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A Case Study- Traffic Noise Pollution in One of the Metro Cities in India, Delhi

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Abstract: **Traffic related noise pollution accounts for nearly two-third of the total noise pollution in an urban area. Noise, a byproduct of urbanization, industrialization and motorization, is increasingly recognized as an environmental nuisance that effects human health and wellbeing. Traffic noise on existing urban roadways lowers the quality of life and property values for persons residing near these urban corridors Due to explosion of population and rapid industrialization the transportation in the city increased to unimaginary heights, but due to the want of efficient Mass Transit System, individual vehicular growth also touched escalating heights. The major adverse impact of noise include interference with communication and disturb in sleep. Generally a request to reduce or step is favored by most of the respondents. Public education appears to be the most effective tool to control noise pollution.**

Keywords: **Traffic Noise Pollution, Metro Cities, India**

I. INTRODUCTION

Due to urbanization, there is a huge increase in the vehicular population on the urban corridors. In India, transportation demand in urban areas continues to increase rapidly as a result of both population growth and changes in travel patterns. During the first decade of the 21st century only, the urban areas in the country confront a historic transportation crisis that has become a planning war against increasing mobility gridlock and noise pollution. Due to absence of a good, convenient and efficient public transport system in urban areas, there has been a need to develop the major corridors of the cities. Traffic related noise pollution accounts for nearly two-third of the total noise pollution in an urban area. Traffic noise on existing urban road-ways lowers the quality of life and property values for person residing in vicinity of these urban corridors. Thus, the study of road traffic noise in big cities is an important issue. Due to limited availability of land resources and finances, many highways and important roads are in the residential and commercial areas. Hence there will be some adverse and environmental effects including psychological and physiological effects to those living to proximity of these corridors.

The recognition of road traffic noise as one of the main sources of environmental pollution has led to develop models that enable to predict noise level from fundamental variables. Traffic noise prediction models are required as aids for urban corridors and highways. In addition, sometimes these models are used in the assessment of existing or envisaged changes in traffic noise conditions. So the present study was carried out to analyze the present state of noise pollution in three major corridors of the Delhi city and to develop a linear regression model to analyze the corridors and to suggest proper measures to reduce the noise within permissible limits.

II. HEALTH CONSEQUENCES OF COMMUNITY NOISE POLLUTION

The adverse health effects of noise are auditory disorders such as hearing impairment, tinnitus, ear ache, noise-induced hearing loss, and non-auditory manifestations which include headache, psychological disturbances manifested by irritability, inability to concentrate on one′s work thereby reducing work efficiency, disturbance in sleep and rest, and interference with speech communication.

Hearing impairment has been defined as an increase in the threshold of hearing. The affected person is unable to understand speech in day-to-day life. Noise-induced hearing impairment mainly occurs in the frequency range of 3,000-6,000 Hz, and with increased exposure, at lower frequencies. Speech intelligibility can be reduced even at 10 dB, averaged over 2,000-4,000 Hz, over both ears. Above 30 dB hearing impairment (averaged over 2,000-4,000 Hz, over both ears), a social hearing handicap is noticeable. Significant hearing impairment occurs on exposure to prolonged exposure to noise levels of 70-85 dB.

Noise-induced hearing loss has been scientifically established as an adverse health effect of noise. In temporary hearing loss, the hearing threshold is elevated temporarily, known as temporary threshold shift. With chronic exposure, permanent threshold shift occurs. In this case, hearing loss becomes permanent due to irreversible damage to the sensory cells of the cochlea. Noise-induced hearing loss usually first affects the hearing threshold at high frequencies above the range of speech perception at around 4 kHz. Hence, it is often not noticed till it becomes severe. The susceptibility of an individual to develop noise-induced hearing loss varies greatly. Therefore, it is difficult to predict the extent of

hearing loss a person will acquire when exposed to a certain noise.

Though there are studies in India which have measured the level of community noise, there is scarce published literature on the health effects of community noise pollution. However, such studies have been conducted in various countries. It is highly likely that similar consequences are occurring in India as well.

