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A study on noise pollution of stone crusher machine at Jaflong, Sylhet

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Abstract

This research work was aimed to assess exposure condition and the safety situation in stone crushing units. Sound level was measured at 6 stone crushing plant. A small questionnaire survey performed on the surveyed area. For the questionnaire survey the interviewees were divided into five categories. They are worker (60), teacher (5), Student (30), Shop-keeper (40) and Tourist (50) out of 185 interviewees. Exposure level of sound was not suitable from health hazard point of view. From this study the whole scenario was dangerous for human health. It was clear the maximum noise level 102 dBA, 100dBA & 99dBA at nearest point from crushing machine. It also clear that the noise level was decreasing with increasing distance from crushing point source. It was observed from this study the safe distance from the permissible sound level view of point was 24 ft at day time. The acceptable sound limit set by Department of Environments is 60 dBA at mixed area. This value exceeds in every stone crushing plant at Jaflong area.

INTRODUCTION

Noise is generated from sound. When sound went on higher and higher pitches with loudness that human ear cannot persists, becomes unwanted and termed as noise.

The details of work specification and activities at a stone crushing plant that breaks large stones into smaller pieces by using machines or manually which produces noise [2]. Noise-induced hearing loss (NIHL) is machine irreversible sensor ineural hearing loss associated with exposure to high levels of excessive noise. This study aims to assess the noise levels and the awareness of the effects of noise on health among stone crushing industry workers. There are laws and legislation set by the department of environment (DOE), Bangladesh. Understanding various sound properties will help to realize the study.

Table 1. Satisfactory Noise Level [3]

Area Category	Night Time	Day Time
Silent zones (Hospitals, Old homes etc.)	40 dB	50 dB
Residential areas	45 dB	55 dB
Commercial areas	60 dB	70 dB
Mixed areas	50 dB	60 dB
Industrial areas	70 dB	75 dB

Each type of pollution has a more or less bad impact on human life. Noise in big cities is considered by the World Health Organization to be the third most hazardous type of pollution, right after air and water pollution [2]. So threats from noise pollution on human health cannot be ignored anymore. Noise effects on human slowly and finally it can causes permanent deafness, continuous exposure can initiate people to several critical diseases or sudden noise can cause to death. If noise level is above 160dB, it results in rupture of tympanic membrane and ultimate hearing loss. From laboratory experiments there is overwhelming evidence that the presence of uncontrollable noise can significantly impair cognitive performances of adults. Noise is able to induce learned helplessness, increase arousal, alter the choice of task strategy, and decrease attention to the task [3].

Sharmin (2009) [4] carried out a study on noise pollution in vulnerable sites of Sylhet city. In this study, noise levels of major commercial areas, major hospital areas, major school and college of major location in Sylhet city have been measured, from 9am to 8 pm during working days with the help of a sound level meter. It is observed that average highest noise level of intersection point is around 97 dBA at Amborkhana. The highest TNI is found in Amborkhana (101.2 dBA). The average noise level of indoor hospital is around 76 decibel and that in indoor of school is 78 dBA. Unplanned urbanization and higher population is claimed to be the cause of such situation [14]. Shilpi Rani Basak (2007) [5] Assessed noise pollution in vulnerable hospital sites of Sylhet city. In this study, noise

levels of major hospital areas of Sylhet city have been measured from 8 am to 8 pm during working days. She found that the noise levels in hospital areas are approximately 75 dBA. Even in commercial areas some hospitals are located without any special arrangement for reduction of noise level. 43% hospitals are located near the road side, 55% are located in mixed area. In residential areas noise level is found lay between 70 to 73 dBA. Unplanned urbanization is remarked as the main cause of such situation. The study suggested safe distance for vulnerable institutions should be 100 meter away from the road.

Farhana hussain (2007) studied traffic contribution to noise and air pollution in Sylhet. They found that heavy traffic causes serious congestion in every point and is responsible for noise and air pollution. At Amborkhana, actual roadway capacity was 7488 pcu where theoretical roadway capacity was 2500 pcu. Noise levels of nine intersection point are observed to exceed allowable limit.

MATERIALS AND METHODS

A. Study Area

In this study survey area is selected Balla ghat, Jaflong under Goianghat upazilla. Jaflong is the north-east zone of Bangladesh. Latitude of Jaflong is +25°10'25.90'' and altitude is +92°0'45.20''. Jaflong is a tourism area, there are about few thousand people visit regularly from whole Bangladesh. Sometimes many foreigners also visit this area. Above these reason this area should be environmentally friendly and peaceful for the tourist. Surveyed stone crushing plant have been selected randomly. This is clear to map of sample collection area (Figure 1). Survey works have been conducted on Shimonto stone crusher Ltd, R.M. stone crusher, Arafat stone crusher, Rumana stone crusher, Capital stone crusher, Proma stone crusher.

