

Effect of Noise on Human Psychology in Public Spaces of Dhaka City

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Abstract - Noise from transport, footpath hawkers, passerby, and so on are now increasingly prominent feature of the urban environment in Dhaka city. The effects of noise exposure on human health, well-being and cognitive development are increasing day by day as well as increasing noise at public spaces. Extreme intensity of noise results in various negative changes in human psychology which in turn creates daily life problems. Noise may affect health is through annoyance: noise causes annoyance responses in both children and adults and annoyance may cause stress-responses and subsequent illness. For children effects of noise have been observed for impaired reading comprehension and memory skills: there is equivocal evidence for an association with blood pressure. In conclusion, noise is a main cause of environmental annoyance and it negatively affects the quality of life of a large proportion of the population. In addition, health and cognitive effects, although modest, may be of importance given the number of people increasingly exposed to environmental noise and the chronic nature of exposure.

Accordingly, an investigation has been carried out employing data collection for measuring noise level and interviewing to know psychological effect of noise in different area in important part of Dhaka city. This study put an effort to determine the level of noise pollution and its zone of influence to know how far noise is affecting the humane behavior and psychology of the study area.

Key Words: Noise, Human Psychology, Public Spaces, Dhaka City

1.INTRODUCTION

Noise has always been an important environmental problem. In ancient Rome, rules existed as to the noise emitted from the ironed wheels of wagons which battered the stones on the pavement, causing disruption of sleep and annoyance to the citizenry. In Medieval Europe, horse carriages and horse-back riding were not allowed during night time in certain cities to ensure peaceful sleep for inhabitants. However, the noise problems of the past are incomparable with those of the modern society. An immense number of cars, motorcycles, trucks and other motorized vehicles crises-crosses developing cities, day and night. In comparison to other pollutants, the control of environmental noise has been hampered by insufficient knowledge of its effects on humans and of dose-response relationships as well as a lack of defined criteria. While it has been suggested that noise pollution is primarily a "luxury" problem for developed countries, exposure to noise is often higher in developing countries, due to densities, poor planning and construction. The effects of the noise are just as widespread and the long term consequences for health are the same. In this perspective, practical action to limit and control the exposure to environmental noise are essential. Noise pollution in large developing cities is an insidious issue. In such noisy cities, many people seem to have become accustomed to the higher noise levels that underpin their daily activities. Yet in a city such as Hong Kong, for example, noise is the most common cause of complaints. Of the 23678 environmental complaints received by the Hong Kong Environmental Protection Department in 2010, 29% were noise related [4].

Noise is present in every human activity, and when assessing its impact on human well-being it is usually classified either as occupational noise (i.e. noise in the workplace), or as environmental noise, which includes noise in all other settings, whether at the community, residential, or domestic level e.g. traffic, playgrounds, sports, music [5]. Noise pollution is a significant environmental problem in many urban areas and one of the most important occupational risk factors both in industry and transportation.

In general, a pattern of exposure to any source of sound that produces high enough levels can result in temporary hearing loss. If the exposure persists over a long period of time, this could lead to permanent hearing impairment [1]. NIHL has a profound physiological and social impact on affected individuals which eventually affects work performance, efficiency and reduces the quality of life. Additionally, noise pollution can cause annoyance and aggression, hypertension, high stress levels, tinnitus, hearing loss, sleep disturbances, and other harmful effects [3]. Noise control measures are being considered as part of an overall strategy to help improve the quality of life of urban dwellers. One important source of urban noise is related to mass transit networks, which include buses, subways, light rail, commuter rail and other transportation systems [2].

Noise pollution continues to pose a major health threat for Bangladesh, especially in cities and particularly in Dhaka city. Much discussion has occurred in the media over the many serious environmental problems that Bangladesh faces which includes water and air pollution, harmful effects of polythene bags etc. Although it is mentioned occasionally, noise pollution has not received serious attention in the past. Recent studies show high levels of noise in various points in the urban centers of Dhaka, Sylhet and Khulna. To many Dhaka residents, it may be considered more of a necessary aggravation than a serious problem that can be addressed. Noise pollution is not only an aggravation, but also a serious risk. The WHO and GoB have established guidelines and standards for maximum allowable levels of noise above which people are harmed; it is widely known that in many parts of Dhaka city, those levels are regularly exceeded. People of Dhaka city mostly suffer from the bad effects of noise pollution. Dhaka is one of the most heavily populated metropolitan cities of the world with significant commuter flows.

