the environment and human life. This is having an effect on health. Human being exposed to and hearing sound more than 60dB has an effect on human health. Human being exposed to the sound for a long time suffers deafness due to pressure on their ears and continuous exposure to sound has immediate effect and long-term effect on health. Such as loss of hearing, change in behavior, sleeplessness, BP problem, etc. Through this review, we have studied the sources of noise pollution in India and their effects on human health.

Keywords: Noise pollution, sources, human health, and India

RESUMEN

La contaminación acústica es un problema creciente en la India. Contaminación acústica en la India Este problema está aumentando continuamente en algunos de estos estados. Desde el inicio del COVID-19 aquí, las personas han pasado tiempo en sus hogares y han usado muchos artículos electrónicos como auriculares, mp3, televisión, etc., lo que ha afectado su salud. Muchos dispositivos electrónicos utilizados para la comodidad humana, los sonidos de las industrias, los sonidos de los vehículos, los electrodomésticos utilizados en los hogares, los generadores utilizados en las granjas, etc., son fuentes de ruido constante. Está teniendo un impacto en el medio ambiente y la vida humana. Está teniendo un efecto sobre la salud. La exposición y la audición de sonidos superiores a 60 dB tienen un impacto en la salud humana. Los seres humanos expuestos al sonido durante mucho tiempo sufren sordera debido a la presión en los oídos y la exposición continua al sonido tiene efectos inmediatos y a largo plazo en la salud. Como pérdida de audición, cambio de comportamiento, insomnio, problemas de presión arterial, etc. A través de esta revisión, hemos estudiado las fuentes de contaminación acústica en India y sus efectos en la salud humana.

Palabras clave: Contaminación acústica, fuentes, salud humana e India

INTRODUCTION

Across the world, noise pollution is emerging as a major environmental threat to public health. Lately, noise pollution in India has been an increasing trend due to the rapid development of industrialization and urbanization. The growing number of cars, trucks, automobiles and two-wheeled vehicles has played an important role in the production of high-pitched noise and noise pollution from vehicles. Poor urban planning and lack of space in cities have led to the construction of houses near railway lines, airports, industries, and busy roads. This has resulted in a high risk of exposure of the general population to health risks caused by noise (Goines, L., & Hagler, L. 2007, Muzet, A. 2007, Stansfeld, S. A., & Matheson, M. P. 2003, & Rajalakshmi, R., et al., 2016). The noise problems of the past pale in significance compared to those of modern urban dwellers; noise pollution continues to increase in magnitude, frequency, and severity due to population growth, urbanization, and technological developments (Hsu, T., et al., 2012). Noise pollutants are a growing international problem, but they have grown critically in metropolitan cities of developing international locations. Delhi, the rural capital of India, is the second worst city in the world with the highest noise pollution in the world. This is observed in Cairo, Mumbai, Istanbul, and Beijing, as noise pollutants in these cities had reached three figures. A look at Mimi hearing technology and the Berlin Charity College sanatorium at the end of the year found that Delhi is second only to China's Guangzhou in terms of the degree of hearing loss suffered by citizens as a percentage of their age (FIM, J. H. 1974). Due to noise exposure, people suffer from various types of diseases such as hearing impairment, voice communication disorder, sleep disorder, cardiovascular disorder, annoyance, etc. (Basner, M., et al., 2014).

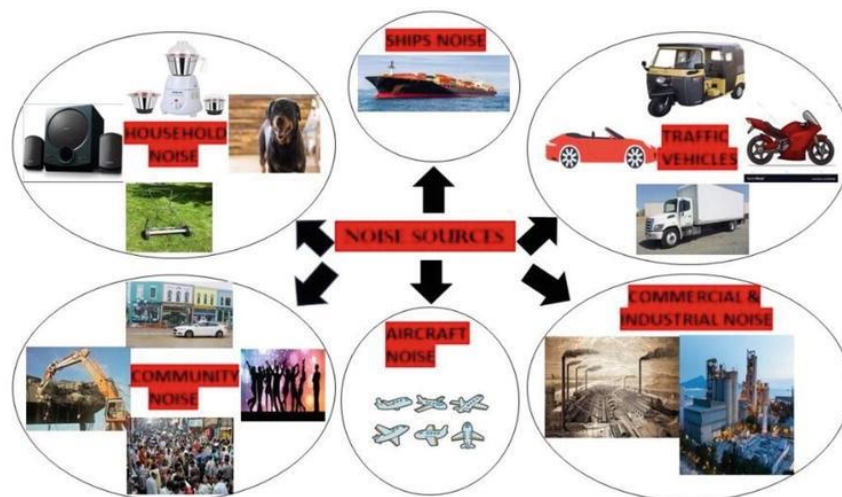


Figure 1. Different noise sources.

