

Subjective Analysis of Road Traffic Noise Annoyance Around Major Arterials in Intermediate City

¹C.R. Patil, ²J.P. Modak, ³P. Vaishali Choudhari and ⁴D.S. Dhote

¹Department of Mech. Engg. PRMIT and R, Badnera-Amravati (India)-444606

²Dean, R and D, PCOEngg.Nagpur (India)-445215

³Departments of Physics, HVPMS CO Engg. Amravati (India)-444606

⁴Departments of Electronics, B.B. Science College. Amravati (India)-444606

Abstract: The present paper reports the evaluation study subjective analysis of the traffic noise annoyance impact on the quality of life among resident's around the major arterials in Intermediate City; Amravati, district place in Maharashtra state (India). A total of 500 individuals in the vicinity of arterials were questioned in writing for their perceptions and attitudes towards road traffic noise. The health effects of noise pollution were analyzed with the help of questionnaire survey. While significant number of individuals were aware of the interference of traffic noise with daily activities and awareness of the health impact. The socioeconomic characteristics of the sample population were identified and the perceived impact of noise on their welfare and health was evaluated. While significant number of individuals were aware of the interference of traffic noise with daily activities and awareness of the health impact.

Key words: Road Traffic noise • Annoyance • Perception • Health impact

INTRODUCTION

The primary source of noise is the individual vehicle; the nuisance is caused by the accumulation of sound of individual vehicles of the traffic stream into traffic noise. Mechanized transport is one of the major pollutants of the natural environment. Noise disturbance due to traffic has detrimental effect on the tranquility of the area and is particularly annoying in the vicinity of noise sensitive areas. It can cause hearing loss, tension, anxiety, anger, Sleeplessness and host of serious problems. Poor vehicle maintenance, poor riding surface, high speed and bad driving add to noise levels. Amravati is a major developing urban centre; district place, growing Intermediate City in the Maharashtra State (India). The city comprises of 57 municipal wards, located at 20°23' N latitude, 78°07' E Longitude. The welfare, health effect of vehicular traffic noise pollution around major two intersections were analysed with the help of questionnaire survey

Literature Review: Increasing urbanization, high-density traffic and rapid industrialization in the last three decades has risen to a number of environmental problems

including noise. Effects of noise exposure on Human beings are generally manifested in the form of cardiovascular, psychological and physiological symptoms or disorders. [1- 3] have appeared in this regard and have shown conflicting results. Preliminary studies have also indicated traffic noise are significant sources of environmental pollution in urban areas. [4-9] have investigated the problem of transport related noise, its characteristics and Some of the studies in India, on exposure to traffic noise annoyance and its effects, noise in industrial areas.

Survey of Social Attitudes: A newly prepared Questionnaire was distributed to heads of households/shops residing in the vicinity of two major intersections i.e. Rajkamal Square zone and Jaistambh Square. A comprehensive questionnaire sought information about traffic noise traits and its effects on exposed individuals. The questionnaire addressed two main categories. In the first category, the socioeconomic characteristics of the individual were sought. These include age, marital status, occupation, education and income. The second category included individual attitudes towards traffic noise and the interference of

Table 1: Socioeconomic characteristics of sample population around both the arterials

Variable(1)	Percent(2)	CumulativePercentage (3)
Sample Size	500	
(a) Age (years)		
15-25	17.526	17.52
25-35	38.144	55.66
35-45	29.897	85.56
45-55	13.402	98.96
> 55	1.0309	100
(b) Marital Status		
Single	42.5	42.5
Married	57.5	100
(c) Education		
SSC	20.619	20.63
HSC	25.773	46.39
Graduation	46.392	92.78
Post graduation	7.2165	100
(d) Income (Rupees Per household)		
< 5000	27.835	27.835
5000-15000	56.701	84.536
>15000	15.464	100
(e) Occupation		
Government	3.0928	3.09
Semi-Government	14.433	17.52
Private	34.021	51.54
Business	48.454	100
Government	0	100

noise with important daily activities, such as sleeping, relaxation, speaking, telephoning, eating, studying and watching Television. The individual annoyance with noise and the effect of noise on health were also included in the survey.

