

# A Review on Noise Pollution Control on Residential as well as Non-Residential Areas

Monalisha Urikхинbam<sup>1\*</sup>, Chitra Shijagurumayum<sup>2</sup>, Thokchom Suresh<sup>3</sup>

<sup>1\*</sup> Department of Civil Engineering, Manipur Institute of Technology, Imphal, India; e-mail: monalishaurikхинbam80@gmail.com

<sup>2</sup> Department of Civil Engineering, Manipur Institute of Technology, Imphal, India.

<sup>3</sup> Department of Civil Engineering, Manipur Institute of Technology, Imphal, India.

## ABSTRACT

Noise pollution is considered to be any unwanted or distressing sound that causes the health issues and affects the well-beings of humans and other organisms. Exposure to loud noise can also cause health hazards. The consequences of sound on living being hinge on upon its frequency. The frequency limits from 20Hz to 20,000Hz are audible, not all the sounds produced by vibrating the bodies or from different source are distinct. The operative techniques must be used to control and prevent of noise from implementation of the nature and the source itself is today's need. In this study, we shall discuss the various methods which may be brought about regarding noise control which is coming from different sources around us. This review of various research works on the impacts of noise pollution at different environmental areas like schools, construction sites, etc. and to prevent or control and recommendation of noise criteria for the noise pollution by using different measures or devices.

**Keywords:** Acoustics, Airborne, Noise pollution

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## INTRODUCTION

Noise is derived from the Latin word "nausea" hint at 'unwanted sound' or 'sound that is hostile or unexpected' that surpassed from the normal range [1,7]. Sound and noise waves in air result from physical commotion of air molecules, that creates difference in pressure in the medium where the wave travels e.g. When a person pulls out guitar strings or moving out building by a truck noise wave produces are connected and arrive to listener by numerous direct through and indirect path [14]. Sound is characteristically described in terms the pitch (frequency) and the loudness (amplitude) of the wave. Loudness, also known as sound pressure level or SPL (Sound Pressure Level) is measured in logarithmic units called decibel (dB) and A-weighting (dBA) also commonly works well for a large range of average noise levels, whereas C-weighting (dBC) is sometimes functional to very loud noises [16]. The sound range categories into two parts – hearing threshold and pain threshold. The normal human ear can adapt sounds range from hearing threshold to pain threshold i.e. 0dB to about 140 dB, but the range between 120dB and 140dB are triggering pain to hear i.e. pain threshold. Sound pressure level

**Corresponding Author :** Monalisha Urikхинbam, Department of Civil Engineering, Manipur Institute of Technology, Imphal, India;

e-mail: monalishaurikхинbam80@gmail.com

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decibel values are different in different zones and it decrease with distance from the source. As the construction activities site that contribute a major noise influence, the noise can produce SPLs upto 105dB, while in the quiet zone like library where maintaining noise is healthy mandatory SPL is about 35dB only and in a public place or inside a public transport it produce SPL upto 85dB. With the increase of adversative effects of hostile sounds, noise has become one of the major sources of pollution in this contemporary times. Noise is the major cause of apprehension in developing as well as developed

countries. A sound wave is stereotypically made up of vibrations at different frequencies. A single point in one second moving at the speed of sound in air is basically the frequency of the numbers of waves. A frequency of one hertz (Hz) is generally one wave per second. A frequency of 1000-hertz is a kilohertz (kHz) [8,10]. The range between 200Hz and 5kHz frequencies are carried human speech, while the actually sound that generally human ear can perceive are in between 25Hz and 13kHz, a wider range. Frequencies below 20 Hz can be distinguished as a vibration, yet not audible to most people [10]. When undesirable noise are exposed for a prolonged period, the noise can cause irritation, fatigue, degradation in listening power, and some cases even permanent damage to the ear. It has been observed that the sound above 90 decibels can cause chronic hearing damage [13]. In terms of music styles people prefer any kind music of their taste and they do not cause statistically significant changes in control accuracy, but some kind of music genre showed lessening in control accuracy. Music are best kind of therapy for people who are need to heal but some certain music kept distracted the people living around and it was harder to concentrate [9].

The most common manifestation of noise effluence is hearing loss or diminishing. Hearing impairment is mostly classified as occupational hazards especially when the individual is affiliated with industry that propagates loud sound or noise [5]. The exasperation of noise increases significantly when unwanted sounds is accompanied by low frequency components or vibration. Noise effluence interferes with the ability to grasp normal speech and may lead to a person's mental health, disabilities and behaviors changes. Environmental noise causes different kinds of disturbance in day-to-day life even disturbed normal person's rest hours. When sleep disruption becomes chronic, the results are mood changes, decrements in performance, and other long-term effects on health and welfare. Many research centers have developed new sustainable materials, in many cases with thought-provoking acoustical properties [11,17]. Children who live in noisy atmospheres are likely to have elevated blood pressures and elevated levels of stress-induced hormones causing numerous health hazards [6,12]. Studies regarding the physiological and sleep disturbances are quite negligible in some places [15]. The adverse effects of noises of high decibels calls for details study to bring about sustainable solutions to mitigate such pollutions as far as possible. The objective

of this paper is to review various works contributed by researchers in the field of noise control.

