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Study on Need of Monitoring Sound Pollution at Educational Institutions

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A B S T R A C T

Humans have interdependent relations with the environment. Many times the activities of the mankind are exploiting the natural resources for only self-benefits and due to which the environmental pollution is the end product. Pollution is a very serious issue as the humankind progresses towards well-being and modernization. It is not only influences health but also affects our biodiversity. Sound pollution is one of the important agent from the factors that affects the living of humankind and its environment with its different species of animals and plants. It is a major concern to all human beings or even animals as it is related with physical, psychological or emotional states. This study is an approach to discuss the need on monitoring the sound pollution with its sources and its effects of various degree of exposure on the activities in the educational institutions. Educational institutions can be divided into sub categories as per the learner groups, from childhood to adult and seniors, similarly as per the level of learning pre-school, primary, middle, high, junior college, bachelors, post graduates, research, professional and advanced courses, different technical non-technical courses. The study finds that sound pollutions and other environmental pollutions are seriously affecting the learners and other stakeholders on their performance and life. The impact of sound pollution on these will increase if appropriate timely measures are not taken. There are many challenges with respect to policies on environmental pollution, governance, need to have sound pollution modelling, mapping and monitoring, the assessment of health and economic risks and the mechanisms for sound pollution management.

Keywords: Sound pollution, environmental pollution, health, educational institutions, monitoring noise

1. INTRODUCTION

Educational institutions are divided into many categories depending on age group, type of education and methodology. Mainly institutions have the classroom based systems with pleasant and silent premises. The places of the learning should have the environment such that the lowest distractions can prevail in it, which is a basic need in learning. There are many institutions which have this kind of atmosphere, but many more do not have the choice due to some or the other reasons. It is also known that where ever number of people increases the crowd is creating the sounds which can be annoying. For the large institutes the number increases and so the level of sound. The effect of sound generated at the schools, temples and other places of worships have found to create the distractions in the activities of the human or its ecosystem. The amount of distraction varies person to person. The same can be understood from the experience of the people residing in the localities near railway tracks.

1.1 Basics of the discussion:

Sound, a mechanical longitudinal vibrations which requires medium to propagate. Sound does nothing till it is up to certain limit, as it creates pressure on the particles of the medium, when the limit of pressure is increased, it becomes nuisance. Sound defined by its characteristics mainly loudness and frequency or pitch. Sound, the mechanical vibrations with pressure are measured in Pascal, Pa and frequency measured in Hertz, Hz. The intensity of sound, loudness is the 'level of sound pressure' and is measured with respect to the threshold of hearing. Human hearing is sensitive to intensity of sound pressure. The differences in intensity level are denoted as L_I and expressed in nepers Np, bels B, or decibels dB (IEC,2002). The disruptive sounds that negatively affect the physical and mental well-being of people or animals in the surroundings is referred to as sound pollution, noise (A Rajak, 2019) (M Verma, 2022) (Oloruntoba EO, et.al 2012) (WHO, 2011). The level of exposure to environmental noise in urban areas have shown direct impacts on the development of society. From the different research findings it is stated that sound pollution is increasing as developments in all sectors for the comfort and wellbeing of human-kind continue to grow. As compared to other types of environmental pollutions like air, water, soil, light, and radioactive pollutants, noise or sound pollution is often not given as much attention because of the less noticeable, instant, direct and harmful impacts on humans than other types of pollutions. The World Health Organization (WHO) states that environmental noise pollution is considered the second most dangerous form of environmental pollution after air pollution, especially in densely populated urban areas (W. Babish, 2002).

1.2 Survey:

It is scientifically evidenced that exposure to high level of noise leads to many health problems. As mentioned in the 'The health effects of environmental noise Publications' Number: 12214, 2018 Commonwealth of Australia that as represented by the Department of Health, Humans can hear a wide range of sound frequencies, from 20 to 20000 Hz and over a wide range of amplitudes, from a whisper to the point of pain. Most commonly the 'A-weighting' method is used. Which has its focus on the mid and high-range frequencies and has less emphasis on low frequencies. However, low frequencies are also important in studying noise (Commonwealth of Australia, 2018).

