

Assessment of Noise Pollution Level and Associated Impacts at Schools in Dharwad City, Karnataka State

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Abstract: Noise, it is defined as unwanted sound and it may cause various psychological and physical stress to human health if exposed to the unwanted noise. Noise pollution is also deliberated as environmental stressor and irritation. In the modern civilization noise pollution has become a part of the life. There are several national and international guidelines relating to the acoustics of classrooms. As per the WHO guidelines the noise level classrooms as 35 dB during the teaching sessions and playground at school should not more than 50 dB and upper limit is 60dB. Total Eight school locations were selected for present study to understand the noise level and its impact on the learners and educators. In the present study, there total eight locations were selected, measurement have been done in accordance, the noise level measuring device (NLMD) had been used in acquisition of noise level in selected locations. The noise level measurements are gathering for period of 8 hours at an interval of one minute (60 seconds) which then are presented in the graphs. The graph plotted is the sound pressure level (Decibel, db(A) versus time measured (second) graph. The data presented will show the noise level, its max, min and mean readings of educates uninterruptedly. In Dharwad city due to rapid urbanization, the vehicular movement in haulage sector and learners themselves lead to more crowded on roads and noise pollution in educational schools in the city. The following range of measures to be taken to control the noise pollution due to vehicular movement in educational centers.

Keywords: Noise pollution, impact, assessment, Dharwad city

I. INTRODUCTION

From lost 25 to 30 years, there is huge amount research activities is going on the effect of noise on the children's learning, schools and performance at school. Exposure to high noise levels is very well known and it's also effects on the well being of human health including performance of the kids at school. The main source for noise pollution is traffic areas, urban environment and working environments. The literature says, that noise pollution around the educational institute's creates multi problems to the teaching learning process and negatively affects the performance of both teachers and students (Godso, 2009).

According to (WHO,2001) recently, pollution from sound has been of rising concern worldwide, predominantly in most metropolitan cities. The noise troubles from the modern industrial sectors seem incomparable to the ancient times given the larger source of noise now present outdoors and indoors.

Most of the noise related problems are ensuing as a outcome of increasing in the population growth, self centered human attitude, fast life style, number of motor vehicles, use of large number of instruments in daily life, excessive exploitation of natural resources, rapid rate of urbanization and industrialization. In the long-ago 30 years, there has been a great deal of investigate into the effects of noise on children's learning and performance at school. (Biswajit Goswami, et al., 2018).

Noise Pollution in India

There are many environmental problems in India. Air pollution, water pollution, solid waste and pollution of the natural environment are all challenges for India. Today in India, Noise pollution is one of the major environmental concerns and sadly many are unaware of the hazards it can cause. It is very unfortunate that we all are subjected to some form of loud noises for a considerable amount of time, during the day. The sources of sound pollution are divided into two categories like natural and anthropogenic activity.

Noise in School

Similarly, the home and the work place, school is also considered as an important micro-environment. The school is important for the connectivity for metal process, resourceful, and community development of kids. Schools are therefore expected to ensure the best possible circumstances for a child's physical and intellectual development, including control of excess environmental noise.

There are several national and international guidelines relating to the acoustics of classrooms. As per the WHO guidelines the noise level classrooms as 35 dB during the teaching sessions and playground at school should not more than 50 dB and upper limit is 60dB.

From the history of the research work indicates, the effects of chronic noise pollution on children at school level, there is relatively little published data quantifying the noise environment inside and outside schools. History of the research work shown that noise can have a detrimental effect upon the cognitive development of primary school children, and that older children in this group appear to be more affected than younger children (Hygge, et al., (2002). The present work indicates the levels of noise pollution in Dharwad City. Objective of the present study is to assess and analyze the noise level in eight different selected schools located around commercial, traffic, airport and residential areas in Dharwad city, Karnataka state, India.

II. MATERIALS AND METHODS

In the present study, author selected eight secondary schools; this study focused on selected noise and health and learning related facts from eight study schools.

Study Area:

The Dharwad city is situated on the edge of western Ghats at the foot of a low range hills on the northern bank, its key points as 15.46' North latitude and 75.01' East longitude, around 18 km away from the Hubli Railway station. As per the census 2011 the population of the twin cities (the city Governed by the Hubli-Dharwad Municipal Corporation) is 1,349,563. City is located and place category with the GPS coordinates of 15° 27' 36.9072" N and 75° 0' 37.0224" E. The total area covers 200.2 km², it is located 425km northwest of Bangalore, on the National Highway 4. The city, where the first fight for unification of Karnataka Ekikarana - was staged, Hence, it holds a special place in the hearts of the people of Karnataka. Spread over seven small hills at an average altitude of 751 meters above sea level, the city enjoys a salubrious climate amidst thick vegetation. City was known for its lakes but several have now dried out. The city has plenty of green cover. The botanical garden established by Karnatak University's has many rare plants, trees and birds. Kelgeri, Sadhanakeri, Navalur and Nuggikeri are also homes for water birds. The location map of the study area is given in Figure. 3.1.

