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Assessment of Noise Levels in Some Quarries in Abakaliki, South East Nigeria

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ABSTRACT

This study assessed ambient noise levels in four quarries located in Abakaliki, South East, Nigeria. Noise level meter was used randomly to measure noise levels in all the quarries. The selected quarries include, Umuohara (A), Sharon (B), Paul B (C) and Ezilo (D) quarries. The noise level measured in Umuohara quarry ranged from 69.67 to 70.57dB (table 1). The noise level for the three months in Sharon quarry ranged from 70.87 to 75.10dB (table 2). The measurement of the noise levels in Paul B and Ezilo quarries ranged from 73.23 to 76.23 and 74.13 to 80.10 respectively. The order of increase in noise level was Umuohara quarry < Sharon quarry < Paul B quarry < Ezilo quarry. The measured noise levels indicated deviations from approved WHO standards (70Db) for industrial areas. Therefore, quarry owners should endeavor to use low noise quarrying machines and their employees encouraged to wear ear muffs and other protective equipments.

Keywords: Abakaliki, Noise levels, Quarries and Umuohara

INTRODUCTION

Noise pollution is displeasing or excessive noise that may disrupt the activity or balance of human or animal life. The word noise is cognate with the Latin word nauseas, which means disgust or discomfort, [7]. Noise pollution has been a serious environmental problem facing most nations globally, especially in business and urban centers. Noise, according to [8], is a sound especially one that is loud, unpleasant or disturbing. The issue of noise pollution, the problems associated with it and the solution to this disturbing trend worldwide has taken the centre stage in environmental policy decisions of most nations, [1] [5]. Although noise is associated with almost every work activity, some activities like quarrying are associated with particularly high levels of noise. In general, sounds above 85 dB are considered harmful; depending on how long and how often one is exposed to them and whether you wear hearing guides, [5]. Previous literature shows that workers in mines, quarries, sawmills, and many others work with machines that produces noise much higher than the tolerated levels and therefore expose workers to potential hearing loss [13] [14]. Noise in the stone quarrying industry is regarded as a major annoyance and may lead to hearing loss and perhaps even cause adverse physiological and psychological effect. It can interfere with communication; disturb sleep, lack of concentration, irritability and reduced efficiency. Noise pollution in stone quarrying industry is one of the environmental problems penetrating all the corners and areas of the working environment [12] [22]. There are a number of activities, which lead to high noise levels in quarrying industry like blasting, drilling, crushing, heavy machineries and transportation. The intensity of noise within the industry and workplace in general is rising

continuously and causing severe nuisance in the immediate surroundings and to the people working therein causing occupational health hazards [16]. Hence this study evaluates noise levels in quarries and will suggest possible control measures to minimize the effect on human health and the environment.

Study Area

The study was carried out at some quarries in Abakaliki, Ebonyi State. Abakaliki lies between latitude 06° 4¹N and longitude 08° 65¹E. The mean annual rainfall ranges from 1700-2000mm. The mean daily temperature is 29°C; while relative humidity during rainy season ranges from 60-80% and dry season falls between 20-30%. The area experiences bimodal pattern of rainfall (April – July) and (September – November) with short dry spell in August known as "August break". The soil belongs to the order, ultisol classified as Typic Hapulustult [9].

MATERIALS AND METHODS

Materials

Sound level meter, GPS, paper and pen was used for the study.

Sample Collection

Four quarry site A, B, C and D, were used for the study. Noise sampling was conducted from three (3) replicate points around each quarry, which served. Noise levels at each point were detected using a noise level meter.

Research Methods/Design

Random sampling techniques were employed in the research using noise level detector. During the period, replicate readings were taken during working hours for 3 months and at each site consecutively. Results from each site were analysed and compared with World Health Organisation Standards (WHO) for industries.

Data Analysis

The data arising from this study was subjected to analysis of variance (ANOVA) using SPSS. Means that are significant was separated with fishers least significance difference (F-LSD), [20].

