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DAY AND NIGHT NOISE POLLUTION STUDY IN SOME MAJOR TOWNS IN DELTA STATE, NIGERIA

O. ANOMOHANRAN & J. E. A. OSEMEIKHIAN

(O. A.: Department of Physics, Delta State University, Abraka, Nigeria; J. E. A. O.: Department of Physics, Ambrose Alli University, Ekpoma, Nigeria)

Abstract

Day and night noise pollution studies have been carried out in some major towns in Delta State, Nigeria, using a $P^{10Nneer}$ 65 noise meter. The noise measurements were taken at 10 points within each of the twons at an interval of 30 min. during the peak period of the day and at the cool of the night. The results obtained show that the average day time noise level for Warri exceeded the WHO permissible limit of 90 dB. All other locations have an everage niose level lower than the WHO limit but within the range of 75-85 dB. The peak niose level for the day time exceeded the WHO permissible limit for all the towns except at Abraka with a peak of 76.2 dB. At night, all the towns investigated exhibited a quiet atmosphere for both the average as well as the paek noise measurements. The reason for the high value of noise in some places was due to automobiles plying the road at slow speeds as observed in Warri and other places. Other reasons were due to the use of electricity generators necessitated by the incessant public power suply failure, commercial motorcycles, recording houses and those using music to promote sales of their wares.

Résumé

ANOMOHANRAN O. & OSEMEIKHIAN J. E. A. : *Etude de nuisances sonores de jour et nuit dans quelques villes principales de l'État deltaïque du Nigéria.* Des études sur les nuisances sonores de jour et nuit ont été enterprises en quelques villes principales de l'État deltaïque du Nigéria en employant le compteur de bruit, le dosimèter $P^{IONnier}$ 65. La mesure de bruit était faite à dix points en chaque villes à intervalle de 30 minutes pendant la période de bruit pointe de la journée et dans la fraîcheur de la nuit. Les résultats obtenus indiquent que le niveau de bruit moyen de la journée pour Warri excédait la limite acceptable de 90 dB recommandée par la OMS. Tous les autres emplacements avaient un niveau de bruit moyen plus faible que la limite exigée par OMS variant entre 75 dB et 85 dB. La période de pointe du niveau de bruit pour la journée excédait la limite recommandée par la OMS pour toutes les villes sauf à Abraka ayant une période de pointe de 76.2 dB. Pendant la nuit toutes les villes étudiées montraient une atmosphere paisible pour les measures de bruit moyen et de bruit de période de pointe. La raison pour le haut chiffre de bruit à quelques endroits était attribuable aux automobiles roulant sur la route à petites vitesses comme on a fait remarquer à Warri et aux autres endroits. D'autres raisons étaient attribuables à l'emploi de génératrices exigées par la panne incessante de courant du public, des motocyclettes commerçiales, des studios d'enregistrement et ceux qui emploient la musique pour la promotion des ventes de leurs merchandises.

Introduction

Environmental noise is a worldwide problem. However, the way the problem is dealt with differs from country to country and is dependent on culture, economy and politics. According to Bruel & Kjaer (2000) and Cavanaugh & Tocci (2004), the problem persists even in areas where extensive resources have been used for regulating, assessing and damping noise sources, or for creating noise barriers. For example, efforts have been made to reduce traffic noise at source. In fact, today's cars for instance are much quieter than those manufactured 10 years ago, but the traffic volume has increased so much that the effect of this effort has been wiped out and the annoyance level has increased. Manufacturing quieter cars may have eased the problem for a period but it has not removed it.

There are no worlwide estimates of the impact and cost of environmental noise. However, one prominent example covering most of Europe does exist. This is the European Union's Green Paper on Future Noise Policy of 1996. Bruel & Kjaer (2000), writing on the green paper, estimates that in terms of the number of people affected by niose, 20 per cent of the number suffers from unacceptable niose levels that cause sleep disturbance, annoyance and adverse health effects. Bruel & Kjaer (2000) also noted that an additional 40 per cent of citizens in Europe live in areas where noise levels cause serious annoyance during the day time. In financial terms, environmental noise costs society an estimated 0.2-2 per cent of the gross domestic product (Bruel & Kjaer, 2000). Even the lower of these figutes represents an immense cost.