Socioeconomic Characteristics: The age, marital status, education, income and occupation of the sample population are presented in Table 1. Thirty eight percent of the sample ranged in age between 25 and 35 years.

Ninety-nine percent were within the working age range 15-55 years of the interviewed individuals, 49.5 % were married. The greatest majority however had a graduation 46 % followed by HSC education 25.7 %, followed by SSC 20.6 % and post graduation 7.2 %. The majority of the sample (56.07%) was comprised with an income of Rs.5000-15000 and 27.8 % had a monthly income less than Rs. 5000.

Problem of Traffic Noise: Sample individuals were requested to rank the most important transport related urban problem. The list included noise, air, vision pollution. Noise (62%) and air (38%) pollution were recognized as the most important transport related urban problem. The reasons for noise pollution were evaluated as Horn (56%) followed by Traffic jam (20%), silencer (13%) and Engine (11%). The distribution of annoyance due to vehicle categories are as 60% due to Trucks, followed by 12% due to Bus, 22% due to motorcycle and 6 % due to car/minibus. Response to the question “Does traffic noise annoy you?” showed that 73% of sample respondent were annoyed; 17% were not annoyed; and the remaining 10 % stated, “I don’t know”. . The period between 12.00 noon to 6 p.m. was identified by 47 % the interviewed individuals as the period when traffic noise bothered the most. The period extending from 6 pm to 12 night was the second most disturbed period of the day (32%), followed by 6 am to 12 noon period (20%), with 12 midnight to 6 am being the least disturbed period (1%).

Perceived Welfare and Health Impact: The response distribution of the sample population, regarding interference of routine activities by traffic noise is given in Table 2. Based on the percentage of responses in the two categories of severe interference (extremely and very much), studying, other time and talking on telephone were the activities most interfered with by traffic noise (53.6%, 42.3 % and 40.2%) resp. Speaking was fourth (38.1%),

Table 2: Distribution of response about interferences of daily activities by traffic noise around both the arterials

Activity	Distribution of Reported Interference(%)					Total
	None	Little	To some extent	Very much	Extremely	
Sleeping	40.2	15.5	22.7	11.3	10.3	100
Relaxing	24.7	29.9	9.3	24.7	11.3	100
Speaking	29.9	15.5	16.5	19.6	18.6	100
Telephone	17.5	21.6	20.6	25.8	14.4	100
Eating	29.9	21.6	12.4	20.6	15.5	100
Studying	14.4	15.5	16.5	17.5	36.1	100
WatchingT.V.	20.6	10.3	34.0	26.8	8.2	100
Other time	26.8	16.5	14.4	22.7	19.6	100

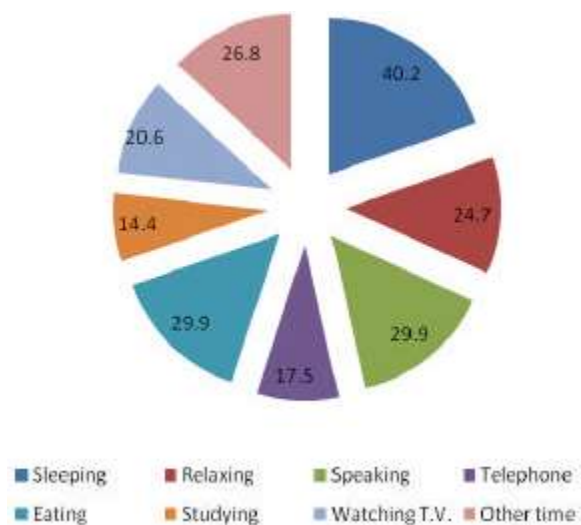


Fig. 1: Distribution of response about interferences of daily activities by traffic noise

