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NOISE ASSESSMENT, AUDIOMETRY OF TRAFFIC PERSONNEL AND COMMUNITY SURVEY AT TWO TRAFFIC JUNCTIONS IN MUMBAI

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ABSTRACT

Road-traffic continues to be the major source of noise in the community, especially in metropolises. It depends largely on the quantum and composition of traffic, condition of roads and traffic- sense of the vehicle users. This research study of two busy traffic junctions in the metropolis of Mumbai was undertaken to assess the ambient noise levels, hearing sensitivity and reactions of traffic regulating personnel, and also community reactions to the traffic noise. The noise levels recorded were distinctly higher than the stipulated Standards of ambient noise. Though, hearing impairment was not found in the communication range for the traffic personnel, as many as 50% of the traffic personnel and 40% of the people surveyed complained of annoyance and irritation. The residents staying around these junctions registered sleep disturbances at night too.

1 - INTRODUCTION

Metropolises like Mumbai with their ever-increasing vehicular population are becoming more and more noisy with every passing day. The roadways in such urban areas occur in regions of high population density as these are lined with buildings on both sides. Various industrialized countries of the world and international organizations have formulated ambient noise standards to avoid annoyance, to conserve hearing, and to make life comfortable. The Indian Standards for ambient levels measured as Equivalent Level (Leq), are 75 dBA for industrial, 65 dBA for commercial, and 55 dBA for residential areas, and 50 dBA for the silence zones during the day. These limits are reduced during night time by 5 dB for industrial, and 10 dB for commercial, residential, and silence zone areas respectively [1].

There is enough research evidence to support various auditory and non-auditory effects of noise on human health [2]. As the noise level increases the effects spread from 'attitudinal' to 'behavioral' and ultimately 'physiological' effects. The effects of most traffic noise fall in the category of nuisance, and attitudes of dislike with a very limited range of physiological effects. This is because the traffic noise levels rarely exceed 90 dBA for more than short periods. At levels between 60 and 90 dBA, noise can cause sleep disturbances, besides causing annoyance and irritation. A population survey of 3600 Japanese women [3] revealed that living near a road with heavy traffic, is one of the risk factors for insomnia.

A true estimate of noise levels and establishment of its relationship with human response should consider precise noise measurement indices. Yeowart et al. [4] tested on a sample of residents of 27 different sites in the greater Manchester area, traffic flow situations to determine the efficacy of various noise indices in the prediction of community dissatisfaction to traffic noise. No index could handle adequately all the traffic flow conditions. In particular extended indices based on L10 (18 hrs) and Leq. appeared to be useful predictors of community response to all the traffic flow situations studied. Several methods to control road-traffic noise in terms of town planning, better maintained roads and vehicles, and stricter legislation have been suggested. In England, trials have begun on rubber roads in an attempt to cut traffic noise, the method claiming to reduce it by 70% [5].

2 - MEASUREMENTS

Based on the results of an earlier study conducted by the institute [6], two traffic junctions, namely Sion Circle (SC), and Bhandi Bazaar (BB) were selected. Both these places are commercial areas having

residential buildings on all sides. Noise level recordings were made for a continuous period of 12 hrs covering maximum period of traffic activity from 8.00 am to 8.00 pm. All the noise measurements were made using an Integrating Sound Level Meter (B&K 2231). Leq observations were made for 15 minutes each, twice every hour. The traffic volume in terms of two, four, and six / eight wheelers was recorded and all hourly recordings were used to find the average traffic flow per hour in a day.

A sample of 30 traffic-regulating personnel was tested for their auditory capacity using pure tone audiometer MAICO-41, USA. These subjects ranged from 28 to 50 years in age and did not have any otological abnormalities. The occupational noise exposure ranged from 2 to 30 years. A questionnaire was used, to record their subjective reactions to the noise exposure. To elicit shop-keepers' and residents' response to noise, a social survey of 144 of these was carried out by administering questionnaires. The group comprised of students, housewives, working men and women, and senior citizens.

3 - RESULTS AND DISCUSSION

The minimum and maximum levels, and the Leq readings are indicated in Table 1, and the average traffic flow values in Table 2. The Leq noise levels at both the places studied, much exceeded for most part of the daytime, the stipulated ambient noise Standards. The vehicular scenario at both places in terms of total vehicular count per hour did not show much difference. However, the composition in terms of two and six/eight wheeler vehicles was considerably different. The higher value of Leq at BB can be attributed to a much larger number of two wheelers at this junction. Noise level surveys carried out by the Central Pollution Control Board of India in the metros, in 1989-90 indicated mean Leq values ranging between 71.5-80.0 dBA during daytime, and 56.0-70.0 dBA at night [7]. According to some results of an analytical model developed for predicting traffic noise in the US for different population densities it was predicted that average noise levels will rise by about 0.4 dBA/year [8]. As can be seen from the results of the present investigation there has been much higher increment than 4 dB over the past decade. The noise nuisance with regard to road traffic will in future be of noise extension in time and space as well as noise intensification. The night noise levels will also for the most part approach those currently recorded during the day.