III. STUDY AREA PROFILE

Delhi is the capital of India and seat of the executive, legislative, and judiciary branches of the Government of India. It is also the centre of the Government of the National Capital Territory of Delhi. New Delhi is situated within the metropolis of Delhi and is one of the eleven districts of the National Capital Territory of Delhi. The foundation stone of the city was laid by George V, Emperor of India during the Delhi Durbar of 1911. It was designed by British architects, Sir Edwin Lutyens and Sir Herbert Baker. The new capital was inaugurated on 13 February 1931, by India's Viceroy Lord Irwin. Although colloquially Delhi and New Delhi as names are used interchangeably to refer to the jurisdiction of NCT of Delhi, these are two distinct entities, and the latter is a small part of the former. Calcutta (now Kolkata) was the capital of India during the British Raj until December 1911. However, Delhi had served as the political and financial centre of several empires of ancient India and the Delhi Sultanate, most notably of the Mughal Empire from 1649 to 1857. During the early 1900s, a proposal was made to the British administration to shift the capital of the British Indian Empire (as it was officially called) from Calcutta to Delhi

Fig:1: Delhi

IV. MEASUREMENT OF NOISE

The response of the human ear to sound depends both on the sound frequency (Hertz) and the sound pressure (decibels). The range of hearing by a healthy young person is 20-20,000 Hz. There is individual variability in the sensitivity to different frequencies. Sensitivity to higher frequencies decrease with age and exposure to noise. Noise exposure at one time can occur from various sources, therefore the average sound pressure level over a specific time period is usually measured.

A widely used scale to measure sound pressure levels is the weighting scale, "A-weighting." It correlates with the subjective response of auditory system, and is expressed as decibels in A-Scale (dBA). Though it is simple and convenient to use, it has limitations of poor predictability. Measurement of noise is done by noise level meters, at locations where people work. Noise dosimeter, which is worn by the person, has the advantage over noise level meter, of capturing the average noise exposure even while moving around. Impulse-sound level meters are preferably used for measuring impulsive sounds, as their short integration time is appropriate for the short integration time of the cochlea, where injury from noise exposure occurs.

To control the generation of noise by various sources in the environment, the Central Pollution Control Board, under the Ministry of Environment and Forests, Government of India, has set standards of sound for different categories of areas (residential, commercial, industrial and silence zones), separately for day-time and at night. It has also set permissible noise limits for vehicles at the manufacturing stage and noise standards for firecrackers.

Recently, on 23 rd March 2011, the Central Pollution Control Board established phase I of the Real Time National Ambient Noise Monitoring Network. It covers 35 locations in seven metro cities (Delhi, Hyderabad, Kolkata, Mumbai, Lucknow, Bangalore, and Chennai). It is a part of the implementation of the National Environmental Policy-2006 (section 5.2.8 [IV]), under which ambient noise is included as an environmental quality parameter. By phase II and phase III, 160 locations spread over 25 cities in 18 states will be established. Ongoing monitoring and appropriate implementation will be possible by this systematic network with central receiving station in Delhi.

V. OBJECTIVES OF THE STUDY

1. To identify traffic noise pollution in Delhi.
2. To show the adverse impact of noise on the basis of responses of respondents.
3. To explore the possible reactions of the people against excessive noise.

VI. METHODOLOGY

The present study is an empirical study and it is based on the sample survey of Delhi. During this empirical study 200 respondents were interviewed.

VII. RESULTS AND DISCUSSION

There are various sources of noise pollution such as vehicular traffic, railway, air traffic, music system etc. Traffic is one of the most important sources of noise in this new technological age. The noise produced from traffic determined by the exhaust system. The data analysis as indicated in Table1 shows that majority of respondents i.e. 35% who belonged to the 40-60% age group believed that effect of hearing is the worse effect of traffic noise pollution.

Table-1
Effect of hearing on different age group

Age Group	Frequency	%age
Upto 20	32	16
20-40	66	33
40-60	70	35
Above 60	32	16
Total	200	100