Source (Farooqi, Z. et al., 2020)

Here are the sources of noise pollution

Sources of noise pollution

1. Industrial sources

Technological progress (industrialization) has led to noise pollution. Textile factories, printing houses, mechanical engineering companies, metallurgy, etc. contribute significantly to noise pollution. In industrial cities like Kolkata, Ludhiana, Kanpur, etc., industrial areas are often not separated from residential areas of the city, especially in small industries (Peng, C., et al., 2015). These operate from workshops located on the ground floor of residential areas, causing annoyance, discomfort, and inconvenience to residents who are exposed to the noise that is inevitably generated. The situation is much better in modern planned cities such as Chandigarh, where the industrial area is kept away from residential areas and both are separated from each other by a sufficiently wide green belt (Azizullah, A., et al., 2011).

2. Transport vehicles

The automotive revolution in urban centers has proven to be a major source of noise pollution. The increase in traffic has led to traffic jams in congested areas where the repeated horns of impatient drivers pierce the ears of all road users (E.M. Simmonds et al., 2004). Aircraft noise is an increasingly serious problem in major cities such as Delhi and Mumbai. The airport is close to metropolitan areas and aircraft fly over residential areas. Heavy trucks, buses, trains, jet planes, motorcycles, scooters, mopeds, jeeps - the list of vehicles is endless, but the result is the same - noise pollution (Chethan. M., 2020).

3. Household

Housekeeping is an industry in itself and the source of many interior noises such as slamming doors sounds of children playing, babies crying, furniture moving, loud conversations between residents, etc. Added to this are the home entertainment facilities, namely the radio, record players and televisions. Household appliances such as blenders, pressure cookers, desert coolers, air conditioners, exhaust fans, vacuum cleaners, and sewing and washing machines are all sources of indoor noise pollution (LI, W.C., et al ., 2016).

4. Public communication system

In India, people only need the slightest excuse to use speakers. The reason may be a church service, birth, death, marriage, election, station dem, or just commercial advertising. The public system thus contributes in its way to noise pollution (Chethan. M., 2020).

5. Agricultural machinery

Tractors, threshers, harvesters, tube-wells, tillers, etc. have made agriculture both very mechanical and also very noisy. In the state of Punjab (Chethan. M., 2020).

6. Various sources

Other sources of noise pollution are auto repair shops, construction work, explosives, bulldozers, rock crushing, etc. M., 2020).

7. Defense equipment

Much noise pollution is added to the atmosphere from artillery, tanks, rocket launches, explosions, military aircraft, and target practice. The screams of jet engines and sonic booms have a deafening impact on the ears and in extreme cases are known to shatter windows and dilapidated old buildings (Kim, K. H., et al., 2015).

For the control of noise pollution by the Government of India, different permissible limits have been set in day time and night time which are shown in Table 1.

The Noise Pollution {Regulation and Control} Rules, 2000 SCHEDULE

(See rule 3(1) and 4(1))

Ambient Air Quality Standards in respect of Noise

Table: 1 Permissible Limit of Noise Levels Laid by Central Pollution Control Board India (CPCBI).

Area Code	Category of Area / Zone	Limits in dB(A) Leq Day Time (from 6.00 a.m. to 10.00 p.m.)	Limits in dB(A) Leq Night Time (from 10.00 p.m. to 6.00 a.m.)
I	Industrial Area	75	70
C	Commercial Area	65	55
R	Residential Area	55	45
S	Silence Zone	50	40

Some of the effects of noise which affect the health of human beings. This is the following.

Human health effect

1. Hearing impairment:

Hearing is essential for well-being and safety. Hearing impairment is generally defined as an increase in the threshold of hearing as assessed clinically by audiometry. Hearing loss can stem from work, community, and a variety of other causes (eg, trauma, ototoxic medications, infection, and heredity) (Hsu, T., et al., 2012). It is generally accepted that exposure to sound levels below 70 dB does not cause hearing damage, regardless of the duration of exposure. There is also general agreement that exposure for more than 8 hours to noise levels above 85 dB is potentially dangerous; to put it in context: 85 dB is roughly equivalent to the traffic noise

of heavy trucks on a busy road. At sound levels above 85 dB, the damage is related to sound pressure (measured in dB) and exposure time. The leading cause of hearing loss is occupational exposure, although other sources of noise, particularly recreational noise, can cause significant deficits. Studies suggest that children appear to be more vulnerable than adults to noise-induced hearing loss (Berglund B, et al., 2007). Noise-induced hearing loss can be associated with abnormal volume perception (volume recruitment), distortion (paracusis), and tinnitus. Tinnitus can be temporary or become permanent after prolonged exposure (Basner, M., et al., 2014). The ultimate consequences of hearing loss are loneliness, depression, reduced language discrimination, reduced school and work performance, limited job opportunities, and a sense of isolation (Passchier-Vermeer, et al., 2000).