According to Prevention and Control of pollution Act, 1981 noise is regarded as a pollutant. It is affecting the health physically and psychologically. Studies have shown that noise pollution adversely affects the lives of millions of population (Sally L L etal., *2016*)(EPA: Title –IV). It was stated that, continuous exposure to loud sounds is always harmful to the hearing systems. In India Delhi, Lucknow, Kanpur, Mumbai, Gwalior, Visakapattanam, Kohlapur, Dehradun, and many other cities face the problem of noise pollution.

The various studies have acknowledged the factors which most influence the noise extent in the urban areas include, transportation (road/rail/air), commercial services, industries, concert, household equipment, drillings of bore well machines, jack hammer operation, building construction work, marble cutting, music concerts, public address systems, loudspeakers at weddings and religious places, processions and many other things (Hsu T, etal, 2012)(Jing Ma, etal, 2018), but in all road transportation noise was found its impact on raising ambient noise level (Gazette of India, 2006)(B S Chauhan, 2023).

While interpreting acoustical data, different metrics are often used for classifications or types of noise. The other factor while monitoring the sound pollution is attenuation factor. In terms of educational premises the location of the institute, surroundings of the premises and the internal management of the institution are main responsible agents to take care of sound pollution at the institutions. For the learners if the atmosphere is not quiet it affects the grasping ability and enhances the stress level of both learner and educator.

The objective of the present work is to emphasize on the need to monitor and control the sound pollution in the educational institutions to tackle the future problems, to investigate the status and validity of ambient noise standards for it. The study is an independent study and review done by author, it has nothing to do with any legal or government body or accepting the conclusions of the present work.

2. Materials, measurements and methods:

Mostly noise is measured in decibels (dB). The zero on a decibel scale is at the threshold of hearing, the lowest sound pressure that can be heard by humans. The sound level depends on the distance between the sound source and the receiver. The sound pressure level L_p in dB without the given distance r to the sound source is meaningless. If there is No distance, then the decibel value is meaningless. The threshold of pain is in between 120 dB and 140 dB, depending on the frequency composition and the sensitivity of the person.

The other weighted scale is Decibels dB(A), 'A' symbol indicates a weighted measurement of a logarithmic scale, the actual measurement of intensity 'I' is compared to a fixed reference level 'I_0' then the 'decibel' value is

$$\mathrm{dB} = 10 \log_{10}\left(\frac{I}{I_0}\right) \qquad \text{---------- (1)}$$

The 'A' weighing filters out lower frequencies of 'C' group. The preferred method to describe sound levels that vary over time, L_{eq} (Equivalent Continuous Sound Level), some examples of the perceptions of sound are listed below,

Table 1 – Perception of Sound.

An example of Sound	**Sound Pressure Level L_P (*dBA*)**
Jet aircraft, 50 m away	140
Threshold of discomfort	120
Fire crackers 1meter apart, Frequent level with music via head phones,	100 dBA
jack hammer at 10 m distance, boring machine	100
Disco, 1 m from speaker	100
Conversational speech, 1 m	60
Low volume of radio or TV at 1 m distance, noisy vacuum cleaner at 10 m distance	55 dBA
Noise of normal living; talking, or radio in the background	45 dBA
Quiet library	40
Hearing threshold	0

The Guidelines Development Group of the World Health Organization (WHO) recommends that noise levels due to road traffic noise should be reduced below 53 decibels (dB) L_{den}. Also, for night noise exposure, it recommends reducing noise levels below 45 dB L_{night}, (WHO, 2018). The ambient air quality standards in respect of noise in India are shown in Table 2, (WHO, 2018) (MoEF, 2000).

