

*Review Article*

A Review on Effects, Monitoring and Control of Noise Pollution

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ABSTRACT

Rapid urbanization and industrialization has improved the living standards of people in developing and developed countries. The problem of water, soil, air and noise pollution is the byproduct of the rapid growth and industrialization. Normally undesired and irritating sound is termed as noise. The noise in industrial, residential and silence zones need to be monitored and controlled. The traffic noise is a major problem in cities and populated areas. The noise of horns is major deterrent. Sound level is alarming during festivals also. It is very important to educate industrial workers, citizens and students about effects of noise pollution and its control methods. The present review provides summary of studies and research carried out on monitoring, analysis, control and modeling of noise pollution and related parameters.

Key words: limits, disorders, regulations, control, monitoring.

INTRODUCTION

The sustainable development is the need of modern population. Development of the country is normally measured in terms of gross domestic product (GDP) and standards of living. The exposure to the various types of pollutants is unavoidable as the effluent from industries is increasing in volume and concentration with increasing size of industrial sector, mainly manufacturing sector. [1,2,3,4] Water pollution is gaining more importance due to its visible effects. [5,6,7,8] The water quality parameters like chemical oxygen demand, pH, heavy metals etc. are widely discussed pollutants. [9,10,11,12,13] Various methods, physical, biological and chemical, are available for their treatment. [14,15,16,17] Air pollutants like oxides of sulphur, nitrogen and particulate

matter are being monitored by regulatory bodies. Adsorption, absorption, biofiltration are few methods for their treatment. [18,19,20]

The noise pollution is least studied pollution type due to invisible and long term effects. It must be noted that noise pollution has as severe effects as water and air pollution. The effects being mental disorder, ear deafness, psychological disorder and many other invisible effect on small kids, new born and old people. Various investigators and surveyors have carried out studies on monitoring, sampling, control and modeling of noise pollution in various areas. Present review aims at summarizing these studies on noise pollution.

STUDIES AND RESEARCH ON NOISE POLLUTION: Stansfeld and Matheson discussed the health effects of noise

pollution. They discussed the effect of road, traffic, industrial and noise on human being. [21] According to his studies, aircraft and road traffic noise exposure are associated with psychological symptoms. Also noise exposure is related to raise catecholamine secretion. According to them, chronic aircraft noise exposure impairs reading comprehension and long-term memory and may be associated with raised blood pressure. Atmaca et.al. discussed the effects of industrial noise on human health. [22] They distributed a questionnaire to over 250 workers in an industry. They chose concrete, traverse, cement, iron and steel and textile factories located in near Sivas in Turkey region. They observed that the noise levels detected in all the industries are much above the 80 dBA that is specified in the regulations and 73.83% of the workers in these industries were disturbed from the noise in their workplaces. Jamrah et. al. studied noise quality in Amman, Oman. [23] According to him, increase in prosperity, fast development and expansion of economy, travel and tourism has led to increase in traffic in the city. They determined road traffic noise index L10 (1h) at 28 locations that cover most of the City of Amman. They observed that the minimum and the maximum noise levels were 46 dB (A) and 81 dB (A) during day-time and 58 dB (A) and 71 dB (A) during night-time. Ijaiya examined noise as a factor harmful to the environment with focus on Nigeria. [24] Noise pollution has not received full attention which they deserve. According to him, there is the need for proper implementation of rules and regulations. Also there is need of public enlightenment, education and sensitization on the hazards, dangers and human health problems to be associated with noise pollution. Swain and Goswami made an attempt to assess the noise level in 12 different squares (major intersection points) of Baripada town during

four different specified times. [25] They observed that that even the minimum Leq and NPL values were more than 70.9 dB and 88.4 dB, respectively. They concluded that there was a need for careful attention for abating road traffic noise through modification of traffic flow and also by sustainable traffic management. Balashanmugam et. al. carried out assessment of noise pollution in Chidambaram town. [26] Ambient noise level monitoring was carried out at various locations of the Chidambaram town by them. They computed various noise parameters like namely equivalent continuous level (Leq), Noise pollution level (Lnp), Noise climate (NC), Percentile noise levels (L10, L50, L90). They observed that the noise levels at various locations of the Chidambaram town are more than the permissible limits. According to them, the honking of horns, flow of ill-maintained vehicles and poor road conditions on roadsides that cause traffic congestion were found to be the reasons for high noise level in Chidambaram town. They concluded that almost all the people are highly exposed to high noise levels [>60 dB (A)], without proper ear protection. They suggested measures such as ban on use of horns, proper maintenance of roads, Removal of road side encroachments, planting of recommended plant species and the implementation of the technical measures for noise levels.

