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Assessment on different levels of noise pollution in Aizawl City, Mizoram, India

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Abstract

Assessment of noise pollution was carried out in Aizawl city of Mizoram during August 2009 to July 2011. Different levels of noise were recorded from industrial zones, commercial zones, residential zones and silence zones by using Sound Level Meter 2031/A. Of all the four zones, residential zones and silence zones were found to exceed the standard prescribed by the Noise Pollution (Regulation and Control) Rules, 2000. Among the commercial zones New Market and Zangena Petrol Pump exceed the standard level. And all the study sites under industrial zones were within the standard level. Detailed information is presented in the paper.

Key words: Noise pollution; control measures; silence zones; Aizawl.

Introduction

The unwanted sound with high level intensity is called noise, and the state of discomfort and restlessness caused to human being is noise pollution.[1] Noise pollution becomes more severe and widespread due to population growth, urbanization, industrialization, etc. Noise problems and complaints increased dramatically by the end of 19th century and beginning of the 20th century as US and European societies became more urbanized and mechanized. With time, the problem of noise was taken up in the social and political context so that legislative measures were introduced to reduced noise pollution.[2,3] Different sources of noise are automobiles, vehicle horns, loudspeakers, explosions, crackers, aircrafts, factories, workshops, musical instruments, animals, etc. The intensity or loudness of sound is measured by a unit of decibel (dBA scale). The effects of high intensity noise on human beings are represented by threshold of hearing –0 dBA, annoyance –80 dBA, damage of hearing –90 dBA, permanent loss of hearing –100 dBA, threshold of pain –120 dBA, pain in ear –140 dBA, damage in ear drum –160 dBA and lung damage at 190 dBA.[4] Today, one of the most important calamities in urban life is unwanted, meaningless and unmusical sound,

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which is technically called noise pollution.[5]

Aizawl is the capital city of Mizoram in the North East India. It has an area of 457 sq km and a population of 291,822 based on 2011 census,[6] the density being 234/sq km. The work was carried out during August 2009 to July 2011 at different levels of four parameters selected based on the guidelines recommended by the Noise Pollution (Regulation and Control) Rules, 2000[7] in known localities in the study area. The selected study zones are as follows:

ZONE 1-INDUSTRIAL ZONES: According to the standards prescribed by the Noise Pollution (Regulation and Control) Rules, 2000, the permissible limit of noise level (LAeq) in the industrial zone during day time is 75 dBA. The following three sites werestudied:

1) Industrial Estate, Zuangtui
2) HB Motors Work, Chanmari
3) LBS Bike Bazar, Bawngkawn

ZONE 2 - COMMERCIAL ZONES: For commercial zone, the permissible limit of noise level (LAeq) during day time is 65 dBA. The following places were selected from the commercial zones:

1) New Market, Dawrpui
2) Millennium Center, Dawrpui
3) Zangena Petrol Pump, Ramhlun 'N'
4) MIZOFED Petrol Pump, Tuikual

ZONE 3 - RESIDENTIAL ZONES: The prescribed standard of noise level (LAeq) for residential zone during day time is 55 dBA. The following places were selected from different parts of Aizawl City:

1) Chaltlang (northern part of Aizawl City)
2) Bazar Bungkawn (eastern part of Aizawl City)
3) College Veng (western part of Aizawl City)
4) Sikulpuikawn (southern part of Aizawl City)

ZONE 4 - SILENCE ZONES: Silence zone is defined as an area comprising not less than 100meters around hospitals, educational institutions and courts. The silence zones are zones which are declared as such by the competent authority. The prescribed limit (LAeq) for silence zone during day timeis 50 dBA. The selected sites for silence zones were as follows:

1) Secretariat Complex, Khatla
2) Civil Hospital, Dawrpui
3) Govt. Mizo Higher Secondary School, Chanmari
4) Mizoram University Campus, Tanhril

The objectives of the present study were to - i) measure levels of noise in different selected areas in Aizawl City, and ii) assess and compare the results with the level of the standards laid by the Noise Pollution (Regulation and Control) Rules 2000.