RESULTS

Tables 1, 2, 3 and 4 show the noise measurement in decibels recorded from the four quarry sites; that is Umuohara, Sharon, Paul B and Ezilo quarries.The noise level measured in Umuohara quarry ranged from 69.67 to 70.57dB (table 1). The noise level for the three months in Sharon quarry ranged from 70.87 to 75.10dB (table 2). The measurement of the noise levels in paul B and Ezilo quarries ranged from 73.23 to 76.23 and 74.13 to 80.10 respectively. Paul B and Ezilo quarries recorded their highest noise levels in the month of September, while Sharon and Umuohara quarries recorded their highest noise levels in the month October. Ezilo quarry recorded the highest noise level throughout the months under investigation. This is attributable to the use of high bed crushers in Ezilo quarry. Umuohara quarry site recorded the least mean noise level for the three months. Umuohara quarry is expected to produce the highest noise, because there are clusters of quarrying machines. Unfortunately, it recorded the lowest because most of the machines have packed up as a result of national economic crunch.The order of increase in noise level was Umuohara quarry site < Sharon quarry site < Paul B quarry site < Ezilo quarry site. The results in table 1

statistically showed significant variation (P< 0.05) in noise levels between Ezilo and Umuohara quarries. However, the rest of the quarries did not show any significant variation at P>0.05 in noise levels within the months of July, September and October.

Table 1: Readings in decibel (dB) from Umuohara quarry site during the months of August, September and October.

Points	August (±SD)	September (±SD)	October (±SD)
A	83.4 ± 20.18	82.1 ± 15.27	82.5 ± 16.04
B	79.1 ± 20.18	78.1 ± 15.27	81.3 ± 16.04
C	46.5 ± 20.18	45.8 ± 15.27	47.9 ± 16.04
Mean	69.67	68.67	70.57
CV (%)	28.97	22.24	22.73
WHO Standard	70 Db	70 Db	70 dB

Source: Researcher's field survey

Table 2: Shows readings in decibel (dB) from Sharon during the months of August, September and October

Points	August(±SD)	September (±SD)	October (±SD)
A	89.4 ± 16.59	89.8 ± 15.88	102.4 ± 24.50
B	65.8 ± 16.59	71.3 ± 15.88	69.9 ± 24.50
C	57.4 ± 16.59	58.2 ± 15.88	54.4 ± 24.50
Mean	70.87	73.10	75.57
CV (%)	23.41	21.72	32.42
WHO Standard	70 dB	70 dB	70 dB

Source: Researcher's field survey

Table 3: **showing readings in decibel (dB) from Ezilo during the months of August, September and October**

Points	August (±SD)	September (±SD)	October(±SD)
A	80.0 ± 11.75	83.3 ± 6.25	82.9 ± 10.17
B	81.8 ± 11.75	84.1 ± 6.25	81.2 ± 10.17
C	60.6 ± 11.75	72.9 ± 6.25	64.5 ± 10.17
Mean	74.13	80.10	76.20
CV (%)	15.85	7.80	13.35
WHO Standard	70 dB	70 dB	70 dB

Source: Researcher's field survey

Table 4: Shows readings in decibel (dB) from Paul B during the months of August, September and October

Points	August (±SD)	September (±SD)	October(±SD)
A	80.5 ±9.87	82.6 ± 13.07	81.0 ±13.78
B	77.2 ±9.87	84.9 ± 13.07	78.3 ± 13.78
C	62.0 ±9.87	61.2 ± 13.07	55.9 ± 13.78
Mean	73.23	76.23	71.73
CV (%)	13.5	17.15	19.21
WHO Standard	70 dB	70 dB	70 dB

Source: Researcher's field survey

DISCUSSION

The noise levels measured across the selected quarries were higher than the recommended limit set by the WHO standards for industrial areas (70dB) in all the quarries except Umuohara quarry site. The Federal Environmental Protection Agency (FEPA, 1979) guidelines stated that noise limits in excess of 95dB should not be heard for more than 4 hours at a stretch. Normally, it should be expected that Umuohara should have higher noise levels because the site is made up of clusters of quarry machines. Unfortunately this was not observed, the average noise level measured in Umuohara was lower than Sharon, Paul B and Ezilo. This could be attributed to the fact that most crusher owners have abandoned their machines due to general decline in industrial activities or crushers were not frequently used during the period of research. Ezilo quarry recorded the highest noise levels

during the research. This could be attributed to the various activities carried out by the sophisticated machineries at the site compared to every other site. At all the places visited most workers in the environment stay close to the noise source consistently for a very long period.