## FINDINGS OF VARIOUS RESEARCHERS

Dasarathy A.K. et.al. [1] The study principally deals with noise effluence in extensive range to public from construction activities, noise carried due to movement of train near railway station and pedestrian way. Some of the places where noise measurement carried out are bored pile (during drilling, driving the casing and concreting), pedestrian location, cars of different year of manufacturing, railway station, etc. The 'A' weighted network was used as it resembles very closely to a person's hearing sensitivity. At an interval for every 10 seconds the noise levels dataset were collected from daytime.

Geetha M et.al. [2] Deals with identifying the influences which affects the developing areas with numerous construction sites that produced overbearing noise. They deliberate different journals, papers, books, and related literatures about noise effluences in construction sites. Moreover, they identified various impacts which distress the society through noise pollution from literature survey. The construction worksite noise is accredited as fuel power equipment, cutting and welding processes, heavy machinery, etc. As a result, various harmful effects of noise effluence at construction site lead to different health hazards like hearing problems, sleeping disorders, cardiovascular issues, etc.

Hazel Kiddo et.al. [3] The quality of noise pollution in school environment located in residential areas were discussed and give information in details for noise levels. Three schools are chosen and the comparison between the measured noise level is performed to determine which school has a very high noise level. In this study, sound level meter with data logger is used. For 8 hours periodically, data observation is collected during class sessions. Among the three schools, one school is located near highway and shophouses and so has a noise level of 68 dBA. Second school has noise level in the critical range and third has low noise level.

Diwakar Sahota et.al [4] To control noise pollution in our built environment and what type of background sound should be recommended in which to keep or create a balance of acoustic around a listener. A sound level meter device is used to measure the vibration yields pressure fluctuation.

Pelumi E Oguntemda et.al. [5] studied and analyzed the noise pollution levels in 41 locations

across Ota metropolis. The datasets were collected intermittently thrice per day; morning, afternoon and evening. This helps in determining probability model which is capable of predicting the noise pollution level. Moreover, the model can be used in different geographical settings where noise effluence poses a perceived menace to the public health of the population. The mean noise level varies for different time period in a day from morning to afternoon then evening, with level of 90.78 in morning which is higher than that of afternoon and evening which means 90.6 and 90.72 respectively.

Azimi [6] Acoustic absorber is the main emphasis for the control of room noise that sound absorbing materials or technologies as an effective noise reduction technology using sustainable acoustic absorbers in building.

Lavanya C et.al [7], it is to control the excessive noise from sources, effects and reactions by signifying effective measures. The total urban noise is mostly contributed by traffic by about 55%. Daily exposure sound from 60dB increases heart disease by 20%. Moreover, exposure from 85 dB for a period more than 8 hours leads to risk in hearing and above 120 dB marked the hearing damage. from their findings noise limits in decibels dB for Window air conditioners of 1 tonne to 1.5 tonne (68 dB), Air Coolers (60 dB), Refrigerators (46 dB) and 78 dB for Front loaders, Cranes (movable), Compactors (rollers), Vibrators and Saws.

Sayed Maha boob basha et.al.[8] As developing areas are very fond of constructing or developing activities causes physical disturbance by certain type of noise or sound waves presence in air molecules that leads to contaminate the area with noise pollution. According to the study, the levels of the inside noise proposed to a building which are built in the traffic area should be reduce to the capable inside noise criteria.

## MATERIALS USED

The materials used by different researchers are:

- 1) HTC make Sound Level Meter [1]
- 2) Ota Metropolis [5]
- 3) Natural fibers (coconut, kenaf, hump, etc) [6]

## RESULTS AND DISCUSSIONS

Darathy A.K. et.al. [1], acknowledged that often neglected but noise or annoying sounds is generated mostly by human daily activities. Noise are paramount up from all different source in one way or another. By the well-informed authorities, some specific locations

that contribute way to much in generating noise like pedestrian, railway station, construction site were measured up. The noise level value at pedestrian location is between 60dB to 110dB and 45dB to 110 dB range at railway station. However, the value were exceed from the prescribed value suggested by specific authorities. In order to reduce the noise, engineered exercised the control of sound waves at the source.

Geetha M et.al. [2], from environmental survey, the building activities or construction sites were the major cause for contributing noise. The study concluded that 55% of noise from equipment, 15% of noise levels were contributed by heavy machineries. With all these types of noise 30% of noise produced at site by construction laborers and workers are highly-pretentious.

