An Empirical Study of Environmental Noise Pollution of Tuticorin District of Tamilnadu, India

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Abstract

Noise is a disturbance to the human environment that is escalating at such a high rate that it will become a major threat to the quality of human lives. This study identifies the sources of noise that create noise pollution. Moreover, the study explores the effects of noise on the sample respondents and their reactions. Finally, various measures to control the pollution are contemplated. The empirical evidence gathered through this study can be employed for developing appropriate legal and public action programme. This empirical study is based on a sample survey of the Tuticorin District of Tamilnadu. 400 respondents were interviewed personally. The data relates to the month of August 2010. Percentage analysis, averages, standard deviation, standard error, F test, chi-square tests, Cramer's V and probability analysis were used. The analysis indicates that a very large proportion of respondents in each age group are being affected by noise emanating from the loudspeakers. A very large proportion of respondents feel that noise interferes with inter-personal communication and causes annoyance. However, there is a much higher incidence of deafness effects on old people. Public education appears to be the best methods as suggested by the respondents.

1. Introduction

No one on earth can escape the sounds of noise- an unwanted, disturbing sound that causes a nuisance in the ear of the beholder. Noise is a disturbance to the human environment that is escalating at such a high rate that it will become a major threat to the quality of human lives. In the past thirty years, noise in all areas, especially in urban areas, has been increasing rapidly. There are numerous effects on the human environment due to the increase in noise pollution. This study identifies the sources of noise that create noise pollution. Moreover, the study explores the effects of noise on the sample respondents and their reactions. Finally, various measures to control the pollution are contemplated. The empirical evidence gathered through this study can be employed for developing appropriate legal and public action programme. The present study was undertaken to study the various sources of noise affecting male and female respondents of different age-groups in Tuticorin District of Tamilnadu, to analyze the data on effect of noise pollution and reactions of different age-groups and sex and to offer suggestions by sex and different age groups to control noise.

2. Materials and Methods

This empirical study is based on a sample survey of the Tuticorin District of Tamilnadu. 400 respondents were interviewed personally. The data relates to the month of August 2010. The sample represents a cross-section of different age groups, sex, geography, educational levels; income levels of respondents and therefore it could be treated as a representative sample for such an exploratory study. The data was collected by using a structured questionnaire blended with suitable open-ended questions. The analysis has been carried out with the help of percentages and cross-classifications on sources of noise, effects of noise, reactions to noise, and suggestions to control noise in terms of age as well as sex. Percentage analysis, averages, standard deviation, standard error, F test, chi-square tests, Cramer's V and probability analysis were used owing to the constraints imposed by the nature of data.

3. Results and Discussion

3.1. Sources of noise

Road traffic is a key source of noise in big cities. The speed and exhaust system determines the noise released by road traffic. 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 these unwanted sounds that are routinely broadcasted into the

air. The noise level and exposure area depends on its source and its strength. Murli and Murthy (1983) also found that traffic noise in Vishakhapatanam exceeds 90 dB even in morning hours that acts as a source of nuisance.

The analysis indicates that a very large proportion of respondents in each age group are being affected by noise emanating from the loudspeakers (table 1). The range is 68% to 84% with

Table 1: Sources of noise in terms of age groups

Source of Noise	Age groups				
	<20	20-40	40-60	>60	Total
Loud speaker	72 (77)	94 (72)	98 (84)	40 (68)	304 (76)
Automobiles	58 (62)	63 (48)	58 (50)	32 (54)	211 (53)
Neighbourhoods	13 (14)	23 (18)	27 (23)	12 (20)	75 (19)
Religious functions	27 (29)	41 (32)	31 (26)	14 (24)	113 (28)
Total respondents	94 (100)	130 (100)	117 (100)	59 (100)	400 (100)