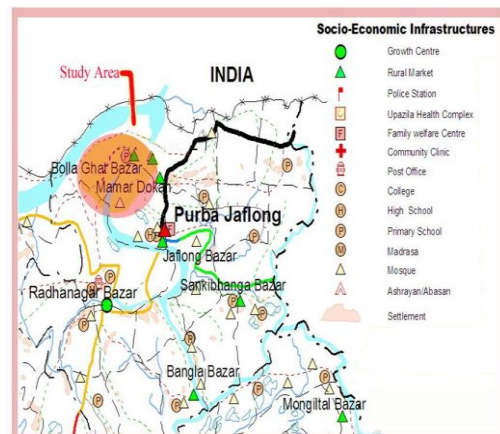


Fig. 1. Study area

B. Sound measurement

All the measurements were made manually on ‘A-weighting’ scale and the sound level meter was switched to fast response position. Sound level has been measured every 5 feet distance from source point of noise (Stone crushing plant). All values of these measurements have been recorded as the sound level of the corresponding location at a specific time. This research is done by using primary data and the data is collected with the help Integrating Sound Level Meter Lutron SL-4010. A small scale questionnaire survey is conducted to find out health effect and people awareness. Noise level is measured in each of the sampling points in working days during 7 am to 6 pm

C. Questionnaire survey

A small scale questionnaire survey is conducted on people of sampling point area. To perform this survey the interviews are divided in to five categories, namely Worker, Teacher, Students, Shopkeeper and Tourist. They are not discriminate on basis of sampling area (Bollaghat, Jaflong). They were asked a few question and their answers were recorded in survey documents. The questions asked are a) Do you feel annoyed by the sound around you? b) Do you feel any physical disturbance due to noise? c) Do you feel any psychological disturbance due to noise? d) Do you know such noise level can lead to deafness? e) Do you know what can be done to control noise level? Finally the percentage of people awareness is calculated from the positive answer of question a, d and e.

RESULTS AND DISCUSSION

It’s clear from figure 2 and 3 the maximum noise level at shrimonto and R.M. stone crusher are 91 dBA and 102 dBA respectively at nearest point from crushing machine. It also clears from the figures that the noise level is decreasing with increasing distance from crushing point source. Maximum noise level at Arafat stone crusher, Rumana stone crusher, Capital stone crusher and Proma stone crusher were found 100 dBA, 88 dBA, 95 dBA and 98 dBA respectively at nearest point from crushing machine It is observed from the figure 2 and 3 the safe distance from the permissible sound level view of point is 26 and 36 ft at day time respectively.

A small scale questionnaire survey was done to divulge health effects on human and to determine public awareness about noise pollution in both of the city. Around 185 people are interviewed to conduct this part of the study.

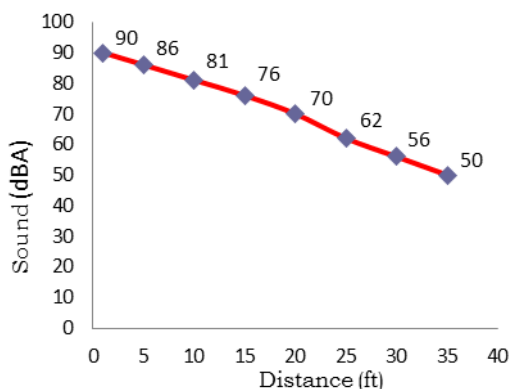


Fig. 2. Variation of noise level with distance (ft) at Shimanto stone crusher

Interviewees are divided into five categories. They are worker (60), teacher (5), Student (30), shop-keeper (40) and tourist (50). There is no division on which city they belong to.

Almost 80% of workers feel disturbed by the stone crushing machine created noise, 15% of them do not feel disturb and 5% of said they feel disturbed sometimes. 95% teachers feel annoyed by the stone crushing machine created noise around them among teachers 2% do not feel disturb and feel disturbed sometimes 3%.90% students are disturbed by the stone crushing machine created noise 8% of them do not feel disturb

and rest 2 % feel disturbed sometimes.85 % of shopkeepers feel disturbed by stone crushing machine created noise. Among them only 5% do not feel disturb and 10 % feel disturbed sometimes.96% tourists feel disturbed by the noisy environment in this tourist area. 2% of them do not feel disturb and rest 2% said they feel disturbed sometimes.

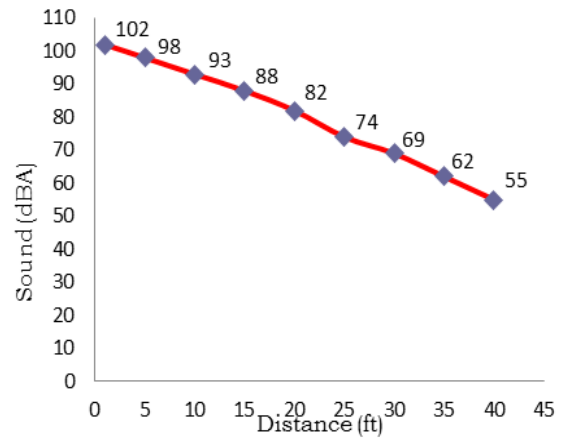


Fig. 3: Variation of noise level with distance (ft) at R.M. stone crusher

Around 90% of workers complained headache, 95% worker sleep interference and 88% of them are said about hearing deficiency and others said 20%. Almost 95% teachers suffered headache, 92% of them have sleep interference and hearing deficiency is felt by 90% of them and others said 35%. 93% students complained headache, 95% student complained sleep interference and 85% felt hearing deficiency others said 23%. 96% shopkeepers have headache, 92% of them have sleep interference, 88% of them feel hearing deficiency and others said 30%. 96% tourists have spoken about headache, 95% have sleep interference, 90% of them have felt hearing deficiency and other said 41%. The other physiological problem includes increase of blood pressure during high noise. Increase of cardio-vascular disease, increase of pulse arte, tinnitus (ringing inside ear).