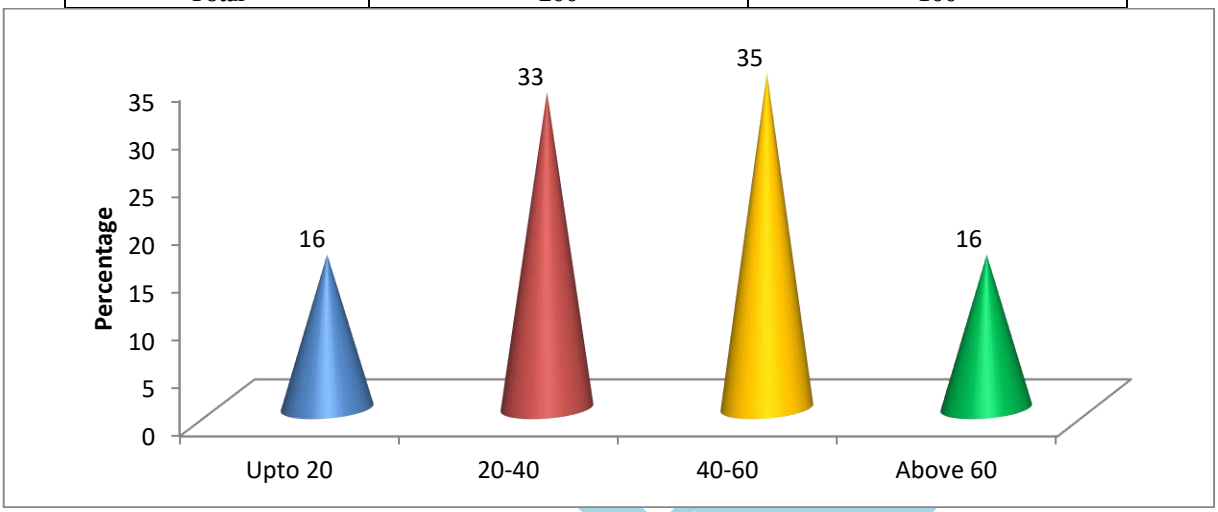

Fig.2

Table 2 given below shows reactions on the whole statements according to their age group. This table consists only highest values of the reactions against the different statements given under table 2 from the tables for different age groups and the result shows that majority of respondents found noise pollution in interference with communication.

Table-2
Effect of Noise on different age groups

	Age groups				
	Upto 20	**20-40**	**40-60**	**Above 60**	**Total**
Effect on hearing	23	57	61	23	164
Interfere with communication	33	73	63	19	188
Cause annoyance	29	69	57	21	176
Disturb sleep	31	71	59	19	180
Result in deafness	7	17	16	7	47
Total	35	76	64	26	200

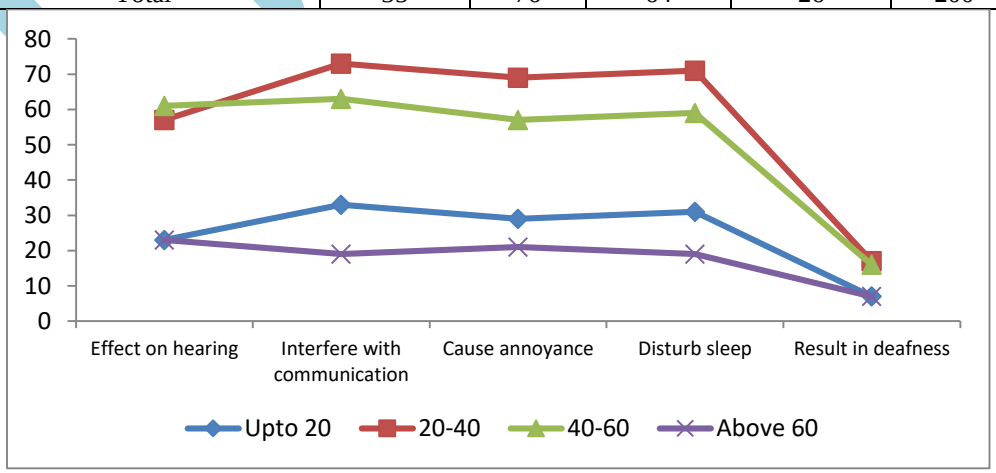

Fig-3

VIII. RECOMMENDATIONS

Fortunately, hearing loss due to community noise pollution is largely preventable. Preventive and control measures have been recommended, viz., stringent

implementation of legislation, efficient engineering products, proper planning of roadways, considering their proximity to human settlements. In industry setting, personal protective equipment such as ear muffs and ear plugs are required. Good practices to prevent noise-induced ailments in children should be adopted. Noise attenuation by placing vegetations around buildings have also been recommended. Recommendations of the Delhi Pollution Control Committee include ban on pressure horns, phasing out of three wheeler autos, extensive plantation of trees on the roadsides, encouraging use of noise-absorbent materials, adequate noise barriers around silence zones, monitoring of loudspeaker, and generator sets to ensure compliance with prescribed rules.

Above all, awareness of the public and stakeholders is the key component in the prevention and control of community noise pollution. Basic and essential information should be extensively disseminated, such as noise levels created by common sources of noise pollution, adverse health effects on both the person creating noise, and the public preventive measures and conditions punishable under law. Graphic displays in public places are a good medium to spread the message. School campaigns, health education programs, and publicizing through print and electronic media can actively address this issue. Involvement of non-governmental organizations in generating public interest and co-operation, and providing audiological facilities will immensely help the cause.

Further exploratory studies are urgently required in India. Socio-demographic factors and determinants of noise-induced health effects, co-morbidities, population-specific thresholds for normal or impaired hearing should be studied.

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