

Assessment of Noise Pollution Based on Community Survey in Tier 2 City, India

Dr. Sasmita Panigrahi¹, Dr. Satyabrata Dash²

¹P.G. Dept. of Botany & Biotechnology, at Khallikote Unitary University, Brahmapur, Odisha

² S.M. Institute of Technology, P.G. Centre for Management Studies, Brahmapur, Odisha, India

Abstract – Noise pollution or excessive, unwanted sound is a major environmental stressor. Noise is no less a pollutant than the toxic chemicals in the environment. As a result of increasing mechanization, the use of increasingly voluminous and complicated machinery and equipment and the stepping up of the pace of production, the noise is becoming an increasingly wide- spread and serious source of discomfort and danger. The present study is an empirical study and is based on the sample survey of tier 2 city of Odisha. During this study, 50 respondents were interviewed by direct interview method. The sample represents a cross- section of different age groups, Gender, educational levels and income groups of respondents. Therefore it could be treated as a representative sample for such an exploratory study. Brahmapur is chosen for the study because it has its importance as a premier business city in Odisha. The growth pattern of the townships exhibits irregular development of roads, lanes, residential colonies, commercial establishments and community centers at different localities which leads to consequent growth of noise sources. A community survey on noise pollution assesses subjective reactions to environmental noise, complementing physical sound level meters. It identifies specific local stressors (e.g., traffic, construction, or industry) and gathers data on perceived sleep disruption, hearing difficulties, and annoyance.

1. INTRODUCTION

The present environmental pollution problems are universal both in the developed as well as developing countries. All these problems are resulting as a consequence of rapid growth of population, excessive exploitation of natural resources, urbanization and industrialization. Noise pollution phenomena are commonly described as a sound and its implications on human health. The current trend of rapid development and increase of the industries, transportations and community activities provides major source of noise pollution, which is well-known environmental hazard throughout the globe. According to Birgitta and Lindvall (1995), road traffic, jet planes, garbage trucks, construction equipment, manufacturing processes, and lawn mowers are some of the major sources of this unwanted sound that are routinely broadcasted in to the air. Crowded cities, mechanized means of transport, new devices of recreation, hooting horns, shrieking of loud speakers, industries and festivals are main sources of noise pollution (Mensoor and Tiwari, 1989). The people residing in urban areas and many occupationally workers develop hearing losses that may be severe. The noise factor is increasingly prejudicing social life and in some instances hearing capacity. In the present scenario, noise is becoming an increasingly widespread and serious source of discomfort and danger.

The term Noise has been defined as a sound without agreeable musical quality or as an unwanted or undesired sound. Noise is no less a pollutant than the toxic chemicals in the environment. As a result of increasing mechanization, the

use of increasingly voluminous and complicated machinery and equipment and the stepping up of the pace of production, the noise is becoming an increasingly wide- spread and serious source of discomfort and danger. Definition given in the ILO Convention No. 148 is the term noise covers all the sound, which can result in hearing impairment or be harmful to health or otherwise dangerous (Garg, 2000).. In most of the countries comparatively very little attention has been rewarded to the noise phenomena, in spite of its importance in the urban and industrial sectors. It has been observed that people residing in the urban areas and many occupationally exposed workers develop severe hearing losses. There is much to suggest that noise hazard is gradually more prejudicing social life and in some instances hearing capacity. The prevention of noise induced hearing loss, therefore, should be accorded top priority. Sudden and unexpected noise has been observed to produce marked changes in the body, such as increased blood pressure, increased heart rate, and muscular contractions. Moreover, digestion, stomach contractions, and the flow of saliva and gastric juices all stop (Broadbent, 1957). Kiernan (1997) find that even relatively low levels of noise effects human health adversely. It may cause hypertension, disrupt sleep and hinder cognitive development in children. The effects of excessive noise could be so severe that either there is a permanent loss of memory or a psychiatric disorder (Bond, 1996). This calls for correct assessment of the noise problem and application of various administrative, engineering and medical control measures. The major sources of noise pollution in the advanced and developing countries include industry, energy sector, transport and community activities. The common instruments used to measure the magnitude of noise fluctuations include sound level meters, dosimeters, octave-band analyzers, sound scopes, noise integrators, graphical level recorders etc. (Agarwal and Jagetia, 2001). The noise is commonly measured as sound intensity that is determined in terms of the pressure of sound waves on the eardrums, and the scale is logarithmic. Loudness of sound corresponds to the degree of sensation depending on the intensity of sound and the sensitivity of the ear (Garg et. al., 2007). The unit of sound intensity measurement is decibel (dB) and each decibel rise depicts ten-fold increase in sound intensity. The permissible noise tolerance levels are displayed (Table 1).

