Environmental Research & Technology, Vol. 1(3), pp. 59-62, 2018

Environmental Research & Technology

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SHORT COMMUNICATION

Assessment of noise pollution due to generators in Akure, Ondo State, Nigeria

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ABSTRACT

World Health Organization declared noise in large cities as pollution (third after water and air). Most areas in the world have this menace. This menace has been on the increase due to population growth, increase in vehicular movements, high industrial activities and many others. This attendant problem has resulted in many sicknesses and even death. One of the causes of noise pollution is generators. Many developing countries rely on them for different activities. Nigeria is inclusive. This study was embarked upon to assess the level of noise from generators using a sound level meter. Four locations were identified: two residential, commercial, and industrial areas. A total of one hundred generators was monitored. The mean results in dBA (minimum and maximum respectively) are: Oke Eri Estate – (88.7 ± 10.3, 90.5 ± 15.2), Housing Estate (81.7 ± 9.2, 85.0 ± 9.5), Stadium Road (84.8 ± 10.0, 113.4 ± 17.5) and FUTA Road (81.9 ± 9.3, 90.0 ± 15.2). The study concluded that the areas are noise polluted because the levels obtained are above the permissible limits.

Keywords: Generator sets, pollution, permissible limits, loss of hearing, irregular frequency

1. INTRODUCTION

Generators (Fig 1) are meant to provide alternative sources of generating electricity. In developing countries, the use is rampant due to non-availability of electric current to perform daily activities. The equipment which supposed to be succor have turned to be a menace due to irregular frequency (noise) produced known as noise pollution.

Noise has no definite definition, the definition or explanation depends on an individual. According to American Speech-Language-Hearing Association (ASHA) (1), "One person's music is another person's noise. Sounds that are soothing for some are irritating to others" In explaining the sound, noise has waves with irregular vibrations and no definite pitch. An engineer will define noise as a sound signal that interferes with the quality of another sound signal, while others simply take it as an unwanted sound. Noise levels are measured in decibels (dBA). Table 1 summarizes sound effects as painful, extremely loud, very loud, moderate and faint. According to ASHA (1), sound levels up to 70 dBA or above are known to be hazardous to hearing over time (8 hours and above).

Fig 1. A Generator

Stansfeld and Mark (2) pointed out that continuous exposure to noise of 85–90 dBA in someone's lifetime in an industrial setting, could end up in loss of hearing.

Loss of hearing is a problem that occurs when the victim is continuously exposed to noise above 85 –

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Received 21May 2018; Received in revised form 16 July 2018; Accepted 16 July 2018
Available Online 6 August 2018
Doi: ISSN: 2636-8498

140dBA over time. How harmful the noise is a function of the volume and the length of exposure to the sound. To sum it, the louder the noise, the less time required before hearing loss occurs (3).

Table 1. The noise chart average decibel levels for everyday sounds

Sound Effect		Decibel Levels
Painful	-	120 - 150 dB
Extremely Loud	-	90 - 110 dB
Very Loud	-	70 - 90 dB
Moderate	-	40 - 60 dB
Faint	-	30dB

Noise is encountered in our daily activities in the homes, offices, churches, mosques, schools, clubs and entertainment centers, movie theaters, quarries, industries, markets just to name a few. To be candid, living things is surrounded by noise. Continuous exposure to elevated levels causes high blood pressure, ear damage, reduced sleep, high anxiety, stress-related problem, annoyance and even difficult thinking (4) According to Mercola (5), $3.9 billion was projected to be the benefit or reducing noise from the environment. It was recommended that noise reduction (5 decibels) would reduce high blood pressure (by 1.4 %) and coronary heart disease (by 1.8 %) prevalence. An estimate from the US suggests that over 100 million Americans are prone to noise pollution (6). Evidence has shown that there are correlations between cardiovascular disease with noise (7, 8, 9).