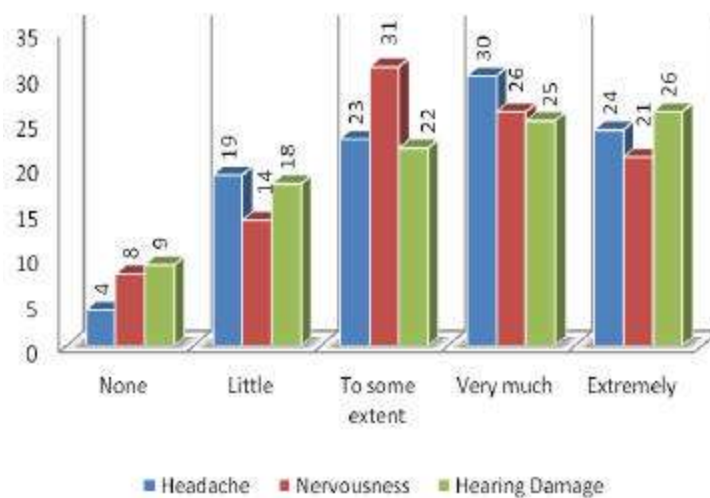


Fig. 2: Distribution of sample responses with regards to health impacts of traffic noise

followed by relaxing, eating (36.1 %), watching T.V. (35.1%) and sleeping (21.6%). Interference with the other two categories of daily activities - sleeping and watching T.V. was reported to a lesser extent. The data indicated that at least one person in five-reported severe interference with important daily activities.

The potential health impacts of traffic noise on exposure individuals are also investigated. Results are presented in Figure 2. Again, based on the severely interfered response categories of extremely and very much. 54% of the sample population reported frequent headaches as a result of being exposed of traffic noise. Nervousness was reported by 47 %, as extent of exposure to traffic noise and 51 % believed that traffic noise causes hearing damage.

CONCLUSIONS

More than half of the total sample population around two major arterials in Amravati city expressed annoyance with traffic noise during daily activities. Of these, 16.8% were “extremely” and 21.1% “very much” annoyed, 18.3% to “some extent” and “little” and 25.5% “none” annoyed. The reported annoyance level reached its maximum during the noon hours for nearly 47% of the sample population. Reported interferences of traffic noise with routine activities were an order of significance studying, other time and talking on telephone relaxing, eating watching T.V. and sleeping. While more than one in two samples reported that traffic noise caused headache, nervousness and hearing as a result of exposure to noise. Individuals

in higher income group reported a much higher level of annoyance with traffic noise than those in lower income groups. The same was observed for the level of education. Both income and education positively affected the perceived the impact of traffic noise on health related variables. Figure No. 1 reflects distribution of response about interferences of daily activities by traffic noise on arterials individually and combined on both the arterials. Figure 2. reflects distribution of sample responses with regards to health impacts of traffic noise on arterials individually and combined on both the arterials

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REFERENCES

1. Bhatnagar Namita, *et al.*, 1991. Evaluation of noise pollution in the home environment. *Indian J. Environmental Protection*, 11(12): 910-916.
2. Das, D.B. *et al.*, 1999. Environmental Noise: A psychological, Physiolo. and Ambient Assessment at Industrial, Residential and Commercial Places of a Rajstan, *Indian J. Environmental Protection*, 19(7): 481-487.
3. Karunakaran, 2001. Effect of noise on industrial workers- a sociological survey, *Ecology Environment Conservation*, 7(4): 477-480.
4. Koushki, P.A., *et al.*, 1999. Urban traffic noise in Kuwait: Profiles and modeling residents' perceptions, *ASCE J. Urban Planning and Develop.*, 125(3): 101-109.
5. Koushki, P.A. *et al.*, 1993. Urban traffic noise in Riyadh, Saudi Arabia: perceptions and attitudes, *ASCE J. Transportation Engine.*, 119(5): 751-761.
6. Mohan Surinder, *et al.*, 2000. Subjective reaction to road traffic noise of residents living in Delhi City, *Pollution Res.*, 19(3): 353-356.
7. Pandya Monica, *et al.*, 1999. Status of noise pollution and effects around industrial areas of Jabalpur city: Part II- analysis of health effects, *Acta Ecologica*, 21(1): 12-16.
8. Rao P.R., *et al.*, 1991. Subjective response to traffic noise and its effects, *Indian J. Environmental Protection*, 11(6): 430-432.
9. Rao P.R, *et al.*, 1992. The prediction of annoyance due to heavy vehicular traffic, *Energy Environment Monitoring*, 8(1): 13-17.