Materials and Methods

The instrument used for the project was Sound Level Meter 2031A. The operational function of data recording was done on a switch on mode of SLM at the selected sites and the numerical values displayed on LCD were recorded. Readings were taken thrice a day (morning 6 a.m – 7 a.m., daytime 12 noon – 1 p.m. and evening 4 p.m. – 5 p.m.) and twice a month (one week interval) at each site for two years. After recording of all the readings, L_{Amax}, L_{Amin} and L_{Aeq}were calculated and the results were compared with the level of the standards of Noise Pollution (Regulation and Control) Rules 2000.

Results and Discussion

In zone 1, noise level in all the three sites were within the standard prescribed by the Noise Pollution (Regulation and Control) Rules, 2000 (*i.e,* 75 dBA) (Figure1). This may be due to the reason that industries in Aizawl city are small compared to those of other cities. The type of industries is usually small scale industry. The machines used are also simple and the noises

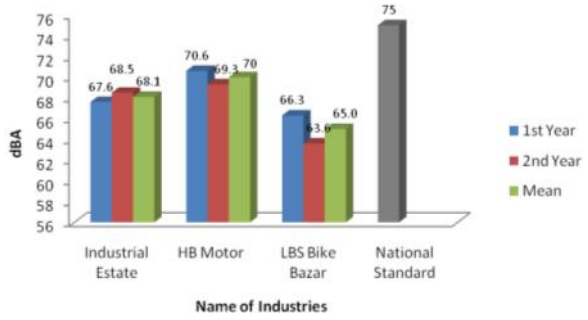

Figure 1. Noise level in industrial zones.

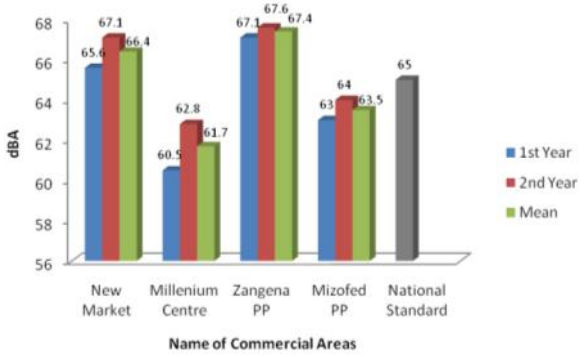

Figure 2. Noise level in commercial areas.

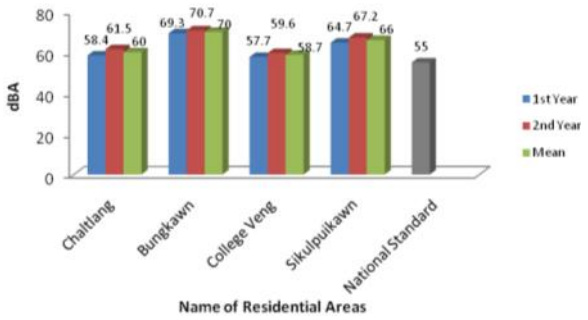

Figure 3. Noise level in residential areas.

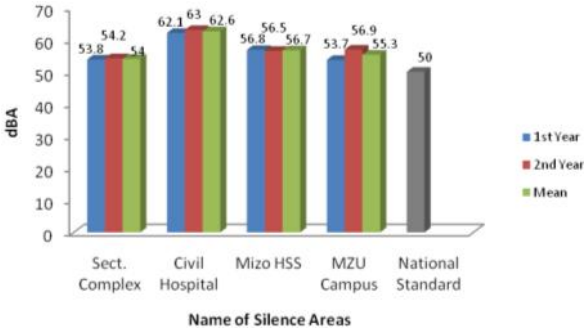

Figure 4. Noise level in silence zones.

produced are not so high. The number of people working in these sites is also less compared to big industries in other cities.In Industrial estate, Zuangtui the noise level was increased in the second year by 0.9 dBA. The other two sites showed decrease in noise level. The decrease in noise level in HB Motor Works was due to the reason that part of the workshop was shifted to some other place during the second year, thereby leaving the workshop with lesser number of machines and workers. LBS Bike Bazar which was located on the roadside was a combination of bike workshop and a showroom for accessories. In the second year, the bike workshop was shifted downstairs in the same building that resulted in the decrease of noise level since the noise came from the workshop only.