Source: Primary Data; Figure in parenthesis are percentages; (χ^2=6.3, p=0.7096, df=9, Cramer's V=0.0547), Significant at 1% probability level

overall %age of 76%. However, 84 % of such people in age group of 40-60 years are marginally higher. Similar is the situation with automobiles. 53% of respondents across different age groups feel that automobile noise affects their activities. A relatively small proportion of respondents (19% across various age groups) acknowledge adverse effect of noise generated by neighbourhoods. Further 28% of respondents across different age-groups stated that noise originating from religious functions affects them. To see the relationship and the intensity of relationship, the chi-square- test was conducted. The result of chi-square- test (χ^2=6.3, p=0.7096,) revealed that there is no significant difference between age group and source of noise in Tuticorin District. In general, apart from the loudspeakers and automobiles, religious functions, as well neighbourhood acts as significant sources of noise pollution. Thus, industrial cities are becoming a victim of new class of pollution i.e. noise. Further, we examine whether sources of noise pollution act upon male population and female population differently.

The table 2 presents the percentage of male and female respondents affected by different sources of noise. It could be concluded that 28% and 19% respondents affected by noise from religious function and neighbourhoods and surprisingly, men are more affected by it over the women population. In terms of loudspeakers, there is no marked difference i.e., 76%

Table 2: Sources of noise affecting male and female respondents

Noise Sources	Male	Female	Total
Loudspeaker	167 (76)	137 (76)	304 (76)
Automobiles	98 (45)	113 (63)	211 (53)
Neighbourhoods	54 (24)	21 (12)	75 (19)
Religious functions	77 (35)	36 (20)	113 (28)
Total respondents	220 (100)	180 (100)	400 (100)

Source: Primary Data; Figure in parenthesis are percentages; (χ^2=22.52, p=<0.0001, df=3, Cramer's V=0.179), Significant at 1% probability level

of male population and female population. It means that loudspeaker noise affect equal proportion of male population as well as female population. The chi-square test value (χ^2=22.52, p=<0.0001) assured that there are marked significant differences in population affected by noise from automobiles.

3.2. Effect of noise

There is no doubt that the noise affects human health adversely. There is a large amount of scientific literature assessing the effects of noise on human beings. Indiscriminate use of horn by the vehicles and widespread use of loud speakers in Indian social and religious ceremonies cause several health hazards to the urban inhabitants. It may cause deafness, nervous breakdown, mental disorder, heart troubles and high blood pressure, head-aches, dizziness, inefficiency and insomnia (Bhargawa, 2001). Singh (1984) noted that the workers exposed to high noise levels have a higher incidence of circulatory problems, cardiac diseases, hypertension, peptic ulcers, and neurosensory and motor impairment. Thus, there are many an adverse effects of excessive noise or sudden exposure to noise. Nagi et al. (1993) found that the noise level produced by household equipment and appliances sometimes reaches up to 97 dB which is more than double the acceptable (45 dB) noise level. This excessive noise could carry several ill-effects viz. annoyance, speech interference, sleep disturbance, mental stress, headache, and lack of concentration.

We can visualize that noise interferes with communication (78%), disturbs the sleep (65%) and reduces the efficiency of individuals under its umbrella (table 3). 46% of sample respondents exposed to noise pollution report occurrence of annoyance and 40% reported hearing problem. As many as 18% reported the deafness and almost equal number reported mental breakdown (16%). The survey data shows that the effect of noise is not similar among various age groups. Generally, growing age bears excessive noise pollution. A very large proportion of respondents (78%) feel that noise interferes with inter-personal communication and causes annoyance. How-

Table 3: Effect of noise on different age groups					
Effect of noise	Age groups				
	<20	20-40	40-60	>60	Total
Effect on hearing	32 (34)	45 (35)	35 (30)	48 (81)	160 (40)
Interfere with communication	76 (81)	103 (79)	99 (85)	32 (54)	310 (78)
Cause annoyance	41 (44)	62 (48)	53 (45)	27 (46)	183 (46)
Disturb sleep	63 (67)	85 (65)	71 (61)	40 (68)	259 (65)
Result in deafness	14 (15)	23 (18)	13 (11)	22 (37)	72 (18)
Mental breakdown	9 (10)	24 (18)	17 (15)	14 (24)	64 (16)
Total	94 (100)	130 (100)	117 (100)	59 (100)	400 (100)
Source: Primary Data; Figures in parentheses are percentages to the total of the respective columns; (F=1.03, df=3, *p* =0.400519, SS=2341, MS=780.33)					

ever, there is a much higher incidence of deafness effects on old people (above 60 years of age). Further, a general perusal of table shows that physiological deafness 15% and disorders 10% are acknowledged by a smaller proportion of respondents in young age groups vis-a-vis older populations and the difference is statistically not significant (F=1.03, df=3, *p*=0.400519).