Climate

The climate is mildly hot during the April to May months (summer seasons), and pleasant during rest of the year, as it is at an altitude of about 750 m. The average yearly rainfall of the area is 838mm. The maximum and minimum temperature was found is 35°C and 26OC, Wind NW at 5 km/h, 36% Humidity is given in below.

| Climate Conditions of the Dharwad City | | | | | | | | | | | | | |
|--|------|------|------|------|------|-------|-------|-------|-------|------|------|------|-------|
| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec | Year |
| Average High °C | 29.0 | 32.0 | 34.0 | 35.0 | 34.0 | 28.0 | 26.0 | 26.0 | 28.0 | 29.0 | 29.0 | 28.0 | 30.0 |
| Average Low °C | 15.0 | 16.0 | 19.0 | 21.0 | 21.0 | 21.0 | 21.0 | 20.0 | 20.0 | 19.0 | 17.0 | 15.8 | 19.4 |
| Average mm | 0.0 | 0.0 | 10.0 | 40.0 | 60.0 | 150.0 | 210.0 | 200.0 | 110.0 | 60.0 | 30.0 | 0.0 | 838.0 |

Description of the Locations and Sampling Details

Noise levels was measured at three different periods of the academic year 2017 - 2018 to understand the impact of noise pollution on learners and educators inside the selected school buildings in and around the Dharwad city. Study was conducted during five academic studying days (Monday to Saturday). This period is distinguished by the maximum educational, organizational and other student activities. During this period, two different times were selected for noise measurements; at the morning rush hour (8.00-9.00 am) and an afternoon hour (1.00-2.00 pm). This time is characterized by relatively high to low activity inside the school campus because most or all students are present inside the campus and into the class rooms. Another period was the "holiday time" which included Sunday holiday. During this time, it is known that mainly the activities inside the school campus are reserved or totally closed.

Total Eight school locations were selected for present study to understand the noise level and its impact on the learners and educators. They are K E Board School, Station road Malmaddi, Rajeev Gandhi Vidyalaya, Near DC office, Pavan school, University road, Kalyan nagar, Presentation Girls high school, opposite K C Park, JSS Sri Manjunatheshwar School, Vidyagiri, Basel mission school, Karwar road, Shanti sadan school, kalyan nagar and Siddrameshwar school, kalyan nagar

Collection of Noise Data

The noise meter was used (digital sound level meter of type 2 model IEC 651) to collect the data and that has been considered to meet sound study necessities of quality control at different environments. The external facial appearance and front face of the digital noise meter, the flow chart of the noise meter given in Figure 3.2. The sound level meter used, can measure the sound frequency from 300 Hz to 8 kHz and from 30

dB to 130 dB in A weighted scale at four ranges. i.e., 30 to 80 dB(A) for low; 50 to 100 dB(A) for medium; 80 to 130 dB(A) for slightly high and 30 to 130 dB(A) automatic measurement range

Calibration was done and fixed at a low range of between 35-100 dB and placed on top of a 1.2 ft bench for standardized vertical distance above the ground level. The low range was selected because it was correlated well with human response. The noise unit was then accustomed to “A” weighting so as to determine the noise level. The “A” weighting network was chosen because it is normally working for industrial and environmental studies.

III. RESULTS AND DISCUSSION

The noise pollution of the school campus is depending on the several factors, like outside activity, inside activity, time of the calendar day, period of year and other activity in and around the school surroundings. Some of the factors were studied in selected school campus in the current study. To study the sound level in the school surroundings sound level meter had been used at the study period. The study was conducted and measured for a period of 8 hours and intervals of 5 minutes and plotted into graphical shape. The graph plotted x axis Decibel dB(A) versus y axis (time measured second) graph.

The data presented in its form maximum, minimum and average readings of selected schools in the current study. In the selected area measured the noise level at specific locations is given in Table 4.1.