A positive and significant correlation of noise in HB Motor Works was established with noise in LBS Bike Bazar (1.000**). A negative and significant correlation of noise in Industrial Estate was established with noise in HB Motor Works (-1.000**) and LBS Bike Bazar (-1.000**).

In zone 2, New Market (66.4 dBA) and Zangena Petrol Pump (67.4 dBA) exceeded the standard prescribed by the Noise Pollution (Regulation and Control) Rules, 2000 (*i.e*, 65 dBA), (Figure 2). New Market is the biggest market in Aizawl City and is located in the centre of the city. Thousands of people moving in and out of this market every day that contributed to the high level of noise in this area. Zangena Petrol Pump is also one of the biggest petrol pumps in the city and is situated along the roadside that makes the noise level high in the area. The other two sites, Millennium Centre (61.7 dBA) and MIZOFED Petrol Pump (63.5 dBA) are within the standard noise level. In all the four sites under zone 2, the noise levels were increased in the second year.

A positive and significant correlation of noise

was established between commercial zone of New Market, Millennium Center, Zangena Petrol Pump and Mizofed Petrol Pump (1.000**).

All the four sites in zone 3 exceeded the standard noise level (*i.e.*, 55 dBA), (Figure 3). The noise level was highest in Bazar Bungkawn (70.0 dBA). Although Bazar Bungkawn is a residential site it is located at the market area. The high noise level is also contributed by the heavy moving vehicle during morning time. The lowest noise level among the residential zones was College Veng which is 58.7 dBA. College Veng is located at the eastern part of the city and is far from the market area. The main contributor for noise in this area was also automobile, but lesser as compared to other residential areas. The noise levels were increased in all the four sites in the second year.

A positive and significant correlation of noise was established between residential zone of Chaltlang, Bazar Bungkawn, College Veng and Sikulpuikawn (1.000**).

In the silence zone, all the four sites exceeded the standard noise level which is 50 dBA during day time (Figure 4). The lowest noise level was in Secretariat Complex (54.0 dBA). Secretariat Complex is located far from the market place. There was no such high level of noise in the area except the noise contributed by automobiles. The highest noise level among the silence zones was in Civil Hospital (62.5 dBA). This was due to the reason thatthe Hospital is located in the centre of the city and is in the market area. As it is the government hospital as well as the biggest hospital in the city thousands of people visits the hospital every day. Sometimes, loud speakers are used in this hospital that also contributes to high level of noise. Increase in noise level was observed in three sites i.e. Secretariat Complex, Civil Hospital and Mizoram University Campus. In Mizo Higher Secondary School, the noise level was decrease by 0.3 dBA.

A positive and significant correlation of noise in Secretariat Complex was established with the noise level in Civil Hospital and Mizoram University Campus (1.000**). A negative and significant correlation of noise level in Mizo Higher Secondary School was established with the noise level in Secretariat Complex, Civil Hospital and Mizoram University Campus (-1.000**).

Conclusion

It has been found out from the study that out of the fifteen study sites, only five of them were within the standard level and the rest ten sites exceeded the standard prescribed by the Noise Pollution (Regulation and Control) Rules 2000.[6] Since Aizawl City is not well planned and lack spaces, silence zones (such as institutions, hospitals and offices), industries and markets are established according to every convenient ways that increases the possibility of high noise level in that area. The main contributor for noise in the city is the enormous increase in the number of vehicles. Vehicular traffic noise problem is contributed by various kinds of vehicles like heavy, medium trucks/buses, automobiles and two wheelers. The noise level increases with increased total number of vehicles and with the increase in speed of vehicles.[8] Noise affects us in many ways. It leaves lasting effects, some short, and some long on our body mechanism and metabolism.[9] The worrisome effects of noise are dangerous enough that noise problem is considered next to crime by certain countries.[10] Noise intensity level in wider but specific parameters including its effects on human health would be interesting to be taken up in future. It is hoped that the present piece of work may be helpful for future studies.

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