Table 2 – Ambient air quality standards in respect of noise in India[15] Limits in dB(A) L_{eq}*

Area Code	Category of Zone	Day-time	Night-time
A	Industrial	75	70
B	Commercial	65	55
C	Residential	55	45
D	Silence	50	40

*Day-time is from 6.00am to 10.00 pm

*Night-time is from 10.00 pm to 6.00am

*Zone may be defined by the competent authority. The schools, hospitals are under the category of silence zone.

From various studies reported on monitoring the sound pollution the methodology used is selection of cites, use of proper instrumentation and period of observation for the sound pressure level. The analysis of the data is done by the usual formulations and measurements of average noise levels for the day, night or particular hours, months, years and may also be for the level of sound in dB.

The data of the noise for the institutions can be collected for the different working hours of the institute. The day equivalent levels L_{day} and night equivalent levels L_{night} are the average equivalent sound levels of 16 hours duration of the day from 06:00 AM to 10:00 PM and 24-hour equivalent sound levels $L_{Aeq;24h}$. (CPCB, 2011).

From the data, the average day and night equivalent sound levels for different durations, weeks or months can be calculated from [16]:

$$L_{day,n} = 10\left[\frac{1}{n}\log_{10}\sum_{i=1}^{n} 10^{\left[\frac{(L_{day,i})}{10}\right]}\right] \quad \text{---------- (2)}$$

$$L_{night,n} = 10\left[\frac{1}{n}\log_{10}\sum_{i=1}^{n} 10^{\left[\frac{(L_{night,i})}{10}\right]}\right] \quad \text{---------- (3)}$$

where, n is the number of days in the weeks or months, and $L_{day,i}$ and $L_{night,i}$ are the day and night equivalent sound pressure levels of the i-th day of that period, respectively

Here the observations were carried out for the working hours of the institutions, from 7.30am to 12.30pm for morning shift. From 10.00am to 05.00pm for day shift. The average noise limit exceedance factor (NEF) for different time periods can also be measured which are not quoted here:

$$EF = \frac{L_0}{L_p} \quad \text{---------- (4)}$$

where, L_0 is the observed ambient noise level, and L_p is the legally permissible limit recommended by the CPCB, India.

3. Result and discussion:

Globally Sound pollution has become a serious concern. Every nation is concerned about the effects of noise emitted from the expanding urbanization and modernization of societies towards comfort. The major sources of noise pollution in urban areas include traffic congestion from heavy vehicles, unnecessary honking, and construction activities. Industrial activities and loud music from events, such as weddings and concerts, also contribute significantly to elevated noise levels. Additionally, night time disturbances from dog barking and movement of heavy vehicles further exacerbate noise pollution in residential zones. We have quoted here the different angle of monitoring and analysis of sound pollution from the different studies so far and the report of the authorised monitoring agencies. The area not touched by the different studies is the educational premises that we have tried to focus on for the unkind effects of noise on the extent of learning and loss of human hours. Therefore it is very important to adopt noise monitoring strategies to monitor the noise levels and planning for suitable noise abatement measures for its reduction.

Recent Studies: The European Environmental Noise Directive 2002/49/EC1 relating to the assessment and management of environmental noise establishes that the member states should create noise maps and action plans for the parts of their territory. The noise maps should present noise levels expressed in harmonized indicators: day–evening–night level L_{den}, and night equivalent level L_{night}. The long term noise monitoring studies are thus required not only for ascertaining the magnitude of ambient levels, but also for devising suitable control plans.

Some of the studies carried out by different researches are quoted here for the necessity of monitoring the sound pollution which are not directly related with our study on sound pollution at educational institutions but are also having mostly the similar sources of sound pollution.

There have been many such studies reported in different parts of the world (N Garg, etal, 2015)(END, 2002). The development of a validated road traffic noise model for Indian conditions similar to that used in developed nations is essential in conducting Environmental Impact Assessment (EIA) studies (N Garg & S Maji, 2014)(MoEF, 2000). There have been no comprehensive long-term noise monitoring studies reported in India until the Central Pollution Control Board CPCB's initiative of project National Ambient Noise Monitoring Network NANMN in the year 2011(N Garg, etal, 2015) (D Chakrabarty, etal, 1997) (D Banerjee, 2006) (P Mandal, etal 2009)..