Hazel Kiddo et.al.[3], upon a brief study, the noise pollution contributed by the below are as follows- students (41%), traffics (30%), construction (12%), shopping activities (2%). Regarding the study, at around 12 noon to 1 pm duration noise level was maximum. Moreover, in order to prevent from the adverse affect around school area the noise range of 35dB to 55dB should be maintain. To maintain the imperative noise near school environment public school children were tested to determine whether quiet (45-55 dB), average (55-70 dB), and noisy (75-90 dB).

Diwakar Sahota et.al [4] Due to the increase in construction noises around us in this developing nation, noise control become an important building service. With the help of engineered approach one can easily use the basic means to reduce the effects of noise in our day-to-day life.

**Table-1:** Recommended noise criteria range for various interior spaces. [4]

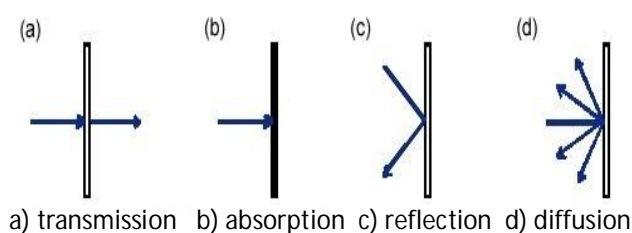
Types of spaces	Acoustical considerations	Noise control values
Concert halls	Listening to both faint and loud sounds	10-20
Recording studios	Close microphone pick ups	20-25
Large theatre	Listening to speech and music	20-25
Conference rooms, classrooms	Clear speech communication	25-30
Private rooms	Clear communication with speech privacy	30-35
Retail shops	Clear speech communication	35-50

Pelumi E Oguntemda et.al. [5], the limit of allowable noise levels are way far from the World Health Organization (WHO) recommendations and Federal Environment Protection Agency (FEPA) set standards. There is no significant alteration in the effects of the noise pollution level for all the times of the day considered still leading to nuisance and health issues. So, with the help of probability model, forecasting the value of noise pollution level can also be determined.

Azimi [6], synthetic fiber as minerals wool or glass wool used are commonly for thermal insulation but they can be harmful for human health if their fibers are inhaled. So, the natural fibers which can be used for thermal and acoustics application. Many recycled materials, such as textile agglomerates, metal shavings, plastic, waste rubber can be used for public housing sites in order to prevent from severe noise influence from various sources.

Lavanya C et.al. [7], strategies are made to prevent mutilation from sound exposure and more convenient for the government and NGOs while taking up measures in noise pollution, which includes the use of amplified product noise labelling, individual hearing protection devices, education programs beginning with early age (school-age) children, consumer guidance and hearing conservation programs to protect occupational worker and equip with knowledge.

Sayed Maha boob basha et.al.[8], with vibrating particles, sound wave characteristically formed. Sound waves can travel away from the source by bouncing into other particles causing them to vibrate with different frequencies. The sound energy that can be not absorbed or remain unchanged should be transmitted or reflected. As to reduce the noise in buildings, the noise reduction coefficient (NRC), which is essentially a type of average coefficient of sound absorption from 250Hz to 2Hz, the frequency range of primary speaking is used. Hypothetically the ranges of noise from fully absorbed (NRC= 1.0) through to fully reflective (NRC= 0.0) NRC.



**Figure 1:** Sound/Surface Interaction [8]

## CONCLUSION

Pollutions comes from numerous sources in developing areas, some of which are essential activities towards the safety and welfare of urban residents, which may include siren noise of emergency vehicles, waste collection and constructions equipment. Other than being nuisance, noise pollution related to construction sites can contribute to wide-ranging hazards such as elevated blood pressure in workers as well as disruption to the routines of local wildlife. We can look up to measures like providing a barrier between noise and workers, protecting from noise exposure. Sound absorbing materials like mineral wool, metal and concrete can be helpful in reducing construction noise by acting as sound reflectors that sound waves bounce off of. Some of these controls likely won't easily eliminate noise on-site or construction site completely but reducing noise by few decibels can significantly help to minimize the damage that extreme noise can cause. As sources for such as traffic, derive from people and goods movement activities that are essential to a city's viability as a place to live and do business. We can consider various techniques that can be employed for the purpose of noise reduction. For reducing noise levels various sound absorbers materials can be used. These absorbers may either be used in permeable form or panel form. Either synthetic or natural materials may be commonly used by absorbers. It is necessary to progress sustainable material to be used for noise lessening purposes. Various innovative methods like water membrane and green wall should be encouraged as they do not cause any harms on environment. The eventual goal should be to recognize ways to improve the acoustic environment. The excessive noise like loudspeakers are frequently used for religious functions. Age groups of 20-40 years usually felt the noise disturbance produces by loudspeakers and automobiles more than the other age groups. Additional research is needed to determine the chronic implications of noise on human health regardless of age group. The World Health Organization strives to warn, raise awareness of promote actions noise pollution. Public education appears to be best method as suggested by the respondents. Moreover, government and NGOs can play a significant role of management in the noise pollution.

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