Measurement of equivalent noise level was carried out by Anomohanran in 35 locations around the Abuja, Nigeria city using a CR811C integrated sound level meter. [27] Their results showed that results showed that the day time mean equivalent noise level of the city ranged from 73.2 dBA to 83.6 dBA. They observed that the average day-night noise level of the City was obtained as 76.4 dBA. At least 10 hours of recovery time is required for people who are

exposed to continuous noise pollution. Improving the traffic situation is best way to solve this problem. Patel and Bhavé studied noise pollution during Diwali festival. [28] Dipawali is one of the most important festivals in India. On this occasion, a lot of fire crackers are used almost in every part of the country as a part of celebration. According to Noise Pollution (Regulation & Control) Rules, 2000, for industrial and commercial area, the limit for sound (Leq) is 75 and 65 dB for daytime and 70 and 55 for night. For residential zone it is 55 and 45 for day and night. Silence zone limits are 50 and 40 dB for day and night. They observed that in the residential area noise levels observed were higher than the permissible standard. Proper supervision, awareness and laws can minimize this problem. Singh and Davar discussed Sources, effects and control of noise pollution. [29] They examined the problem of noise pollution in the wake of its ill effect on the life of the people. During investigation, automobiles and public address system (loudspeakers) turned out to be major sources of noise pollution. They concluded that government and NGOs can play a significant role in the process of reducing noise and its ill effects. Kumar et. al. presented a brief review on the Legislative Aspects of Noise Pollution. [30] They conducted studies to trace the amount of damage caused by the noise from various natural as well as man-made sources, especially traffic. In fact, noise has come to be associated with the mental, physical, emotional and psychological well-being of an individual, be it human beings or even animals. In legal terms, noise can be considered as an assault on an individual. They identified the various legislative provisions available in India and other parts of the world to check this menace. An Analysis of noise pollution in Tirupur city was carried out by Keerthana et.al. [31] They studied traffic noise in Tirupur city in the

busy areas of the city which have high traffic flow in peak hours. They observed that whole city was affected heavily by noise pollution. Horns of vehicles like rickshaws, buses, wagons & trucks etc were major source of pollution.

Ozdamar and Giovanis explored the determinants of health status and the willingness to pay for reducing the air and noise pollution in Turkey. [32] They carried out estimates based on the data from the annual Income and Living Conditions Survey (ILCS) in Turkey which took place in period 2006-2012. Their results showed that the, marginal willingness to pay (MWTP) for the individual who report a problem on air and noise pollution is higher by 22-25 TL than the individuals who did not report. Juang et. al. carried out studies aimed at investigating the levels of noise pollution in some hospitals in Taiwan and studying the effects of noise pollution on the physiological and psychological reactions and annoyance response of medical care staff, patients and visitors in these hospitals. [33] Their results showed that daily average sound levels measured inside these hospitals during daytime were between 52.6 and 64.6 decibels. Talking of visitors or patient's family members was a major source of noise inside the wards. They identified five major noise sources as, Footsteps," "renovation of hospitals," "talking of visitors or patient's family members," "shouting of nursing staff" and "doors opening or closing". They concluded that noise pollution inside and outside the wards either directly or indirectly affect, in a simultaneous manner, the subjective perception of noise, emotions, physiology and experience of noise inside and outside the wards of both the medical care staff and the patients and visitors. Subramani et. al. discussed the fundamentals of acoustics and analysis of vehicular traffic noise. [34] They obtained large number of data sets to account for statistical temporal

variations in traffic flow conditions. They developed a mathematical model for predicting L_{10} or Leq level by considering the parameters like total vehicle volume per hour, average vehicle speed in kmph, Atmospheric temperature in °C, Surface temperature in °C, and Relative humidity in %. Maisonneuve presented a novel approach to monitor noise pollution involving the general public. [35] They demonstrated the use of mobile phones as noise sensors and provided a low cost solution for the citizens to measure their personal exposure to noise in their everyday environment. According to the studies carried out by Weilgart, marine biodiversity is likely compromised by undersea anthropogenic noise. [36] He alarmed about effects of ocean noise on aquatic life and its effect on biodiversity. He concluded that ocean noise must be managed nationally and internationally before irreversible damage to biodiversity and the marine ecosystem occurs.

CONCLUSION

Noise pollution affects human behavior and psychology. It can also cause severe hearing problems. There is need to aware the people about the noise pollution. Regulatory authorities can play important role in reducing the problem with the help of non government organizations. Also used of noise protective equipments at receiver end can protect receiver. The industrial workers also need to use personal protective equipments to reduce constant exposure to noise. The rotating parts and all machinery parts should be properly lubricated from time to time. The proper maintenance of vehicles and awareness can reduce noise pollution due to vehicles and horns. Awareness among people can help to reduce the noise level during festivals. There is also need to control ocean noise pollution which affects ecosystem. This calls for international efforts to protect irreversible

damage due to ocean noise. It can be concluded that awareness, technology and regulations are three important aspects for noise pollution control

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