As in case of road traffic noise, for conducting Environmental Impact Assessment (EIA) the development of model of a validated road traffic noise for Indian conditions, similar to that used in developed nations is necessary (N Garg & S Maji, 2014) (MoEF, 2000). The same is the need of the educational institutions and its surroundings.

The Central Pollution Control Board (CPCB), New Delhi, under the Ministry of Environment and Forest, MoEF, has under taken many initiatives and carried out numerous studies in monitoring the ambient sound levels at noise hot-spots. CPCB, India initiated the process of developing National Ambient Noise Monitoring Network (NANMN), a follow-up of Section 5.2.8 (IV) of National Environmental Policy (NEP)-2006. In which it was decided to include ambient noise as a regular parameter for monitoring in specified urban areas (NPRC, 2010) (CPCB, 2011).

Noise Monitoring Study in India (2011-2020) carried out by Naveen Garg et.al, have analysed long-term noise data, utilizing the National Ambient Noise Monitoring Network (NANMN) for continuous data collection (N Garg, et al. 2023). It helps identify the Most Exposed Urban Sites and compares noise levels against established standards, facilitating informed decision-making for noise action plans. Additionally, the NANMN raises public awareness about noise pollution and supports the development of policies aimed at reducing noise levels in metropolitan cities. Key findings revealed that many monitored sites exceeded ambient noise standards, particularly in commercial and industrial zones, with significant increases in both day and night noise levels over the decade. The study emphasized the need for effective noise action plans and policy frameworks to address and mitigate noise pollution in metropolitan areas. The research findings are 94.3% of observations exceeded the Night Noise Guidelines target of 55 dB L_{night}. Most of the monitoring sites recorded day equivalent sound levels between 60-75 dB(A). In their observations it was found that silence zones showed the highest Ambient Exposure Factor (AEF) for noise levels. Study aids in predicting future noise scenarios and informs national policy for noise pollution reduction.

Some of the findings here quoted from B S Chauhan et.al. (B Chauhan, 2023), as their study focuses on evaluating and assessing hourly equivalent continuous noise levels at 100 locations in the National Capital Territory (NCT) of Delhi region, as well as conducting a socio-acoustic survey on noise annoyance. Noise pollution is a significant issue in urban areas, affecting 68% of subjects in Delhi city, The study found that 68% of subjects were exposed to stress, 64% to hearing loss, 56% to blood pressure, 48% to depression, 36% to agitation, and 12% to fatigue. Singh and Davar (2004) reported that sleeping disorders and reduced efficiency were the major effects on the people of Delhi due to noise pollution. Mohan et al (2000) found that people living up to 30 meters from arterial roads were exposed to much annoyance due to traffic noise. Jyoti et al (2014) found that 35% of subjects were highly exposed to hearing problems due to noise pollution, while those aged 20-40 years were highly exposed to communication interference, sleep disturbance, cause annoyance, and deafness. Ahmed and Sarkar (2014) reported that residential areas are mostly affected due to vehicular traffic noise, with the equivalent traffic noise level varying from 63 dB to 66.7 dB(A) during night-time along an arterial road in Delhi.

Honking is a major noise source in India, contributing 2 to 5 dB(A) additional noise in total road traffic noise. An increment in vehicular speeds from 35 to 55 km/hr provides a significant increment in road traffic noise levels by 4–5 dB(A). Noise prediction models developed for homogenous traffic conditions are not appropriately applicable for heterogeneous traffic conditions. In Nagpur City, road traffic noise levels increased by 5–6 dB(A) between (2012) and (2019), with honking noise increasing by 4–6 times and traffic noise by 1.7 times. A positive correlation was observed between honking events and noise levels, while negative correlations were observed for noise levels with vehicular speeds and traffic volume.