Table 1: Permissible Limits of Noise Levels

Station	DBA	Station	DBA
Television	65- 67	Factory (where workers spend eight hours a day)	90
Ceiling Fan	45	Threshold of pain (duration 20 s)	120
Refrigerator	44	Maximum for impulse noise	135
Washing Machine	61	Maximum for instantaneous noise	150
Road traffic near residential areas	70	Ear-drum rupture	180
Noise on sites of construction	70	Lung damage	194
Audio and Radio	75		
Air Conditioner	61		
Electric Grinder	82		
Vacuum Cleaner	87		
Generator	80-85		

Source: H.M .Dix, 1981

2. OBJECTIVES OF THE STUDY:

The objectives of the present paper are as follows:

1. To identify different sources of noise pollution in Brahmapur City on the basis of community response survey.
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.
4. To find out the suitable solutions for abatement of noise pollution.

3. REVIEW OF LITERATURE

Sources of Noise Pollution

Noise disrupts the tranquility of the environment and can affect climate and human health negatively. Amongst the common sources of noise pollution that contributed directly to climate change are:

(a) Electricity Generating Plant

Electric energy occupies the top grade in energy hierarchy as it finds innumerable uses in homes, industry, agriculture, and defense and of course in some nations, transportation. Nigeria's electricity power situation is very poor because of erratic power supply. As a result, there is an upsurge in the use of electricity generating plant with its attendant noise pollution on the environment and human health. Most workplaces and homes use generating plants 24 hours in alternative to power supply. The noise from generating plants in Nigeria couples with its accompanying smoke emission to the sky has greatly contributed to the breaking of the ozone layer in the sky (Agarwal, and Tiwari 1997).

(b) Vehicular Traffic

Increase in vehicular traffic is also a source of noise pollution around the globe especially in most urban cities around the world. The situation is getting seriously alarming with increase in traffic density on city roads (ibid). The emissions of smoke from cars are of great concern to the changes we are currently experiencing in the climate of this country and that of the world in general (Kumar and Paulsany, 2006).

(c) Construction / Industrial Noise

To meet the demands of the necessity of living, the construction of buildings, highways, and city streets causes a lot of noise. Pneumatic hammers, air compressors, bulldozers, loaders, dump trucks, and pavement breakers are the major sources of noise pollution in construction sites all emitted one classes of smoke or another, which are all contributing to the current changes in climate (Paulsanmg and Latha , 2000).

(d)Household Noise

Household equipments such as vacuum cleaners, mixers and some kitchen appliances are noisemakers of the house. Though they do not cause too much of problem, their effect of noise emitted on human health cannot be neglected. Furthermore, noise can be generated from neighborhood noise consisting of neighboring apartments and noise within one's own apartment (Kumar and Paulsany, 2006).

4. METHODOLOGY

The present study is an empirical study and is based on the sample survey of tier 2 city of Odisha as Brahmapur city. During this study, 50 respondents were interviewed by direct interview method. The sample represents a cross- section of different age groups, Gender, educational levels and income groups of respondents. Therefore it could be treated as a representative sample for such an exploratory study. Brahmapur is chosen for the study because it has its importance as a premier business city in Odisha. The city is expanding at a faster rate to cope with the increasing population. The growth pattern of the townships exhibits irregular development of roads, lanes, residential colonies, commercial establishments and community centers at different localities which leads to consequent growth of noise sources.

The data were collected by using a structured questionnaire blended with suitable open- ended questions. The data analysis has been carried out with the help of percentages and cross classifications on source of noise, reaction to noise and suggestions to control in terms of age as well as gender.

5. ANALYSIS AND INTERPRETATION

There are various sources of noise pollution such as vehicular traffic, railway, air traffic, music system, public address system, neighborhoods and electrical appliances etc. Excessive use of horns by the vehicles and widespread use of loud speakers in different occasion in Indian social and religious functions cause several health hazards to the inhabitants. The noise released from road traffic is determined by the speed and exhaust system. The data analysis as indicated in table- 2 shows that a very large proportion of respondents in each age group are being affected by noise emanating from automobiles.

Table- 2: Source of Noise in terms of Age Groups

Source of Noise	Age Groups				
	Up to 20	20- 40	40- 60	Above 60	Total
Loudspeakers	7 (83)	15 (78)	12 (70)	4 (68)	38 (78)
Automobiles	8 (89)	17 (88)	14 (89)	5 (76)	44 (87)
Neighborhoods	4 (49)	7 (38)	8 (48)	3 (44)	22 (44)
Religious Functions	6 (66)	13 (70)	12 (77)	4 (60)	35 (70)
Total Respondents	9 (100)	16 (100)	15 (100)	10 (100)	50 (100)

Note: Figures in Bracket are given in %.

The range in this source is 76% to 89% with overall % age of 87%. However, percentage of such people in age group of

above 60 is slightly lower. Almost similar in the situation in the case of loudspeaker. Majority of the respondents feel that loudspeakers' noise affect their activities. An almost equal proportion of respondents (70% across various age groups) acknowledge adverse effect of noise generated by religious functions.

At last, a relatively small proportion of respondents (44% across various age groups) claim that noise emerging from neighborhoods create problem before them. From this survey, we are seeing that apart from automobiles and loudspeakers, religious functions as well neighborhoods also act as a significant source of noise pollution.

In Table 3, it has been examined that now the noise pollution affects male population and female population separately.