1.1 AIM

To understand the relationship between noise and behavioural effect on human psychology in public places of Dhaka city.

1.2 OBJECTIVES

- To access the internal noise environment of public places in Dhaka city through continuous noise level measurement along places.
- To identify the heavy noisy public area in Dhaka city and comparison with occupational health and safety guidelines.
- To find out the causes of noise
- To identify the effects of noise and to generate awareness regarding the noise hazards of public spaces in Dhaka.
- To understand the relationship between noise and human behaviour.

1.3 SCOPE AND LIMITATION OF THE WORK

Finding and screening the effect of noise on human psychology is difficult task. Because there are several numbers of independent variables for finding effect on human psychology. Human psychology may be affected by many reasons; those are types of spaces, causes of Noise, type of Noise, Area size of public spaces, user number of those public spaces, intensity of noise level, location of those public spaces, noise reflectors and absorbents ratio of those spaces. Human Psychology may be affected by age group of users, physical conditions of users. There are many reasons like traffic jam, personal problems of the participants; weather etc can affect the moods of the participants. In this research traffic, problems, personal problems and existing moods, weather condition has been ignored. Only Noise and its effect on participants mind have been interviewed.

2. RESEARCH METHODS

This part describes the methodology adopted to carry out the research work.

2.1 SELECTION OF THE PUBLIC SPACES

Dhaka is a big and overpopulated city. Noise pollution creates an alarming situation throughout the Dhaka city. The objective of this study is to find out the heavy noisy public spaces of Dhaka city. As per the objective five noisy places have been selected which is in a major spine route of Dhaka city. The spine is started from Mirpur 12 to Shahbag. These five points are Mirpur 12 bus stoppage, Mirpur 10 Golchattar (infront of Shah ali plaza), Agargaon (infront of IDB), Farmgate bus stoppage and Shahbag signal. These public spaces have been chosen for measuring noise intensity and its effect on human behaviour.



Fig 1 : Selection of five public places for noise measurement

2.2 DATA COLLECTION FOR MEASURING NOISE LEVEL

To complete these study continuous noise level measurements were carried out from those five public places of Dhaka city. For this purpose a sound meter and noise detector apps has been downloaded in mobile phone. Noise level measurements were carried out in the middle of each selected places three times in a day. The time has been selected as morning (7 am to 10 am), noon (12 am to 3pm) and evening (5pm to 8pm). To ensure recording of actual noise level at public places continuous noise level measurements has been done under normal operation condition at least five minutes for each pick. The noise level meter also recorded average noise level, minimum experience noise level and maximum experience noise level for every pick. Noise levels were recorded in decibels. Noise Levels have been measured by sound meters from Mobile Apps.

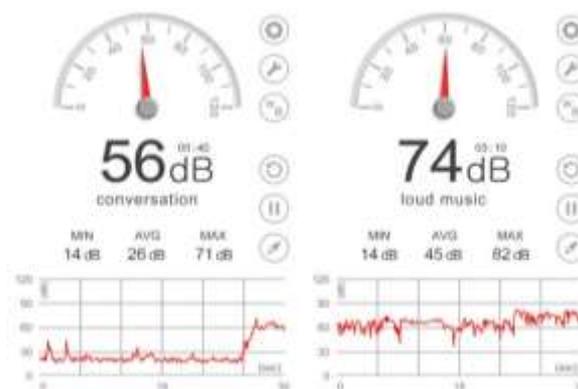


Figure 2: Integrating-averaging sound meters in Mobile Apps.

2.3 PARTICIPANTS SELECTION

The main objective of this study is to understand the relationship between noise and human psychology. As well as finding out the noise level, the reaction and feedbacks from publics, the causes of noise, it was necessary to interview the human beings who

are regularly crossing these selected public spaces. To fulfil this purpose 9 participants were selected for each selected space. Among 9 participants 3 were selected for morning, 3 were for noon and 3 were for evening session. Total 45 participants were interviewed in this study.

2.4 DADA COLLECTION PROCEDURE

At first noise data collection was done. Then the data collection from the human being has been done. Participants were selected purposively and then they have been educated about the purpose of this study. After this they have informed about some ethical consideration. Then the main data collection procedure has been started. At first data has been collected individually. The participants who are agreed to participate were asked to complete the questionnaire. Along with the written instruction within the questionnaire, the participants were instructed verbally to make it sure that they had understood the task. Then they were requested to answer the questionnaire sincerely and honestly. All possible clarifications were to made to any problems faced by the respondents while answering the questions and there was no time limit for the participants. After accomplishment of their task, the answered questionnaires were collected from them and they were given thanks for their sincere cooperation.