Traffic Junction	Leq (dBA)	Min. Level (dBA)	Max. Level (dBA)
Sion Circle (SC)	79.1	64.0	99.6
Bhendi Bazaar (BB)	81.4	66.9	99.5

Table 1: Noise levels at the two traffic junctions.

Traffic Junction	Two Wheelers	Three Wheelers	Four Wheelers	Six/Eight Wheelers
Sion Circle (SC)	726	67	4028	1209
Bhendi Bazaar (BB)	1620	16	3694	415

Table 2: Volume and composition of traffic at SCand BB.

The traffic personnel tested for their hearing did not show an impairment in the communication range except for the group exposed for between 21-25 years (Figure 1). 50% of the subjects found the traffic noise to be intolerable. The main complaints expressed by these personnel were annoyance and irritation. 30% also said that they expected calm at home and got irritated easily if home was found to be noisy. The irritation was caused mainly because of unwarranted use of pressure horns by the drivers. Nearly 45% of the respondents of the community survey complained of annoyance due to noise and 35% complained of sleep disturbances. 60% of the students complained of trouble in concentrating while studying.

4 - SUGGESTIONS

Following need to be given serious consideration for curtailing road-traffic noise:

1. Giving the two-wheeler traffic bypass roads.
2. Giving the heavy vehicles time restrictions.
3. Levying a pollution charge to the polluter.
4. Enforcing strictly, automobile noise limits at the manufacturing level.

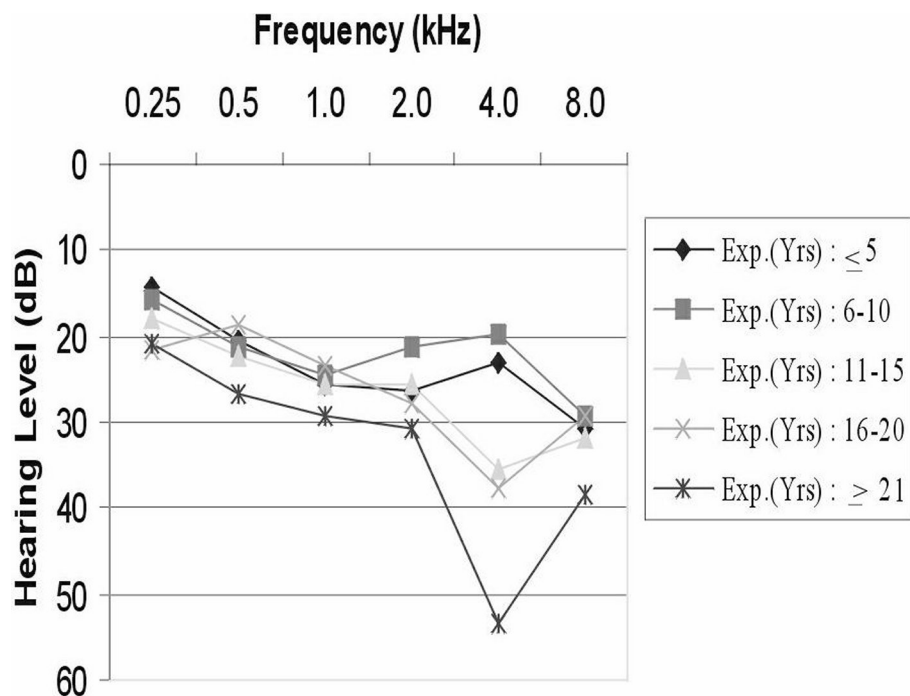


Figure 1: Hearing levels of traffic personnel.

5. Increasing use of battery-operated vehicles.
6. Adopting latest technology for better roads.
7. **Increasing mass transport by road as well as rail.**
8. **Making public capable of "self regulating" or "self policing" in terms of vehicle maintenance and use of horns.**

5 - CONCLUSION

Two traffic junctions in Mumbai were studied during most of the day time for the ambient noise levels vis a vis traffic volume and its composition. At both places noise levels much exceeded the permissible ambient noise standards. If this trend is not arrested now, it will be causing higher and higher levels of annoyance, irritation and insomnia for the exposed population who do not have a choice of change of place, be it the residents or the traffic personnel as was evident from the surveys conducted. A system combining strict enforcement of legislation, proper punitive measures, education of public to raise awareness, adoption of latest technology for infra-structural improvement, and stress on extensive mass transport are some of the suggested measures.

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