From the different findings it is found that, Indian cities have been facing severe problems due to constant growth of vehicles, urbanization, mixed traffic zones, and incompetent road networks. The average road traffic noise in most Indian cities is more than 70 dB(A).

As per the Report on Ambient Noise Monitoring in Maharashtra during Ganesh Festival – 2023 ()MPCB, 2023). The study indicate that there was a notable increase in the overall noise levels this year at certain locations when compared to the previous year. The most significant increase was observed on the last day of monitoring. This surge in noise levels can be attributed to the culmination of the festival, known as the 11th day (last day) or Ganesh Visarjan, during the procession, in which the idol of Lord Ganesha is paraded through the streets accompanied by musical instruments, Dhols, DJs, and bands and fire crackers. (CPCB, 2015) and there are many reports on the different types of rituals and festivals celebrations in India with the loud sounds and fire crackers.

Now a days DJ's with laser shows are mostly influencing the young generation for the enjoyment of any type of celebrations. There is a need to aware public with the very dangerous effects of the sound pollution. There is an urgent need to monitor and implement strict rules and actions against the violators. Due to the majority of residents in urban colonies are of the enjoyment category on any cost. And some are high earners majority of them do not think about the neighbourhood and its ecosystem.

Authors Contribution: While concentrating on the educational institutions there are two types of sources of noise, internal and external. The all above examples in the review with the study are the external sources of noise for educational institutes. The internal sources of noise at the institutes are generating annoyance to the local residents and the learners in the institutes too. The main component is the public address systems used by the institutions. There is no limit how much the volume should be maintain and no time limit. The activities of the institutions starts with the PA system. To control / instruct the students they use PA systems and usually the sound level is not monitored. Here the sound level was measured during working

hours of the institution from the start to the dispersal. It was observed that the institutes those use PA systems have found the sound level of 60-70dBA and without PA system are 55-60dBA for the distance of 3meters. In between the mid hours the sound level was observed to be 50-55dBA. The observations are also carried out when there is no teacher in some of the classrooms, the nearby classes are under the influence of nuisance and affects the learning ability of the learners and influences other stake holders in the premises. The observations are also confirmed that the complaints of distraction, headache are the outcomes of not monitoring the specific level of noise for the healthy learning atmosphere. There is a need to control the noise generated in the premises due to different activities like construction work, excessive use of PA system, etc. The data on noise level for the different activities and time is given in the following table 3. Graphical presentation of excess noise at external sources at the educational institutes. *Graph. 1:*