The table 4 shows that perception of male and female populations about the effect of noise varies. The survey data shows that the effect of noise is not similar among male and female groups. A significantly higher proportion of male population feels the adverse effects of noise on hearing (46%), efficiency (71%), and interferes with communication (92%). Differences in terms of physiological (depression, sleep, mental breakdown) and interference with communication are not marked i.e. almost equal proportion of male and female population is susceptible to such effects of noise. The results indicated that the effect of noise among male and female respondents showed significant difference (t=1.4165, df=14, *p*=0.1785, Standard error of difference = 24.797).

Table 4: Sex-based differences in perception of effects of noise			
Effect of noise	Male	Female	Total
Effect on hearing	101 (46)	59 (33)	160 (40)
Interfere with communication	202 (92)	108 (60)	310 (78)
Cause annoyance	107 (49)	76 (42)	183 (46)
Reduce efficiency	156 (71)	103 (57)	259 (65)
Cause depression	46 (21)	35 (19)	81 (20)
Disturb sleep	131 (59)	121 (67)	252 (63)
Result in deafness	42 (19)	30 (17)	72 (18)
Mental breakdown	46 (21)	18 (10)	64 (16)
Total	220 (100)	180 (100)	400 (100)
Source: Primary Data; Figure in parentheses are percentages to the total of the respective columns; t=1.4165, df=14, *p*=0.1785, SEd = 24.797			

3.3. Reactions to noise

Several initiatives have been taken by various countries to check the noise level. The movement against noise pollution is weak in India. Most of the people do not consider it a pollutant, and take it as a part of routine life. Of late, it has been recognized as a pollutant (Negi et al., 1999).

We have analyzed the data on reactions of age-groups with a view to ascertain the differences in groups, if any (table 5). Popular reactions across various age-groups include 'request the perpetrator to stop/reduce the noise'. Significant proportions of people affected by noise seek redressed through administrative procedure or quarrel-the latter is popular with youngsters (up to 20 years) as well as with "mature people" (40-60 years). People falling in 20-40 years do not indulge in administrative, legal remedies and/or quarrelling. Though a small percentage, the recourse to legal remedy (police) probably indicates serious violations of noise-controlling laws or community ethics.

Table 5: Reactions to noise by different age groups					
Reactions	Age groups				
	<20	20-40	40-60	>60	Total
Request the source	72 (77)	20 (15)	81 (69)	32 (54)	205 (51)
Complain to the authorities	41 (44)	67 (52)	50 (43)	19 (32)	177 (44)
Complain police	18 (19)	12 (9)	22 (19)	4 (7)	56 (14)
Quarrel with people	53 (56)	31 (24)	36 (31)	8 (14)	128 (32)
Total	94 (100)	130 (100)	117 (100)	59 (100)	400 (100)
Source: Primary Data; Figure in parentheses are percentages to the total of the respective columns					

The table 6 shows that there is no major difference in proportions of male and female populations with regard to the set of probable reactions toward excessive noise. Major reactions to excess noise are similar to what we have seen in case of different age groups i.e. request and seek administrative rem-

Table 6: Reactions to noise among sex groups			
Mode of Reaction	Male	Female	Total
Request the source	189 (86)	103 (57)	292 (73)
Complain to the authorities	92 (42)	85 (47)	177 (44)
Complain to police	29 (13)	27(15)	56 (14)
Quarrel with people	69 (31)	59 (33)	128 (32)
Total	220 (100)	180(100)	400 (100)
Source: Primary Data; Figure in parentheses are percentages to the total of the respective columns; (χ^2=9.83, p=0.0201, df=3, Cramer's V=0.1227), Significant at 1% probability level			

edy. It can be inferred from the table that 44% of the sample respondents complain to the authorities. It is heartening to note that 33% of the fair sex is found to indulge in an aggressive reaction (quarrelling) even more than 31% of their masculine counterpart. It may be a result of modern education, nurturing, and a changing concept of womanhood. The result of chi-square- test (χ^2=9.83, p=0.0201,) revealed that there is no significant difference between sex and probable reactions toward excessive noise.