CONCLUSION

The evaluation of noise level in selected quarries in Abakaliki, southeast Nigeria has been carried out. The results showed that all the quarries at one point or the other had noise levels that exceeded the WHO standard. The noise quality description of these quarries showed that the noise levels of these quarries are not healthy for human health. Paul B and Ezilo quaries had unsatisfactory noise levels. Continuous exposure to these noise qualities may lead to hearing impairment which may gradually lead to Noise Induced Hearing Loss (NIHL) that may be temporary or permanent

REFERENCES

1. Abdelraziq, I. R., Ali-Shtayeh, M .S. and Abdelraziq, H. R. (2003). Effects of noise pollution on blood pressure, heart rate and hearing threshold in School children. Journal of Applied Science, 3(10), 717 - 723.
2. Akansel, N. and Senay, K. (2008). Effect of intensive care unit noise on patient: A study on coronary artery bypass graft surgery patients. Journal of Clinical Nursing, 17(12), 1581-1590.
3. Alao, A. A. and Avwiri, G. O. (2010) Noise Levels Associated with Selected Oil and Gas Installations in Ogba/ Egbama/ Ndoni Local Government. *Journal of environmental Issues and Agriculture in Developing Countries,* 2(3).
4. Ali, S. A. A. (2013). Study effects of school noise on learning achievement and annoyance in Assiut City, Egypt. Applied Acoustics, 74(4), 602 - 606.
5. Babisch, W. (2002). The noise/Stress concept, risk assessment and research needs. Noise and Health, 4(16), 1-11
6. Berglund B., Lindvall T., Schwela D. H. (1999). Guideines for Community Noise. London: World Health Organisation.
7. Encyclopaedia Britannica. (2012). Encyclopaedia Britannica Ultimate Reference Suite. Chicago: Encyclopaedia Britannica.
8. Environment (2018). Definition from the Merriam-Webster Online Dictionary". Merriam-webster.com. 2018-02-20. Retrieved -08-26.
9. FDALR, 1985. The Reconnaissance Soil Survey of Southeastern Nigeria. Federal Department of Agriculture and land Resources, Soil Report, pp: 133.
10. Federal Environmental Protection Agency (FEPA) (1979). Protective Noise Levels, FEPA report, 5.
11. Federal Environmental Protection Agency (FEPA) (1991) FEPA report, 52.
12. Gale, A, N. and Groat, C. G. (2001). Potential Environmental Impacts of Quarrying stone in Karst,. US Geoloogical Survey
13. Gorai, A. K. and Pal, A. K. (2006). Noise and its impact on human being: A review. Journal of Environmental Science and Engineering, 48(4), 253-260.
14. Koffeman A, and Kerkers A, (2000). Cost optimal reduction of noise in large industrial areas – a method to select measures, noise-con 2000. Newport Beach, California; December 03–05.
15. Lazarus, H. (1998). Noise and communication: the present state. In N. L. Carter and R. F. S. Job (Eds.), Noise as a Public Health Problem. Noise Effects, 1, 157-162.
16. Mahendra, P. K. and Venugopalachar, S. (2011). The

possible influence of noise frequency components on the health of exposed industrial workers—A review. Noise and Health, 13, 16–25.
17. Monsen, M. G. and Gustafsson, U. M. E. (2005). Noise and sleep disturbance factors before and after implementation of a behavioural modification programme. Journal of Intensive and Critical Care Nursing, 21(4), 208-219.
18. Okeke, P. N and George, D. M (2015). Evaluation of Ambient Noise Levels in Portharcourt Metropolis, South – South, Nigeria. *IOSR Journal of Environmental Science, Toxicology and Technology*
19. Okoro, R. C. (2014). Survey and analysis of noise by generating plants in some parts of the University of Calabar, Calabar, Cross River State Nigeria. International Journal of Research in Agriculture and Food Sciences, 1(3), 8-15.
20. Orellana D and Vishniac B (2007). Noise in the adult emergency department of John Hopkins Hospital. Journal of the Acoustical Society of America, 121(4), 1996-1999.
21. Shahid, M. A. and Bashir, H. (2013). Psychological and physiological effects of noise pollution on the residents of major cities of Punjab (Pakistan). Peak Journal of Physical and Environmental Science Research, Vol.1(4), 41-50.
22. Singh, N. and Davar, S. C. (2004). Noise pollution: Sources, effects, and control. Journal of Human Ecology, 16(3), 181-187.
23. Tanko A (2007). "Environmental concerns, assessment and protection procedures for Nigeria's oil industry"Centre for Development studies and the school of Geography, Geol. Environ. Sci., BUK, Nigeria.
24. World Health Organization (1980). International Standard/Acceptable Levels. Nigeria.