3 RESULTS AND DISCUSSIONS

Based on the data collection and analysis obtained results are discussed below. At Mirpur 12 the highest noise intensity was 79 dB, lowest noise intensity was 76 dB and the average intensity was 75 dB. At Mirpur 10 the highest noise intensity was 83 dB, lowest noise intensity was 81 dB and the average intensity was 80 dB. At Agargaon the highest noise intensity was 75 dB, lowest noise intensity was 70 dB and the average intensity was 70 dB. At Firmgate the highest noise intensity was 89 dB, lowest noise intensity was 81 dB and the average intensity was 85 dB. At Shahbag the highest noise intensity was 78 dB, lowest noise intensity was 72 dB and the average intensity was 74 dB. It is seen that the average noise intensity at Fiemgate is highest which is 85 dB and at the Mirpur 10 it is second highest which is 80. At Agargaon the average noise intensity is lowest which is 72 dB. From this result it can be said that among the five public zone the Firmgate and Mirpur is most crowded place and Agargaon is comparatively lower crowded place. In Framgate and Mirpur10 there are no open space for absorbing the created noise. Rather, at these place there are many noise reflector such as high building, footoverbridge etc. This is a reason for the increased noise intensity. On the other hand at Agargaon there are enough open space for absorbing the created noise and also there are minimum noise reflector which makes the place comparatively less noisy.

The result also shows that participants from each spase mention some causes of noise of the specific area. It is found that noise from vehicles, disorganized passerby, hawkers in the footpath are the main sources of extreme noise.

It is also found that the extreme intensity of noise results in various negative changes in human psychology which in turn creates daily life problems.

Table 1 : Average Noise level at Mirpur 12

| Count No | Noise Level at Mirpur 12 (dB) | | |
|----------|-------------------------------|--------------------|----------------------|
| | Morning (7am-10am) | Noon (12 pm -3pm) | Evening (5 pm – 8pm) |
| 1 | 79 | 75 | 76 |
| 2 | 78 | 77 | 76 |
| 3 | 80 | 73 | 77 |
| Average | 79 | 75 | 76 |

It is found that at Mirpur 12 in the morning among three participants two are said that they are experiencing irritation, argumentativeness, anxiety, stress for the extreme noise. At the same place in noon among three participants three are reported about headache, nausea, tiredness etc. In the evening two participants reported about uncertainty, headache, problems in cardiovascular system and depressed mood and one participant said about sleep problem along with other problem.

Table 2: Average Noise level at Mirpur 10

| Count No | Noise Level at Mirpur 10 (dB) | | |
|----------|-------------------------------|--------------------|----------------------|
| | Morning (7am-10am) | Noon (12 pm -3pm) | Evening (5 pm – 8pm) |
| 1 | 85 | 80 | 83 |

| | | | |
|---------|----|----|----|
| 2 | 79 | 81 | 78 |
| 3 | 83 | 79 | 81 |
| Average | 83 | 80 | 81 |

At Mirpur 10 in the morning three among three participants said that the noise is responsible for anxiety, irritation, uncertainty, stress, nervousness. In the noon most of the participants stated about headache, nausea, poor concentration and querulous. In the evening most of the participants stated about increase heart rate, uncertainty, sleep problem.

Table 3: Average Noise level at Agargaon

| Count No | Noise Level at Agargaon (dB) | | |
|----------|------------------------------|-------------------|----------------------|
| | Morning (7am-10am) | Noon (12 pm -3pm) | Evening (5 pm – 8pm) |
| 1 | 75 | 70 | 70 |
| 2 | 77 | 71 | 71 |
| 3 | 73 | 73 | 70 |
| Average | 75 | 72 | 70 |

At Agargaon it is found that, in the morning among three participants two are said that they are experiencing irritation, depressed mood, anxiety, and stress for the extreme noise. At the same place in noon among three participants three are reported about headache, nausea, concentration problem. In the evening two participants reported about uncertainty, depressed mood, relationship problem and one participant said about sleep problem, reduce of self-confidence along with other problem.