According to Maduemezia (2002), noise pollution is one aspect of environmental pollution that is taken rather lightly in Nigeria. He asserted that greater part of the sources of noise in the society is of a social origin. However, noise, as a polluting agent in the environment, has been recognized in recent years as a serious threat to the quality of life enjoyed by people in most industrialized nations (FTA, 1995). In developing nations, however, noise pollution has not been seen as dangerious and having adverse effect on the life of the people (Abumere, Ebenero & Ogbodo, 1999). This is probably the reason why not much research into environmental noise pollution has been carried out within Nigeria cities.

Nevertheless, the Federal Government as far back as 1990, while forming the Federal environmental Protection Agency (FEPA), entrusted it with the responsibility of formulating laws to regulate and control the levels and impact of noise in the country (FEPA,1991). Unfortunately, the impact of FEPA has not yet been felt (Onuu, 1999). Very few reports of noise pollution studies are available in Nigeria. Menkiti (1979) highlighted the fact that there were many deaf people in Nigeria, the deafness being caused by exposure to noise. Onuu & Menkiti (1996) have analyzed the spectra of road traffic noise for parts of south-eastern Nigeria and concluded that this type of noise dominates the low frequency range (500-800 Hz).

Most people in Nigeira (Niger-Delta inclusive) would not recognize noise as an insidious pollution or attribute it to any phisiological impact though they may consider it as nuisance during sleeping hours. According to Abumere *et al.* (1999), extensive work on noise measurement surveys in large cities of the world carried out by environmental research workers concluded that the noise levels were influenced primarily by surface traffic along major roads within the cities.

The American Speech-Language-Hearing Association (ASHA) is giving a nationwide warning to the American public about the growing danger of hazardous environmental noise levels (Rockville, 2003). A new multi-media public service campaign has been launched to raise awareness and educate the public about hazardous noise and its impact on hearing. According to the ASHA president, Ochsner (2003), "we have become a noisy society and noise is slowly robbing us of our hearing. She stated that both the loudness of noise and the length of time one is exposed to such noise determine its ability to damage hearing. She said sounds that are louder than 85 dB are potentially hazardous.

Hearing loss often occurs gradually, becoming worse over time. For this reson, many people do not become aware of their hearing loss until it is too late to avoid permanent damage. Ochsner (2003), advocated taking a few precautions that can greatly reduce one's chances of hearing loss and improve one's overall health. There should be a limit to exposure to noisy environments when possible, alternating a quiet activity with a noisy one, and using hearing protection devices, such as ear plugs, when operating loud machinery or power tools. Ochsner (2003) also asserted that noise from children's toys and vacuum cleaners can all exceed 85 dB. She, therefore, advised that

consumers should check the dB ratings of products before purchasing them.

In addition to damaging hearing, research continues to provide data on other adverse effects of noise on health. It is now known that noise can cause stress-related health problems. Noise elevates blood pressure, causes fatigue, reduces sleep, increases frustration and anxiety in concentrating (United States Environmental Protection Agency, 2003). The need for an environmental noise surface has, therefore, become neccessary in the Niger-Delta so that the citizens can have a better understanding of the noisy environment they live in.

Experimental

The study was carried out in eight major towns in the Delta State, Nigeria. The towns, shown in Fig. 1 are Warri/Effurun, Ughelli, Sapele, Abraka, Patani, Ozoro, Oleh and Ogharaeki. The purpose was to compare the noise levels in these areas with the World Health Organization (WHO) standard to ascertain where caution should be exercised. The general field survey for the assessment was carried out using a $P^{1}0^{Nneer}$ 65 noise dosimeter. This instrument is a general purpose meter type 2 of the American National Standard Specification. Areas which are suspected to have high noise intensity were preferred. The noise dosimeter was set to 'A' weighting network. The 'A' weighting network was used because it is the most commonly used device for industrial and environmental studies. In effect it selects the low frequency sound energy and has been found to correlate