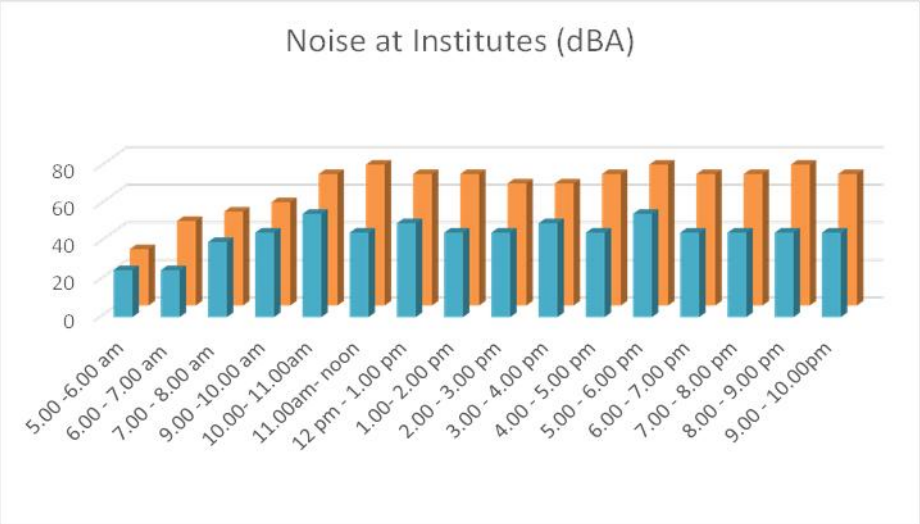

Table 3 – Ambient noise level for the different activities and time

Activities / time	**Sound Pressure Level dBA**	
	External sources	Internal sources
6.00 am / no activities	30	25
6.00 am to 7.00 am	45	25
7.00 am to 8.00 am	45-50	40
9.00 am to 10.00 am	50-55	40-45
10.00am to 11.00am	65-70	50-55
11.00am to 12.00pm	70-75	40-45
12 pm to 1.00 pm	65-70	45-50
1.00 pm to 2.00 pm	65-70	40-45
2.00 pm to 3.00 pm	60-65	40-45
3.00 pm to 4.00 pm	60-65	45-50
4.00 pm to 5.00 pm	65-70	40-45
5.00 pm to 6.00 pm	70-75	50-55
6.00 pm to 7.00 pm	65-70	40-45
7.00 pm to 8.00 pm	65-70	35-40
8.00 pm to 9.00 pm	70-75	30-35
9.00 pm to 10.00pm	65-70	30-35
During marriage procession	75-85	45-50
Advertising road side	75-80	45-50

Unnecessary honking	75-80	50-55
Heavy very heavy vehicle	75-80	50-55
Procession with DJ	85-90	50-55

The external sources are all other, that is due to the human and environmental activities in the surroundings. Mainly includes, road traffic, construction works, advertisings along the road side, unnecessary honking, vehicles with higher engine noise, unnecessary shouting's in the and outside the premises.

As per, Naveen Garg et.al 2023. There are some recommended strategies for controlling noise pollution. Which include implementing noise action plans, conducting periodic noise monitoring and mapping, and establishing legal measures such as restrictions on loudspeakers and pressure horns. Traffic management policies, like restricting heavy vehicle entry in residential areas and synchronized traffic signalling, are also essential. Additionally, creating vegetative barriers, conducting noise awareness campaigns, and ensuring proper land-use planning can significantly contribute to noise reduction (N Garg etal 2023).

It was also recommended that smartphone applications can contribute to noise pollution awareness, by providing an effective, novel, and economical means for measuring and monitoring noise levels in real-time. They facilitate the dissemination of information to the community, particularly among younger generations, enhancing public understanding of noise pollution issues. This increased awareness can lead to greater community engagement and support for noise abatement initiatives. Recommendations on guidelines for noise abatement in urban areas from an Indian perspective include establishing a mixed zone category for noise standards, demarcating silence and no-honking zones, and implementing strict enforcement of ambient noise limits. Traffic management measures, such as setting restrictive speed limits and minimizing heavy vehicle traffic in sensitive areas, are also advised. Additionally, promoting community awareness about health hazards related to noise exposure and incorporating noise action plans into urban planning are essential for effective noise control.

Several workers in the previous studies have recommended the need of monitoring and analysing the sound pollution for the betterment of the society and ecosystem. In one of the findings specifically carried out in Delhi city researchers quoted the importance of noise monitoring. Garg et al (2022) reported that no silence or residential zone site complied with ambient noise standards in seven metropolitan cities in India. Road traffic noise contributes around 55% of the total environmental noise in urban areas. Noise pollution is a significant issue in urban areas, with road traffic noise contributing around 55% of total environmental noise.

M Verma et.al 2022, emphasises that the Noise pollution is the second most hazardous environmental issue after air pollution. While discussing India's Noise Pollution (Regulation and Control) Rules 2000. The authors emphasizes the need for noise abatement measures and compliance with ambient air quality standards. It also highlights the responsibilities of authorities in enforcing noise control measures. And have suggested various techniques for noise reduction at the source and through transmission path management (M Verma et.al 2022).

According to the Noise Pollution (Regulation and Control) Rules 2000, the following measures can be taken to control noise pollution: 1. Categorization of Areas: The State Government shall categorize areas into industrial, commercial, residential, or silence zones to implement specific noise standards. 2. Enforcement of Standards: Authorities are responsible for ensuring that noise levels do not exceed the specified ambient air quality standards. 3. Regulation of sources of sound: Use of loudspeakers or public address systems requires written permission from the authority, and measures should be taken to minimize noise from vehicles and construction activities.