The maximum safe noise level (MSNL) for human beings is 70 dB(A) for 24 h exposure without harmful effects (10).The U.S. Occupational Safety and Health Administration (11), pegged the noise level of an 8 h Time Weighted Average (TWA) to 85 dB(A). The U.S. Environmental Protection Agency (12) documented an 8 h level of 75 dB(A) as the safe level for occupational noise while 90 dB(A) is the limit for maximum 8-hr exposure. In India, the Bureau of Indian Standard has recommended acceptable noise levels to be 50dB, 55dB, 65dB and 75dB for silence zone, residential, commercial and industrial areas respectively (13).

In a presentation by Shabi (14), he classified the causes of noise pollution into industrial, traffic, religious, environmental, commercial, community and associated noise like street carnivals, socio-cultural activities, public events and others. Shabi (14) also provided a record of noise pollution in Lagos State for the year 2015 as:

1. No of noise pollution cases - 1527
2. Noise from medical concern - 57
3. Noise from religious activities - 51.08%
4. Noise from domestic generator - 84.50%
5. Noise from industrial activities - 33.33%
6. Noise from sanctions and closures - 80%

To control or reduce noise pollution, a legal framework was put in place in Nigeria, to this end National Environmental Standards and Regulations Enforcement Agency (NESREA) was established and enacted a noise standard and control in 2009 (section 35). The standard is provided in Table 2.

There is the awareness that Akure and its suburbs are faced with the challenges of noise from generators, but no efforts have been put in place to quantify the menace. The study, therefore, has been undertaken to solve this. Therefore the aim of the study was to assess the noise levels associated with generators from Akure, Ondo State, Nigeria.

Table 2. NESREA Standard of Noise Pollution Control

Facility		Maximum Permissible Noise Limits Db A (Leq)	
		Day (6:00am -10:00pm)	Night (10:00pm – 6:00am)
A.	Any building used as a hospital, convalescence home, home for the aged, sanatorium and institutes of higher learning, conference rooms, public library, environmental or recreational sites.	45	35
B.	Residential Buildings	50	35
C.	Mixed Residential (with some commercial and entertainment	55	45
D.	Residential + industry or small scale Production + commerce	60	50

2. MATERIALS AND METHOD

The study was carried out on generators using the Sound level meter (GB: 2266204) with specification: Measurement range 30dBA – 130dBA, accuracy (± 1.5dB), frequency range (31.5Hz – 8KHz) and power supply (3*1.5V AAA battery), made in China. The noise levels were taken at four selected locations, namely Oke Eri Estate, Housing Estate, Stadium Road and Federal University of Technology, Akure (FUTA) Road. One hundred generators were earmarked for the research with a minimum of twenty-five sets from each location. The time of measurements was during busy periods (night for Oke-Eri and Housing Estates and daytime for FUTA and Stadium Road) of the day. Noise sample readings were taken in dB (A) scale by pointing the meter close to the generator sets. The

generated values were determined using Minitab 16 Statistical Software.

3. RESULTS & DISCUSSION

Table 3 depicts the mean values of noise levels obtained at four different locations in Akure. From the results, it was observed that Stadium Road had the highest decibel levels followed by Oke Eri Estate. The reasons for the differences were: Stadium Road is an area where most publishing press companies are located. For the business to thrive well, generating sets were used as an alternative to the electric power supply. During the study, it was noticed that many generators used are 6.5 horsepower and above. Many of the sets are powered by diesel engines, which produce higher sound levels than sets that are powered by petrol engines. In addition, many generators in this location are old, many of them have no bolts and nuts, thereby making the disjointed parts to make noise which added to the noise of the engines. In fact, many of the generators have no silencer to reduce the noise. Housing Estate is a residential area. In this place, the number of houses is not many. During the daytime, most inhabitants are in the schools and offices. The highest results obtained were done in the night when most residents are back home. Most FUTA Road residents and industries use soundproof generators which produced less sound compared to other locations in this study.

The interesting thing noted in this study is that all the areas visited have decibel levels above the recommended limits set by WHO (10), NESREA, (15) and The U.S. Occupational Safety and Health Administration (11). The end result is a problem for the inhabitants of the selected places. According to a review on generators by jdowling (16), it was observed that the noise from the machines is mainly from engine mechanical, exhaust, cooling fan, alternator, induction (windings) and the structure of the generator. This observation collaborates what was observed in the study.

