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Analysis of Construction Site Noise: The Causes, Impact on People and the Environment

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***Abstract*– A comprehensive analysis on the activities of a construction site with respect to noise is carried out. The major sources of noise in a construction site is identified as the power generating set and other heavy duty machines. Some selected machines used in the construction site is evaluated by taking readings (sound levels) at varying distances to ascertain the noise levels of these machines. The study employed the use of physical/acoustic measurement and questionnaires for social survey. The results of the field experiments were graphically represented. The study recommends that the issue of environmental noise is really a menace in the society and should be looked into by relevant government agencies, also that residential buildings and offices cited close to construction site should be fully insulated to avoid annoyance.**

Keywords*– *(Environmental Noise, Noise Pollution, Noise Assessment, Construction Site)

I. INTRODUCTION

Environmental noise is any undesired sound that constitutes a menace to the environment which is often times attributed to human attitude and increasing industrialization. The Niger Delta region in Nigeria due its abundance in mineral resources has attracted different companies amongst. These companies are in turn situated around communities with all activities directly and indirectly affecting the people residing around such areas. According to [1], the human ear has a known ability of handling varieties of sound and again [1] stated that the hearing mechanism of human beings responds to change in sound pressure in a relative rather than absolute manner, hence a logarithmic scale decibel (dB) is used to measure sound pressure level.

In their article [2] stated that noise and sound are used interchangeably, but when talking of physical quantity, sound is preferred.

Reference [3] investigated the noise quality of some selected flow stations in the Niger Delta region. The result of the investigation showed that the noise emitted from the flow stations are slightly above the Federal Environmental Protection Agency (FEPA) recommendation level and could be hazardous and environmentally unfriendly to the host communities. [3] carried out noise pollution studies in Yenagoa metropolis using a precision digital noise level metre (PK 254). The results showed that the average noise level ranges between 70.5 dB(A) and 85.7dB(A) with mean level of 77.35± 2.07dB(A). The investigation also revealed that the major sources of noise pollution in the city are automobile traffic, indiscriminate honking of horns and sirens, recording stores playing loud music electricity generators and plants. Reference [4] described environmental noise as any unwanted sound that constitutes a menace to the environment. Reference [5] in their research investigated the transient and impact of noise pollution arising from industrial machines within the premises of Port Harcourt refinery and resolved that the average Noise Pollution Level (NPL) for the sources were higher than the maximum noise level. Again [2] worked extensively on environmental noise assessment of industrial plants in Port Harcourt metropolis, using a quest 300 noise dosimeter. The interpreted results show that the sand blasting area has the highest noise level in the yard and that access to these sites must be restricted to employees.

II. AIM AND OBJECTIVES

This research work is aimed at analyzing the level of noise in a construction site and consequently educate construction site workers on safety measures to take in other to guide against severe health challenges accrued by noise and also enlighten the people living close to such areas on how to avoid the health challenges that might come their way by virtue of their exposure to such noise around them. The research will also provide necessary information to relevant agencies to abate this irreversible nuisance to the society.

III. METHODOLOGY

For the purpose of this research, noise monitoring which involves the use of Questionnaires/Social Survey and Physical/Acoustic Measurement are used.

A. Noise Monitoring

Under noise monitoring, a BK precision digital sound level meter set on A-weighting is used due to its recommendation by some group of researchers [3] for industrial and environmental studies. The digital sound level meter was held with its microphone at a distance of about 1.2m above the ground, which is the approximated average ear – ground distance for a human being [4].

1. Field Measurement

The sound levels of different construction work machines are taken at different distances while in use to evaluate their sound levels.

The digital sound level meter was held at a height of about 1.2meters above the ground level with its microphone and set to A-weighting and at a slow response rate to ensure proper accuracy as at when the readings were recorded. In effect, it selects the low frequency sound energy that correlates well with

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the human response. Consequently all reading were written as ***dB(A),*** where the **A** stands for the ***A-weighting***.

Some other valuable information like the longitude and latitude of the various locations were also recorded during the exercise using a GPS device.

a) Field Dataset

The noise levels of the various machines identified in this research are presented and shown below.

TABLE 1. NOISE LEVELS OF SAMPLED MACHINES

S/N	Machine Type	Noise Level Measurement in Decibel dB(A)				
		D1= 2m	D2= 4m	D3= 6m	D4= 8m	D (avrg)
1	Lathe Machine	110.5	102.2	99.5	94.6	101.07
2	Wreathing Machine	120.4	117.1	107.9	100.4	111.45
3	Fuck Lift	100.0	98.3	95.6	91.9	96.45
4	Trailer Head (Mezd Actros 2031)	110.1	102.6	100.9	98.5	103.03
5	Cat 455 KVA Generator	100.3	98.9	94.6	90.3	96.03
6	Trailer Head (Actros 3340)	98.7	95.2	91.1	89.6	93.65
7	Grove Crain (RT 530E-2)	101.4	99.9	96.5	92.4	97.55
8	Idol	99.1	96.3	91.6	89.6	94.15
9	Bulldozer (CAT-D6G2XL)	110.0	107.5	100.7	98.8	104.25
10	Wheel Loader (Cat 966H)	99.3	97.9	93.3	90.7	95.3
11	Wheel Loader (Cat 980G)	100.3	98.6	95.6	90.4	96.23
12	Bulldozer (CAT-D6G2XLV)	102.9	100.3	98.6	95.1	99.23

B. Questionnaires and Social Survey

A total number of 150 questionnaires were designed and on 5 respondents were distributed randomly.

C. Graphical Analysis

Graphical representation of the data which was gathered in the course of this research work is presented below.