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Table 4.1 Noise Levels in Specific commercial locations at Dharwad City

| Specific Locations | Noise Level, dB (A) | | |
|--------------------------------|---------------------|---------|---------|
| | Maximum | Minimum | Average |
| Railway Station (Main) | 83 | 68 | 75.5 |
| Road ways | 79 | 69 | 74.0 |
| State Bank of India | 76 | 65 | 70.5 |
| General Post Office | 70 | 62 | 66.0 |
| General Hospital | 73 | 63 | 66.5 |
| College | 76 | 63 | 69.5 |
| Inside a Bus during Movement | 96 | 66 | 81.0 |
| Inside a Train during movement | 96 | 80 | 89.5 |
| Market | 75 | 67 | 71.0 |

In the present study, there total eight locations were selected, measurement have be done in accordance, the noise level measuring device (NLMD) had been used in acquisition of noise level in selected locations. The noise level measurements are gathering for period of 8 hours at an interval of one minute (60 seconds) which then are presented in the graphs. The graph plotted is the sound pressure level (Decibel, db(A) versus time measured (second) graph. The data presented will show the noise level, its max, min and mean readings of educates uninterruptedly.

Table 4.2 Noise level at K E Board School, Station road Malmaddi

| Sl. No | Determines time | Number of Observation | Sound level dB (A) | | |
|--------|---------------------------------|-----------------------|--------------------|---------|---------|
| | | | Average | Minimum | Maximum |
| 1 | Morning (7.00 AM to 12.00 PM) | 58 | 54.66 | 48.00 | 61.50 |
| 2 | After noon (2.00 PM to 5.00 PM) | 38 | 80.77 | 54.60 | 92.50 |

Table 4.3 Noise level at Rajeev Gandhi Vidyalaya, Near DC office

| Sl. No | Determines time | Number of Observation | Sound level dB (A) | | |
|--------|---------------------------------|-----------------------|--------------------|---------|---------|
| | | | Average | Minimum | Maximum |
| 1 | Morning (7.00 AM to 12.00 PM) | 51 | 55.83 | 49.20 | 61.50 |
| 2 | After noon (2.00 PM to 5.00 PM) | 30 | 78.50 | 49.60 | 91.20 |

Table 4.4 Noise level at Pavan School, University road

| Sl. No | Determines time | Number of Observation | Sound level dB (A) | | |
|--------|---------------------------------|-----------------------|--------------------|---------|---------|
| | | | Average | Minimum | Maximum |
| 1 | Morning (7.00 AM to 12.00 PM) | 34 | 56.80 | 49.20 | 61.50 |
| 2 | After noon (2.00 PM to 5.00 PM) | 25 | 77.01 | 50.80 | 90.80 |

Table 4.5 Noise level at Presentation Girls high school

| Sl. No | Determines time | Number of Observation | Sound level dB (A) | | |
|--------|---------------------------------|-----------------------|--------------------|---------|---------|
| | | | Average | Minimum | Maximum |
| 1 | Morning (7.00 AM to 12.00 PM) | 53 | 54.02 | 48.00 | 60.90 |
| 2 | After noon (2.00 PM to 5.00 PM) | 38 | 81.09 | 57.60 | 93.40 |

Table 4.6 Noise level at JSS Sri Manjunatheshwar School

| Sl. No | Determines time | Number of Observation | Sound level dB (A) | | |
|--------|---------------------------------|-----------------------|--------------------|---------|---------|
| | | | Average | Minimum | Maximum |
| 1 | Morning (7.00 AM to 12.00 PM) | 46 | 53.02 | 48.00 | 60.90 |
| 2 | After noon (2.00 PM to 5.00 PM) | 26 | 77.24 | 57.60 | 89.70 |

Table 4.7 Noise level at Vidyagiri, Basel Mission school

| Sl. No | Determines time | Number of Observation | Sound level dB (A) | | |
|--------|---------------------------------|-----------------------|--------------------|---------|---------|
| | | | Average | Minimum | Maximum |
| 1 | Morning (7.00 AM to 12.00 PM) | 42 | 60.81 | 49.20 | 77.90 |
| 2 | After noon (2.00 PM to 5.00 PM) | 28 | 80.84 | 49.60 | 89.60 |

Table 4.8 Noise level at Shanti Sadan School

| Sl. No | Determines time | Number of Observation | Sound level dB (A) | | |
|--------|---------------------------------|-----------------------|--------------------|---------|---------|
| | | | Average | Minimum | Maximum |
| 1 | Morning (7.00 AM to 12.00 PM) | 34 | 77.01 | 49.20 | 61.50 |
| 2 | After noon (2.00 PM to 5.00 PM) | 25 | 56.80 | 50.80 | 90.80 |