In India under the ministry of environment and forest the central pollution control board has provided the rules for the control of noise in the year 2000, as the Noise Pollution (Regulation and Control) Rules, 2000 which governs each type of noise pollution. Prior to this, noise pollution and its causes were addressed by the Air (Prevention and Control of Pollution) Act of 1981. On February 14, 2000, the Union Government passed the Noise Pollution (Regulation and Control) Rules, 2000. According to the authority granted to it by the Environment (Protection) Act of 1986, this was done as an effort to reduce the increasing ambient noise level coming from diverse sources in public areas.

There is a need to monitor the ambient noise in and near the premises of the spoted silence zones including educational institutions, as many studies have added the level of noise in silence zones has increased beyond the allowed limits and violation is becoming a practice amongst the many. Our observations related with the internal and external sources of noise are indicating the relation between them that the noise level goes on increasing as the time passes on from the morning to evening and then shows negative trend after 6.00 pm. But not much decrease is found in the external source of noise. At some time both the internal and external sound shows same percentage of increase, eg. 7.00 am to 8.00am; 10.00am to 11.00am; 5.00pm to 6.00pm. There is very little influence of external noise observed at the morning hours than that of other duration of the day.

4. Conclusions:

Every human being on the planet, relies totally on the environment for survival. However, the healthy survival depends heavily on pollution free environment. A change in the chemical, physical, or biological quality of the environment caused by humans or with their assistance that is harmful to the environment or goes beyond acceptable bounds is referred to as pollution. Environmental hazards, on the other hand, are caused by natural events, industrial activities, and human activity that disrupt the environment and contaminate it with chemical, biological, or physical agents that are fatal to humans, animals or plants.

As confirmed by many studies Sound pollution has various disturbing health-related effects on ecosystem. Depending upon the exposure time and loudness of sound, noise pollution can have various harmful effects like (WHO, 2005) (M Martin, 2006) (M Chien, 2007)

a) Physical damage to the inner ear, resulting in temporary or permanent hearing loss.

b) Raises blood pressure, and causes irritability, anxiety, and mental fatigue.

c) Interferes with sleep, recreation, and communication.

d) Impairs memory and attention span in children exposed to high noise levels.

e) Potential threat to fetal development, impacting birth weight.

f) Children are more sensitive to noise, which can affect reading, speech, language, and language-related skills.

g) Hypertension due to prolonged exposure.

h) Hearing loss from loud noise, leading to eardrum damage.

i) Sleeping disorders, affecting daily activities.

j) Cardiovascular issues, including increased stress and blood pressure.

The level of social development in a nation is directly correlated with the amount of environmental noise that urban populations are exposed to. In developing nations, a strategic approach to environmental noise management (ENM) is required to help stakeholders and decision-makers create and carry out efficient ENM plans (D Schwela, 2023) (D Schwela, 2008). Compliance with ambient noise standards was primarily seen in commercial and industrial zones, while silence and residential zones struggled to meet the limits. The study suggests the need to reconsider ambient noise rules, especially for residential and silence zones emphasis on educational institutions, and to consider a mixed zone category for noise abatement guidelines in the future from an Indian perspective. There are challenges in developing countries with respect to environmental noise policies, governance, noise emission, noise modelling, mapping, and monitoring, the assessment of health and economic risks, and the mechanisms for financing environmental noise management (D Schwela, 2023).

We have discussed the works of different researchers here towards external and internal factors of Sound Pollution and its control at educational institutions. Noise pollution adversely affects the human being and hence the learners in the institutions leading to irritation, loss of concentration, loss of hearing. In this study, the focus was on the monitoring and control of Noise Pollution. Controlling noise pollution is essential to lessening its negative effects. The techniques and methodology applied as, determine the sources of noise pollution, evaluate the causes of elevated noise levels, and implement strategies to lower unwanted noise levels. The study shows that, in order to effectively control noise pollution, stronger environmental regulations and strict adherence to the law are required. To effectively reduce the risks associated with noise pollution, a planning and monitoring system for noise pollution control must be in place.