2. Negative social behavior and annoyance:

Irritation is defined as a feeling of displeasure associated with an agent or condition that a person believes is negatively affecting him. Perhaps a better description of this reaction would be disgust or fear. Noise has been used as a harmful stimulus in several studies because it produces the same type of effects as other stressors. The annoyance increases significantly when the noise is accompanied by vibrations or low-frequency components (Basner, M., et al., 2014). The term annoyance does not include the wide range of negative reactions associated with noise pollution; these include anger, disappointment, discontent, withdrawal, helplessness, depression, anxiety, distraction, excitement, or exhaustion. A lack of perceived control over the sound amplifies these effects (Goines, L., & Hagler, L. 2007). The social and behavioral effects of noise exposure are complex, subtle, and indirect. These effects include changes in daily behavior (e.g. closing windows and doors to eliminate outside noise, avoiding the use of balconies, patios, and yards, increasing the volume of radios and televisions); Changes in social behavior (for example, aggression, unfriendliness, non-participation or withdrawal); and changes in social indicators (e.g. residential mobility, hospital admissions, drug use, and accident rates); and mood swings (increased reports of depression) (Singh, N., & Davar, S.C. (2004). Noise exposure by itself is not believed to induce aggressive behavior. However, in combination with pre-existing provocation, anger or hostility, alcohol or other psychoactive substances, noise can cause aggressive behavior (Passchier-Vermeer, et al., 2000). The consequences of the nuisance are personally felt dissatisfaction, publicly expressed complaints to the authorities (although the underestimation is likely significant) and the negative health effects already identified. Since discomfort can mean more than mild irritation, it describes a significant deterioration in the quality of life, which corresponds to deterioration in health and well-being. In this regard, it is important to note that annoyance does not decrease over time despite continued exposure to noise (Berglund, B., et al., 2007).

3. Interference with Spoken Communication:

Noise pollution interferes with the ability to understand normal language and can lead to various personal disabilities, disabilities, and behavioral changes (Basner, M., et al., 2014). These include problems with concentration, fatigue, insecurity, lack of self-confidence, irritation, misunderstanding, impaired work

capacity, disturbed interpersonal relationships, and stress reactions. Some of these effects can lead to more accidents, disruption of communication in the classroom, and reduced academic performance. Particularly vulnerable groups include children, the elderly, and people who are not familiar with the spoken language (Passchier-Vermeer, et al., 2000).

4. Sleep Disturbances:

It is well known that uninterrupted sleep is a prerequisite for good physiological and mental functioning in healthy individuals. Ambient noise is one of the main causes of insomnia. When sleep disturbances become chronic, the consequences are mood swings, decreased performance, and other long-term effects on health and well-being. Much recent research has focused on aircraft, road, and train noise. For example, continuous noise above 30 dB is known to interrupt sleep. For intermittent noise, the likelihood of being awakened increases with the number of noise events per night (Berglund, B, et al., 2007).

Primary sleep disturbances are difficulty falling asleep, waking up often, waking too early, and changes in sleep stages and depth, particularly a reduction in REM sleep (Basner, M., et al., 2014). In addition to various effects on sleep itself, noise during sleep causes increased blood pressure, increased heart rate, increased pulse width, vasoconstriction and changes in breathing, cardiac arrhythmias, and increased exercise. For each of these, the threshold and response relationships can be different. Some of these effects (eg awakening) diminish with repeated exposure; others, particularly cardiovascular responses, do not. The secondary effects (so-called after-effects) measured the next day are fatigue, depressed mood, well-being, and decreased performance. The decrease in alertness leading to accidents, injuries, and death has also been attributed to sleep deprivation and disturbed circadian rhythms (Firdaus, G. and Ahmad, A. 2010). Long-term psychosocial effects have been associated with nocturnal noise. Noise pollution during the night increases the total noise pollution for the next 24 hours. Particularly sensitive groups include the elderly, shift workers, individuals vulnerable to physical or mental disorders, and those with sleep disorders (Passchier-Vermeer, et al., 2000).