Table- 3: Source of Noise in terms of Gender Groups

Source of Noise	Male	Female	Total
Loudspeakers	21 (79)	18 (77)	39 (78)
Automobiles	24 (88)	19 (86)	43 (87)
Neighborhoods	11 (41)	10 (47)	22 (44)
Religious Functions	16 (58)	19 (85)	35 (70)
Total Respondents	27 (100)	23 (100)	50 (100)

Note: Figures in Bracket are given in %.

Table 3 presents the figures and % of male and female respondents affected by different sources of noise. There are critical differences in population affected by noise from religious function and according to survey; women are more affected by it over the men population.

In case of noise emerging from neighborhood also has slightly little more impact on women as compared to men population. Majority of the respondents feel that loudspeakers' noise affect their activities. An almost equal proportion of respondents (70% across various age groups) acknowledge adverse effect of noise generated by religious functions.

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In Table- 3, it is revealed that now the noise pollution affects male population and female population separately. It also reveals the figures and % of male and female respondents affected by different source of noise. There are critical differences in population affected by noise from religious function and according to survey; women are more affected by it over the men population.

In case of noise emerging from neighborhood also has slightly little more impact on women as compared to men population. In terms of remaining two sources, there are no marked differences in % of male and female population. It means that the other sources of noise (automobiles and loudspeakers) affect in nearly equal proportion of male as well as female population.

Effect of Noise:

It is obvious that the noise effects human health adversely. It is very difficult to quantify the effect of noise because tolerance levels among different people and types of noise vary considerably. Indiscriminate use of horn by motor vehicles and wide spread use of loudspeakers in different Indian social and religious functions cause different type of health problems to

the inhabitants. It may cause mental disorder, deafness, high blood pressure, dizziness, nervous breakdown and insomnia (Bhargawa, 2000). Nagi et. al., 1993 found that the noise level produced by household equipments and appliances sometimes itches up to 97 dB, which is more than double the acceptable 45 dB noise level. On this type of excessive noise carried by several interests. Similarly Singh (1984) noted that the workers exposed to high noise levels have a high incidence of circulatory problems, cardiac diseases, hypertension, peptic ulcers and neurosensory and mental problem.

From the Table 4, we can see how the noise interferes with communication, disturbs the sleep and cause annoyance under its influence. Majority of the sample respondents exposed to noise pollution report the interference with communication. Nearly 24% respondents reported the deafness problem.

Table 4: Effect of Noise on Different Age Groups

Effect of Noise	Up to 20	20-40	40-60	Above 60	Total
Effect on hearing	23 (66)	57 (75)	61 (95)	23 (92)	164 (82)
Interfere with communication	33 (94)	73 (96)	63 (98)	19 (76)	188 (94)
Cause annoyance	29 (83)	69 (91)	57 (89)	21 (84)	176 (88)
Disturb sleep	31 (89)	71 (93)	59 (92)	19 (76)	180 (90)
Result in deafness	7 (20)	17 (22)	16 (25)	7 (28)	47 (24)
Total	35 (100)	76 (100)	64 (100)	25 (100)	200 (100)

Note: Figures in brackets are given in percentage.

The survey data shows that the effect of noise is not similar among various age groups. Generally, growing age bears the brunt of excessive noise pollution. The data show that all age groups proportion of respondents feel that noise causes disturbance in sleep and also breeds annoyance. Nearly 82% of the respondents claim that the noise also affects hearing. However, there is a much higher incidence of deafness than could be people (above 60 years).

Table 5 shows that perception of male and female populations about the effect of noise varies. According to data analysis it is found that majority of male population feels the adverse effect of noise on hearing.

Table 5: Sex-based differences in perception of effects of noise

Effect of Noise	Male Group	Female Group	Total
Effect on hearing	90 (83)	74 (81)	164 (82)
Interfere with communication	99 (91)	89 (98)	188 (94)
Cause annoyance	89 (92)	87 (96)	176 (88)
Disturbed sleep	93 (85)	87 (96)	180 (90)
Result in deafness	26 (24)	21 (23)	47 (24)
Total	109 (100)	91 (100)	200 (100)

Note: Figures in brackets are given in percentage

6. SUGGESTION FOR CONTROLLING NOISE

The different figures in table- 7 indicate the responses of individuals to a set of probable solution. The data analysis reflects that the most of the people think about education,

government efforts and involve of NGOs as a tool to control the noise pollution. Some of these respondents also favor the empowerment of the police, which can also facilitate checking of noise levels. However the data suggests need for a multidimensional approach. If we talk about responses of different age group, then the data analysis strengthen the belief that education is the best way to control the noise pollution. There must be the flow of information about noise pollution because people are not aware of legislation of environment. So they require only the information based knowledge, by which they can implement this knowledge in controlling the noise pollution.

7. CONCLUSION

The present study explores the different sources, effects, reactions and suggestions for controlling the noise pollution. The analysis shows that automobiles and loudspeakers are the major sources of noise pollution. The survey also indicates the different effects of noise on different age group people. The adverse impact of noise may result in improper communication, sleepless and hearing impairment.

In the majority of cases the affected party prefers a request to stop the noise. In this survey, public education is found to be the most important tool to control the noise pollution. Besides this, the NGOs and government can also play a significant role in the process of controlling the excessive noise.

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