Table 4 : Average Noise level at Farmgate

| Count No | Noise Level at Farmgate(dB) | | |
|----------|-----------------------------|-------------------|----------------------|
| | Morning (7am-10am) | Noon (12 pm -3pm) | Evening (5 pm – 8pm) |
| 1 | 85 | 83 | 83 |
| 2 | 79 | 84 | 78 |
| 3 | 83 | 86 | 81 |
| Average | 83 | 85 | 81 |

At Farmgate it is found that, in the morning among three participants two are said that they are facing nausea, headache, depressed mood, anxiety, and stress for the extreme noise. At the same place in noon among three participants two are reported about sleep disturbance, concentration problem, relationship problem, heart problem. One participant said about misunderstanding. In the evening two participants reported about uncertainty, depressed mood, relationship problem and one participant said about cardiovascular problem, headache, nausea along with other problem.

Table 5: Average Noise level at Shahbag

| Count No | Noise Level at Sahbag (dB) | | |
|----------|----------------------------|-------------------|----------------------|
| | Morning (7am-10am) | Noon (12 pm -3pm) | Evening (5 pm – 8pm) |
| 1 | 77 | 75 | 70 |
| 2 | 78 | 76 | 72 |
| 3 | 80 | 73 | 74 |
| Average | 78 | 74 | 72 |

At Shahbag in the morning three among three participants said that the noise is responsible for anxiety, irritation, uncertainty, stress, nervousness. In the noon most of the participants stated about headache, nausea, poor concentration and querulous. In the evening most of the participants stated about increase heart rate, uncertainty, sleep problem.

Table 6 : Comparison the noise level in different spaces along with different Time

| | Mirpur 12 | Mirpur 10 | Agargaon | Farmgate | Shahbag |
|---------|-----------|-----------|----------|----------|---------|
| Morning | 79 dB | 83 dB | 75 dB | 83 dB | 78 dB |
| Noon | 75 dB | 80 dB | 72 dB | 85 dB | 74 dB |
| Evening | 76 dB | 81 dB | 70 dB | 81 dB | 72 dB |
| Average | 77 dB | 82 dB | 72 dB | 83 dB | 75 dB |

It is also found that at every point in the morning most of the participants facing same type of psychological problem such as anxiety, stress, headache, irritation etc. in the morning though the environment remains comparatively cool, there is a pressure for going office or workplace, that's why the participants reported such problems. In the noon it is found that the participants are experiencing headache, nausea, concentration problem etc. In the evening there is a pressure for coming back home after a busy working day among the participants. They report about depressed mood, sleep problem, uncertainty, heart problem anger etc.

4 CONCLUSIONS

From this result it can be said that among the five public zone the Farmgate and Mirpur is most crowded place and Agargaon is comparatively lower crowded place. In Farmgate and Mirpur10 there are no open space for absorbing the created noise. Rather, at these place there are many noise reflector such as high building, etc. This is a reason for the increased noise intensity. On the other hand at Agargaon there are enough open space for absorbing the created noise and also there are minimum noise reflector which makes the place comparatively less noisy. The result also shows that participants from each space mention some causes of noise of the specific area. It is found that noise from vehicles, disorganized passerby, hawkers in the footpath are the main sources of extreme noise. It is also found that the extreme intensity of noise results in various negative changes in human psychology which in turn creates daily life problems.

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5 REFERENCES

- [1] ANSI (1996). Determination of occupational noise exposure and estimation of noise-induced hearing impairment (S3.44-1996). New York, NY: American National Standards Institute. Report No.: S3.44-1996.
- [2] Gershon, R. R. M., Neitzel, R., Barrera, M. A. and Akram, M. (2006), Pilot Survey of Subway and Bus Stop Noise Levels, *Journal of Urban Health: Bulletin of the New York Academy of Medicine*, 83(5).
- [3] Hossain, M. I., Rashid, K. N. and Ahmed, T. (2013), Assessment of Occupational Noise Hazard in Road Ways and Traffic Intersections in Dhaka city, *Journal for Civil Engineering, IEB*, 41(2): 111-122.
- [4] Jaeger-Cueppers, M. (2011), *Arvan Transport and Health, Module 5c, Division 44, Noise and its Abatement, a source book for policy maker*, GIZ publication.
- [5] Mangalekar, S.B., Jadhav, A.S. and Raut, P.D. (2012), Study of Noise Pollution in Kolhapur City, Maharashtra, India, *Universal Journal of Environmental Research and Technology*, 2(1): 65-69.