5. Cardiovascular Disturbances:

A growing body of evidence confirms that noise pollution has both temporary and permanent effects on humans (and other mammals) via the endocrine and autonomic nervous systems (Singh, N. & Davar, S.C., 2004).

Sound has been hypothesized to act as a non-specific biological stressor that triggers responses that prepare the body for a fight-or-flight response. For this reason, noise can trigger both endocrine and autonomic nervous system responses that affect the cardiovascular system and thus can be a risk factor for cardiovascular disease. These effects become evident with prolonged daily exposure to noise levels above 65 dB or with acute exposure to noise levels above 80-85 dB. Acute exposure to sound activates nerve and

hormonal responses, leading to transient increases in blood pressure, heart rate, and vasoconstriction. Studies in individuals exposed to occupational or environmental noise show that exposure of sufficient intensity and duration increases heart rate and peripheral resistance, increases blood pressure, increases blood viscosity and blood lipids, induces changes in electrolytes, and increases blood pressure. Levels of adrenaline or epinephrine and cortisol. Sudden and unexpected sound also evokes reflex responses (Goines, L., & Hagler, L. 2007). Cardiovascular disorders are independent of sleep disorders; the noise that does not interrupt the sleep of the subjects can in any case trigger autonomous responses and secretion of adrenaline, adrenaline, and cortisol. These reactions suggest that one can never completely get used to nocturnal noise (Passchier-Vermeer, et al., 2000). Temporary noise exposure causes easily reversible physiological changes. However, exposure to noise of sufficient intensity, duration, and unpredictability causes changes that may not be as easily reversible. Studies that have been conducted on the effects of ambient noise have shown an association between noise exposure and subsequent cardiovascular disease. Although the increased risk of cardiovascular disease from noise is limited, it is important for public health as both the number of people at risk and the noise to which they are exposed continue to increase (Berglund, B, et al., 2007).

6. Disturbances in Mental Health:

Noise pollution is not considered a cause of mental illness, but it is thought to hasten and amplify the development of latent mental disorders. Noise pollution can cause or contribute to the following adverse effects: anxiety, stress, nervousness, nausea, headache, emotional lability, sexual aggression and impotence, mood swings, increased social conflict, neurosis, hysteria, and psychosis (Berglund B, et al., 2007). Population-based studies have suggested associations between noise and mental health indicators, such as B. a rating of well-being, symptom profiles, use of psychotropic and sleeping pills, and admission rates to nursing homes. Psychiatric hospitals, Children, the elderly, and people with underlying depression may be particularly vulnerable to these effects because they may not have adequate coping mechanisms. Children living in noisy environments find noise disturbing and report reduced quality of life (Basner, M., et al., 2014). Noise levels above 80 dB are associated with both an increase in aggressive behavior and a decrease in behavior helpful to others. The news media routinely reports violent behavior related to noise-related disputes; In many cases, these conflicts also endanger children. Children living in noisy environments have been shown to have increased blood pressure and stress-induced hormone levels (Basner, M., et al., 2014), Ended in injury or death. The effects of noise mentioned above may help explain some of the dehumanization observed in the modern, congested and noisy urban environment (Goines, L., & Hagler, L. 2007).

Some laws have been made to control the problem of noise in India which is as follows.

Existing Legal Provisions for Controlling Noise

Section 268 of the Indian Criminal Code⁶ states that "Anyone guilty of public nuisance who commits any act or is guilty of unlawful negligence causing general harm, danger or nuisance to the public or persons in

general living or occupying the property in the vicinity, or that must necessarily cause harm, impediment, danger or harassment to persons who may have reason to exercise a public right. "Article 290 says:" Whenever someone commits a public disturbance which in any case is not otherwise punishable by this Code, will be punished with a fine of up to Rs 200 / -. According to Article 133 of the Code of Criminal Procedure, the magistrate has the power to conditionally order that the person causing the disturbance removes the disturbance (Kumar, B., et al., 2004).

CONCLUSION

Noise pollution has become a big problem today. This is causing a lot of health problems to the people working in the industries. The main reason for this is being in constant contact with equipment that produces noise pollution. People living near tariff signals, railway stations, airports, etc. are also facing various health problems. Today the young generation is constantly using noise pollution devices, knowing that it is a harmful factor for the healthy. To deal with the problem of noise pollution, government and non-government organizations should jointly run awareness campaigns at schools, colleges, stations, etc. so that this problem can be reduced. Industrial equipment should be periodically checked and the people working in it should be subjected to periodic health checks.

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