Table 4.9 Noise level at Siddrameshwar School

| Sl. No | Determines time | Number of Observation | Sound level dB (A) | | |
|--------|---------------------------------|-----------------------|--------------------|---------|---------|
| | | | Average | Minimum | Maximum |
| 1 | Morning (7.00 AM to 12.00 PM) | 53 | 54.42 | 48.60 | 62.90 |
| 2 | After noon (2.00 PM to 5.00 PM) | 38 | 82.60 | 65.40 | 92.50 |

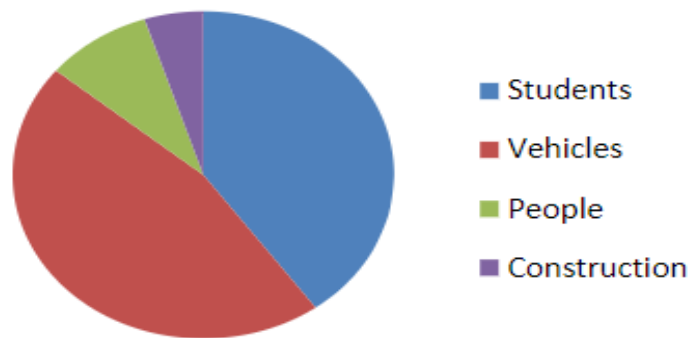


Figure 4.1 Noise Pollution at Different sources during the study period and schools

A social survey was conducted in different educational schools in Dharwad city by supplying a Questionnaire to the students, teachers and Head of the educational centres to understand the main goal of the study. Based on the survey conducted during the study period, the noise from different sources is given in figure 4.1. Major sources of noise pollution are from vehicles moving around the schools and inside the institutions and also educational centers.

In the entire study, based on the attempt made through questionnaire and distributed among student, staff of the schools indicates the major sources of noise pollution were motor vehicular traffic (56%) followed by students themselves (30%), people moving around the schools (8%) and construction work and other activities (6%).

The maximum noise level observed was maximum 93.4 dB (A) in Girls high school is given in table 4.5. The major sources of sound in and around the study area were motor vehicular traffic 56% followed by students themselves 30%. The permissible limit of traffic noise is 50dB (A) as per the Rules & Regulations of the National Pollution Control Commission (1978), Section 78).

However, in the present study all the selected schools showing the maximum level of noise pollution and cross the noise level allowable limits. From the analysis of data from questionnaire it is clear that all the educational institutes does have noise problem. Noise problem in educational institutes mainly depends on where the institute is located. All the surveyed schools in Dharwad city are located in the centre of the city. Other than these hereby schools are suffering from noisy environment creating disturbance in daily work. The findings from the Questionnaire indicates about the adverse effect of noise pollution on schools and educators along with the students and the findings is summarized as there is a lot of disturbance in teaching-learning process as 78% agrees with it (Figure 4.2).

From the investigation it was also indicates that the people muscularly carried the action from official body, Govt., or working group to reduce noise pollution. Most of surrounding communities are opinion and paying attention on the ban of high powered horn and old vehicles (Haines, 2001). The local organization should support the community and take some steps and authoritarian actions to be decrease such noise pollution. The authors are also supporting the present study and confirmed with results (Avwiri, 2003, David O. Baloye and Lobina G. Palamuleni. 2015, Abdolreza Gilavand and Amir Jamshidnezhad. 2016). Ozer S, Zengin M, Yilmaz H (2013) reported in quick industrialization and increasing in the community the transport division is growing hurriedly and increasing in the number of vehicular movement on road also leads to congestion and noise level.

In the present study, reviews the cause, sound effects and controlling behavior for noise pollution. In small scale industries, roadways, goods carrying system and public places releases noise and major sources of high sound level. Day to day due to human activities accidentally every people are contributing to create noise pollution. These noise pollution affect indirectly affect the students in teaching and learning process, it may affects the student academic calendar, present study also supports the work conducted by Haines , et al., 2001 and Celik and Karabiber, 2000.

IV. CONCLUSIONS AND RECOMMENDATIONS

In Dharwad city due to rapid urbanization, the vehicular movement in haulage sector and learners themselves lead to more crowded on roads and noise pollution in educational schools in the city. The following range of measures to be taken to control the noise pollution due to vehicular movement in educational centers.

- a) The school should have some educational criteria to maintain good environmental condition and location of the schools and to be maintained away from the road, building and other sources from construction activities.
- b) Educational centers should have some percussion to be taken with respect to building, insulation system and also fencing with concrete walls to control the noise pollution in and around the schools. The health effects of sound pollution were recorded.

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