Around 96% of workers suffering from irritation, 98% worker undergone attention deficiency, 80% of them are said they have bad temperature and other 20%. Almost 95% teachers feel irritated, 99% of them experiences attention deficiency and 92% have bad temperament during high level of sound and other 20%. About 95% of students suffer from irritated 96% of them are undergone attention deficiency and 90% student said they have bad temperament if they are subjected to high level of sound and other 35%. About 92% shopkeepers feel irritated, 90% face attention deficiency. 87 % of them admit they become bad tempered during high level of sound and other 26%. About 92% tourists are irritated, 98% of them have felt hearing deficiency and 95% possess ill temperature and other said 35%.

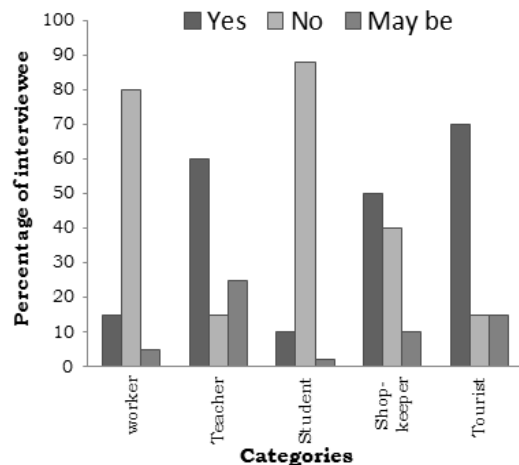


Fig. 4. Evaluation of people awareness of noise level

From figure 4 in spite of their profession only 15% worker are aware of bad effect and 80% remains ignores. About 5% they are still in confusion. About 60% teachers are concerned about the hazard that such noise level poses threat. But 15% teachers are remains unaware of it and more 25% of them are perplexes. Only 10% of students answered positive about the fact, 78% of them are uninformed about the ultimate result of being exposed to such noise level, 12% students are confused of the question. Just 50 % shopkeepers are informed that deafness can cause everlasting hearing impairment. 40 % admitted they do not know about it and 10 % of them are confused. About 70 % tourists answered positive about the fact, 15% of them are uninformed about the ultimate result of being exposed to such noise level, 15 % tourist are confused of the question.

88% workers propose to improve machine use, 90% suggest to shift the machine safe area, 50% said other methods. 90% teachers suggest improve machine use, 95% recommended to shift the machine safe area, 40 % advised many other alternative solution. 90% students propose to improve machine use, 85% of them suggest shifting the machine safe area. 25 % advised many other alternative solutions. 70% service-holders suggest improve machine use, 92% of them suggest shifting the machine safe area. 40 % advised many other alternative possible solutions. About 96 % tourists raise their voice for modify and improved machine used, 93% of them suggest to shift the machine safe area. 20 % said improve working condition, confined area and many other alternative possible solutions.

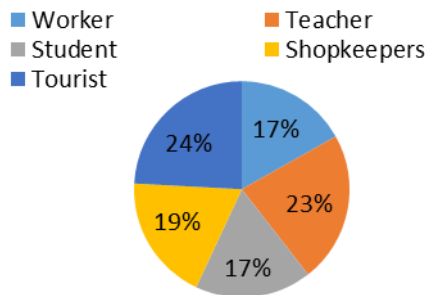


Fig. 5. Awareness of people

From the figure 5 it is seen that percentage of awareness of worker, teacher, student, shopkeeper and tourist is 17%, 23%, 17%, 19% and 24% respectively. It is understood that the awareness among people is not in satisfactory level. People are facing the problem but do not have adequate idea of what such noise can charge on them.

CONCLUSION

The study reveals the existing noise pollution status of stone crushing plant at Jaflong Bollah Ghat area, Goainghat, Sylhet. The acceptable noise level set by Department of environment (DOE), Bangladesh exceeds in every stone crushing plant at Jaflong area. During the observation maximum noise level from R.M. stone crusher was found 102 dBA and minimum noise level from Rumana stone crusher was found 88 dBA. The permissible noise level at mixed area set by DOE is 60 dBA was found lowest distance 24 feet from crushing plant Rumana stone crusher and workers stay there more than 8 hours in a day. Maximum stone crushing plant are situated within 500 feet from commercial/ residential area. There is a number of people especially tourist complained headache. Stone crushing plant should be installed at safe distance from residential/commercial area. Personal protective equipment should be used properly and regularly too.

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