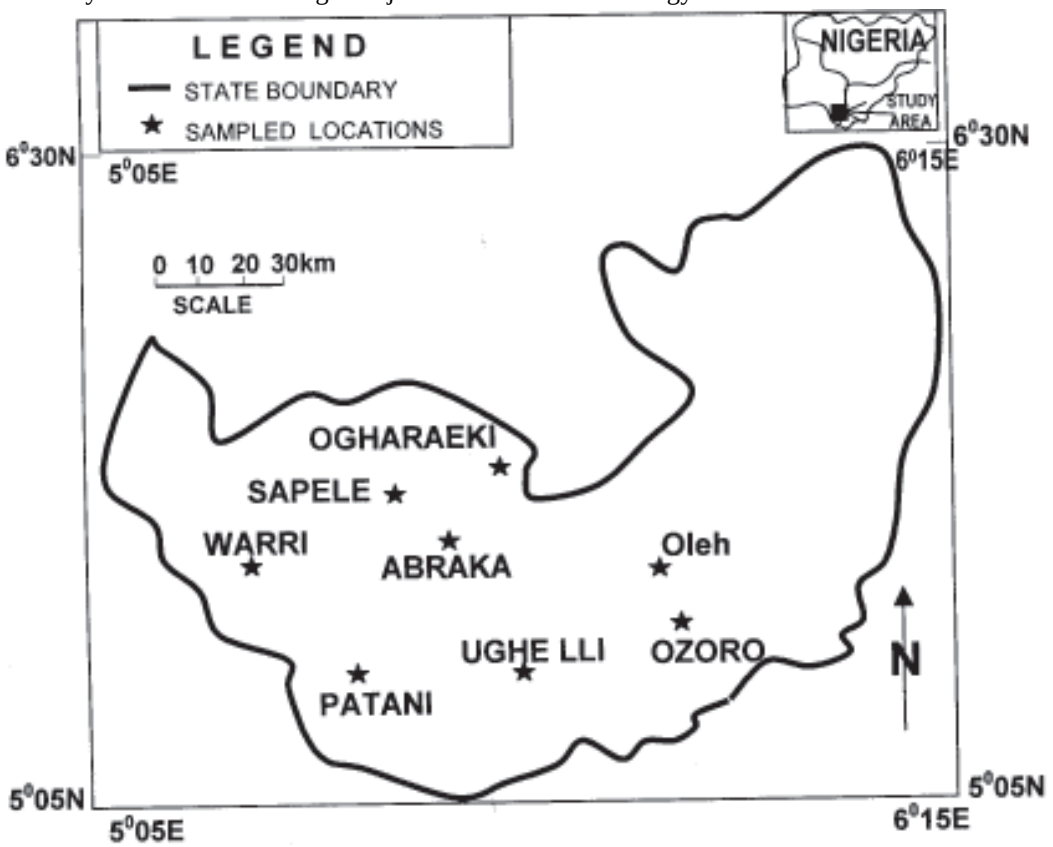

Fig. 1. Map of Delta State showing the study area

well with human response.

When measuring noise levels for environmental assessment, it is always necessary to follow some defined and repeated procedures. In the course of the study, the instrument was mounted in an open space at a height of 1.5 m above the ground. This is to enable the instrument record the environmental noise to a high degree of accuracy as stated by Bruel & Kjaer (2000). The instrument was set on automatic mode to run continuously for 30 min. In each of the towns, 10 locations were selected and measurements taken, and the average determined and recorded in Table 1 for day time average and Table 2 for night time average.

Results and discussion

The radar plot of Tables 1 and 2 are presented as Fig. 2 and 3. From these figures, the average noise level in Warri/Effurun which is 92 dB is a little more than the WHO maximum permissible noise level for residential areas. The peak noise level is, howsever, much greater than that of the WHO standard. From the study, Warri was found to be very noisy during the day, this trend needed to be checked. Most of the day time noise in Warri was due to automobiles plying the road at very slow speeds as a result of traffic hold-ups at almost every junction, as well as the sound from generators used by most commercial houses,

Table 1

Summary of day time noise measurements

Towns	*Average noise level (dB)*	*Per cent of noise level over WHO standard*	*Peak noise level (dB)*	*Per cent of peak over WHO standard (dB)*
Warri/Effurun	92.0	102	114.9	128
Ughelli	82.7	92	95.3	116
Sapele	79.7	89	99.8	111
Abraka	75.2	84	85.7	95
Patani	83.1	93	92.8	103
Ozoro	87.0	97	104.1	116
Oleh	84.9	94	96.3	107
Ogharaeki	82.2	91	113.7	127

Table 2

Summary of day time noise measurements

Towns	*Average noise level (dB)*	*Per cent of noise level over WHO standard*	*Peak noise level (dB)*	*Per cent of peak over WHO standard (dB)*
Warri/Effurun	77.5	86	79.7	89
Ughelli	61.9	68	89.9	100
Sapele	62.0	69	76.2	85
Abraka	64.6	72	69.2	77
Patani	69.6	77	79.3	88
Ozoro	75.3	84	85.6	95
Oleh	73.2	81	84.6	94
Ogharaeki	73.0	81	85.6	95