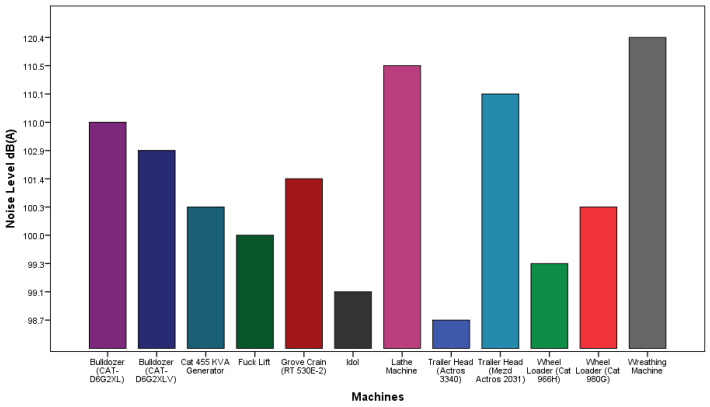


Fig. 1. Histogram Showing the Noise level of Machines at a Distance of 2metres

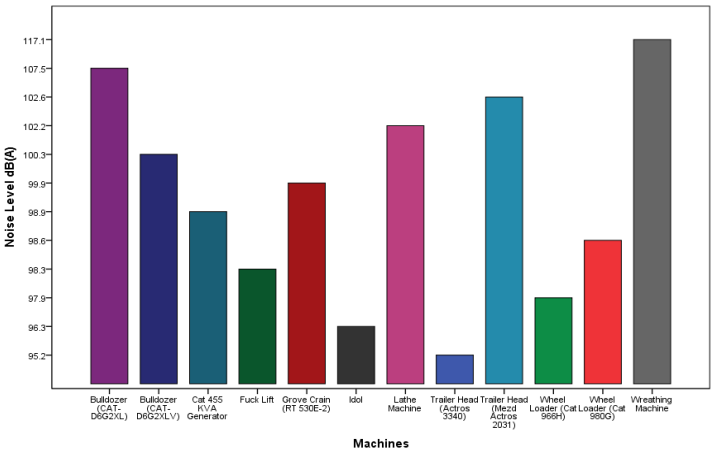
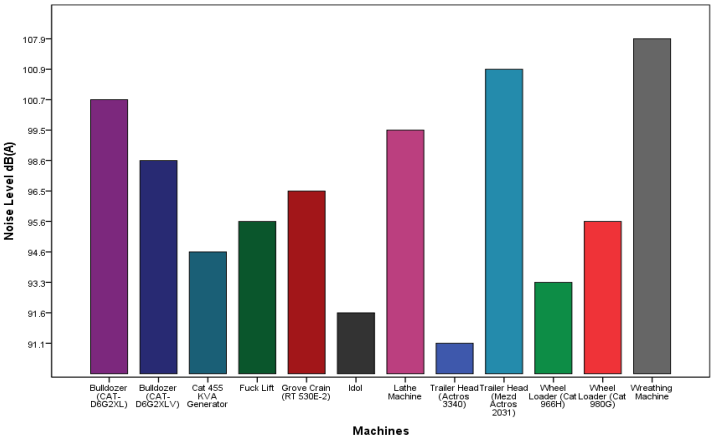


Fig. 2. Histogram Showing the Noise level of Machines at a Distance of



4metres

Fig. 3. Histogram Showing the Noise level of Machines at a Distance of 6metres

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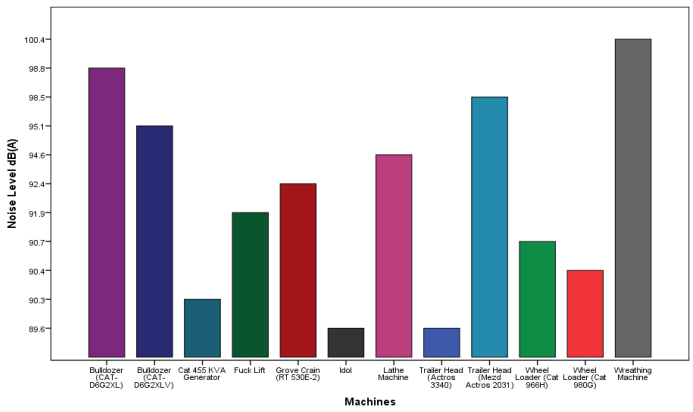

Fig. 4. Histogram Showing the Noise level of Machines at a Distance of 8metres

IV. RESULTS AND DISCUSSION

Reference [1] stated that when one is exposed to excessive noise, it poses health problems on that individual. The negative effect noise has on people's health, economy and work performances are considered. The study comprises the use of physical noise measurement tools in the likes of sound meter, and the applications of questionnaires for social survey work as stated earlier.

Table 1 shows the data obtained for noise distribution of the various machines used at the Construction site in. **Fig. 1 – Fig. 4** shows histograms of the sampled machines that are used at the construction site against the distances in which the noise levels where recorded. The histogram shows that the noise level at 2m is higher than the subsequent distances which are 4m, 6m and 8m respectively. This implies that the closer one is to a noise source the higher the severity as seen in the patterns.

V. SUMMARY AND CONCLUSION

When one is exposed to excessive noise, it poses health problems on that individual. The negative effect noise has on people's health, economy and work performances are considered. The study comprises the use of physical noise measurements tools in the likes of sound meter, and the applications of questionnaires for social survey work. The research work concludes with the following recommendations as shown in the next heading.

VI. RECOMMENDATIONS

- Residential buildings and Offices cited close to construction site areas should be fully insulated to avoid annoyance
- Sensitization programs should be carried out by relevant agencies to sensitize people living close roads
- An Environmental Impact Assessment (EIA) on noise should be carried out on the communities to determine the noise impact on the people.

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