Table 3. Noise Levels at the different locations (Average)

Locations	Decibel Levels	
	Minimum	Maximum
Oke Eri Estate	88.7 ± 10.3	90.5± 15.2
Housing Estate	81.7 ± 9.2	85.0± 9.5
Stadium Road	84.8 ± 10.0	113.4± 17.5
FUTA Road	81.9 ± 9.3	90.0± 15.2

4. CONCLUSIONS

It is concluded that residents are chronically exposed to generator noise at the level between 81.7 dB(A) and 113 dB(A) which can cause negligible risk of hearing impairment. All locations evaluated in the study showed a noise level above the maximum permitted levels. The areas studied should receive constant guidance about the importance of acoustic adequacy and hearing aids. There is the need to measure and monitor noise levels in the environ regardless of any mitigation measures that have been put in place. Anti-vibrations should be mounted, the silencers should be perfect so that it can reduce the noise down to 40dB(A). Malik (17) is of the opinion that the oil and filter for generators should be changed after every 50 hours of use. He also recommended that canopies or rooms in the generator houses should be much bigger than the machine.

REFERENCES

[1]. American Speech-Language-Hearing Association (ASHA) *Noise. Audiology Information Series* (2017a).

[2]. Stansfeld S. A and Mark M. P "Noise pollution: non-auditory effects on health", British Medical Bulletin Vol. 68, 243–257, 2003.

[3]. The Noise Center (2017), "Common environmental noise levels", Center for Hearing and Communication. Retrieved on 17th May 2017.

[4]. American Speech-Language-Hearing Association (ASHA) (2017b). Home, Community, and Recreational Noise. Audiology Information Series, 2017.

[5]. Mercola J "Quieting Down Could Save Billions in Heart Disease Costs", The World's #1 Natural Health Website. Mercola.com, 2015

[6]. Swinburn T. K, Hammer M. S and Neitzel R. L "Valuing Quiet An Economic Assessment of U.S. Environmental Noise as a Cardiovascular Health Hazard", Am. J. Prev. Med.; 49 (3):345 – 353, 2015.

[7]. Basner M, Babisch W, Davis A, et al. "Auditory and non-auditory effects of noise on health", Lancet. 383:1325–1332.http://dx.doi.org/10.1016/S0140-6736 (13)61613-X, 2013.

[8]. Hansell AL, Blangiardo M, Fortunato L, et al. "Aircraft noise and cardiovascular disease near Heathrow airport in London: small area study", BMJ. 2013; 347:f5432. http://dx.doi.org/10.1136/bmj.f5432, 2013.

[9]. Babisch W. "Updated exposure-response relationship between road traffic noise and coronary heart diseases: a meta-analysis", Noise Health. 16:1–9. http://dx.doi.org/10.4103/1463-1741.127847, 2014.

[10]. WHO Guidelines for Community Noise, Geneva: World Health Organization 2000.

[11]. Li Q, Qiao F, Yu L "Risk Assessment of In-Vehicle Noise Pollution from Highways", Environ Pollut Climate Change 1: 107 2016.

[12]. Environmental Protection Agency "Information on levels of environmental noise requisite to Protect public health and welfare with an adequate margin of safety", EPA, Washington DC, 1974.

[13]. Anurag V. Tiwari, Prashant A. Kadu, Ashish R.Mishra "Study of Noise Pollution Due To Railway and Vehicular Traffic at Level Crossing and Its Remedial Measures", American J. Engineering Research. Vol. 2 (4), pp. 6-19, 2013.

[14]. Shabi A. "The regulation of noise pollution in a mega city. A paper presented at Noise Pollution Stakeholders; forum. Theme: Noise: A menace for urban development", Held on May 9, 2016, at LTV Blue Roof, Agidingbi, Ikeja, Lagos. Organized by Lagos State Government, Ministry of the Environment in collaboration with Ministry of Home Affairs 2016.

[15]. National Environmental (Noise Standards and Control) Regulations, S. I. No. 35. 2009.

[16]. jdowling "Noise reduction for Generators", Caribbean Northern Lights, 2015.

[17]. Malik S. "Power problems: Generators add to air and noise pollution", Published in The Express Tribune, May 22nd, Pakistan, Punjab. 2011.