From the studies of M. Verma et.al the findings are important in providing the measures to control the sound pollution in urban localities. It is quoted here the different steps that make up the noise management strategy (M Verma etal, 2022). In addition to providing personal ear protection, engineered control for noise reduction at source, and/or diversion in the trajectory of sound waves, part of the noise control techniques include reduction of the noise exposure time or isolation from the sources. The methods used to reduce noise can be broadly categorized as [3]. Noise control at source by employing techniques like-(1). Reducing the noise levels, (2). Maintenance of noise source for lowering amplitude of noise, (3). Control over vibrations, (4). Low voice speaking, (5). Prohibition on usage of loud speakers limiting PA systems, (6). Maintenance of machines, (7) controlling Noise from different processions passing by the silent zone, (8) controlling noise near the premises and inside the premises of institutions on celebrating different festivities and programs.

From the study it is recommended for effective noise control that the need of, 1. Developing noise maps based on $L_{Aeq,24h}$ to identify hotspots. 2. Implementing the Best Practicable and Economical Option for noise abatement in identified hotspots.

In some of the studies it was presented that Noise exposure affects children's reading, comprehension, and studies, leading to place school and university at distances. Noise over 30 dB disturbs sleep, increases stress, and increases crime rates. It also causes heart, nervous system, respiratory and blood pressure problems. Youngsters are members of subgroups, and noise sensitivity affects them more. Since children under five years old struggle with reading and comprehension and are negatively impacted by constant noise. Need of schools, colleges, and universities to be located far from busy and noisy areas. More than 30 dB of noise can also cause stress and hypertension, interfere with sleep, and should be strictly enforced by law. Additionally, noise has a detrimental influence on the environment, increases crime, and disrupts social order.

From the reports of CPCB's, the mixed category zone that predominates at some of the locations is the main cause of the excessive violations of ambient noise limits for the residential and silence zone sites. Therefore, lowering ambient noise levels can be greatly aided by the execution and implementation of rules as well as administrative measures like traffic management policies, noise screening policies, legal measures, and strict enforcement of ambient noise standards. Which is must for reducing noise from the external sources at educational institutions also monitoring and controlling is needed to curb the noise from the internal sources at the institutions.

Thus from the various studies it can be concluded that the urbanization has led to sound pollution and without strict monitoring the problem is becoming a danger to the life of ecosystem. Noise pollution has been shown to lead to various health problems, including hearing impairment, increased stress levels, sleep disturbances, cardiovascular disturbances, and negative effects on mental health & learning ability. It interferes with spoken communication, disturbs cognitive functions, and can lead to annoyance and disruptions in daily life. Moreover, noise pollution has been associated with disturbances in physiological functions and can exacerbate pre-existing mental health conditions. To tackle this issue not only through stricter regulation but also effective enforcement, public awareness, and measures to mitigate noise levels, especially in high-traffic, commercial areas and silence zone including educational institutions is the necessity.

The study here finds correlation between the internal and external sources of noise at the educational institutions and also the effects on each other. From the data of the study it is concluded that the noise affecting the learning process, influences more at the day hours than at the morning hours. Also the internal sources of noise are prevalent at the day hours than at the morning. Hence it can be concluded that the educational institutions must have their teaching hours to be kept for morning rather than other duration of day to have very small or no effect of noise on the process of learning and the mental and physical with psychological well-being and stress free environment of the institution. In order to reduce sound pollution and create sustainable atmosphere at the premises of educational institutions that improve learner's ability and conducive environment for learning, monitoring and controlling of noise is must. It can be achieved by dividing learner group and types of institutions with sound proof classroom and silent premises with proper noise management.

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