3.4. Suggestions to control noise

A study by Singh and Mahajan (1990) conducted in Delhi and Calcutta; found that the noise level is 95 dB as against the ambient limit of 45 dB. Even at the "calm" places, it does not fall below 60 dB. Shetye et al. (1981) had estimated that noise level in crowded locations in Bombay was almost double that of residential standards adopted by most countries (45 dB during day and 35 dB at night). Evidently, noise pollution has assumed alarming proportions affecting adversely the efficiency of various populations, mental health and general quality of life. Moreover, it is becoming a problem of law and order with the growing number of complaints to police and administration. Unless and until, measures are taken to control the level of noise, the ongoing urbanization and industrialization may complicate the problem so much that it becomes incurable.

The table 7 indicates responses of individuals to a set of probable solutions. In general, a set of a significant proportion i.e., 49% and 25% of respondents feel that public education programmes and government can help us control the noise-level. Further 8% of respondents feel that the police and civil administration, if empowered, could also facilitate checking of noise-levels. However, the data suggests need for a multi-dimensional approach i.e. a single measure cannot achieve the goal of noise-reduction. In terms of age, 9% of persons between 20-40 years and 8% of persons between 40-60 years

Table 7: Suggestions by different age groups to control noise					
Suggestion	Age groups				
	<20	20-40	40-60	>60	Total
Education	54 (57)	62 (48)	58 (50)	21 (36)	195 (49)
Government efforts	17 (18)	44 (34)	31 (26)	6 (10)	98 (25)
Involving NGO's	13 (14)	8 (06)	14 (12)	14 (24)	49 (12)
Empowering police	7 (07)	4 (03)	5 (04)	10 (17)	26 (07)
Empowering Civil authorities	3 (03)	12 (09)	9 (08)	8 (14)	32 (08)
Total	94 (100)	130 (100)	117 (100)	59 (100)	400 (100)
Source: Primary Data; Figure in parentheses are percentages to the total of the respective columns					

feel that civil authorities should be empowered along with other measures. It strengthens the belief that public education is needed direly because people are not aware of legislation/ rules of environment ministry of Tamilnadu.

Male and female groups do not seem to differ regarding alternative methods of controlling the noise-level (table 8). Predominantly, 47% of male and 51% of the female respondents advocate public education. Empowering the police is rated as a tool for control of noise by smaller proportion of people (7%) in total sample. Thus, change in public attitude by programmes of government/NGO (12%) and civil measures (fines etc.) (8%) could help us reduce or prevent the noise pollution and the dif-

Table 8: Suggestions by different sex groups to control noise			
Methods	Male	Female	Total
Education	104 (47)	91 (51)	195 (49)
Government efforts	53 (24)	45 (25)	98 (25)
Involving NGO's	27 (12)	22 (12)	49 (12)
Empowering police	17 (8)	9 (5)	26 (7)
Empowering Civil Authorities	19 (9)	13 (7)	32 (8)
Total	220 (100)	180 (100)	400 (100)
Source: Primary Data; Figure in parentheses are percentages to the total of the respective columns; (χ^2=1.63, p=0.8034, df=4, Cramer's V=0.0638), Significant at 1% probability level			

ference is statistically not significant (χ^2=1.63, p=0.8034).

4. Conclusion

The paper explores the sources, effects, reactions and suggestions for controlling the excessive noise. Automobiles and public address system (loudspeakers) turns out to be major sources of noise pollution. Across various age groups, there is almost an equal proportions of respondent reporting neighbourhood, music and religions functions as sources of noise. The survey indicates that noise affects individuals in several ways. It results in improper communication, sleeplessness and reduced efficiency. A substantial proportion of respondents among various age-groups complain to administration. Interestingly, about one-third of young people (below 20 yrs) prefer to quarrel with the erring party. Public education appears to be the best methods as suggested by the respondents. However, government and NGOs can play a significant role in the process.

5. References

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