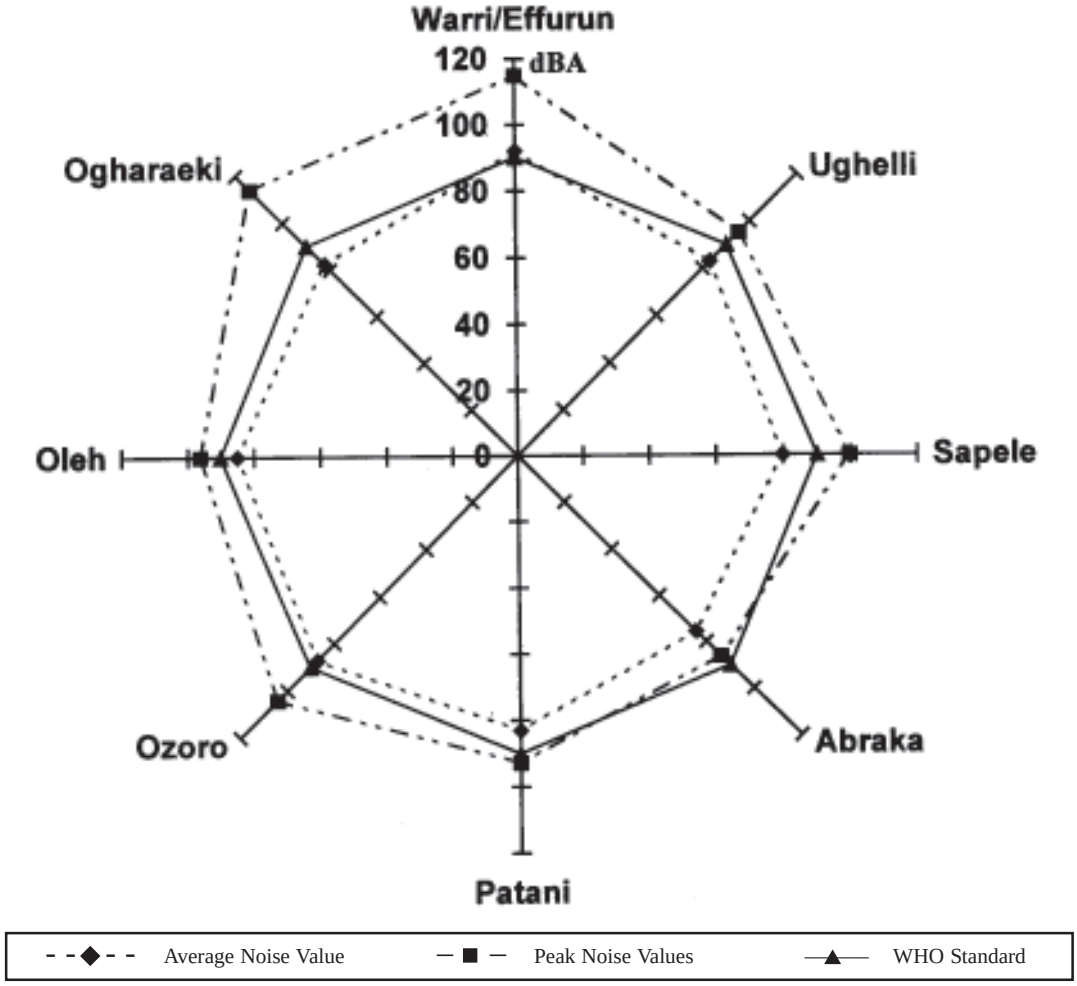

Fig. 2. Radar representation of the Noise level in the different locations for day time measurements

banks and oil servicing companies found in almost every street in Warri and Effurun.

At night, Warri/Effurun is relatively quiet with 77.5 dB and 79.7 dB for average and peak noise levels, respectively. This low level compared to the day time measurement was because many of the commercial and oil servicing companies close at night. Also, most automobiles would already be out of the road because of the security situation in Warri. This level should be maintained as much as possible and, where possible, be reduced further. This can be done by reducing the number of generators working at night through improved performance of the National Electric Power Authority.

The measurement made in Ughelli showed that day time and night time noise levels were 82.7 dB and 95.3 dB, respectively. The day time average noise level was less than the WHO maximum permissible limit. However, there were some places that showed high noise level giving rise to a peak that was higher than the WHO limit. At night, Ughelli had an average noise level of 61.9 dB and a peak of 89.9 dB. Hence, Ughelli was relatively

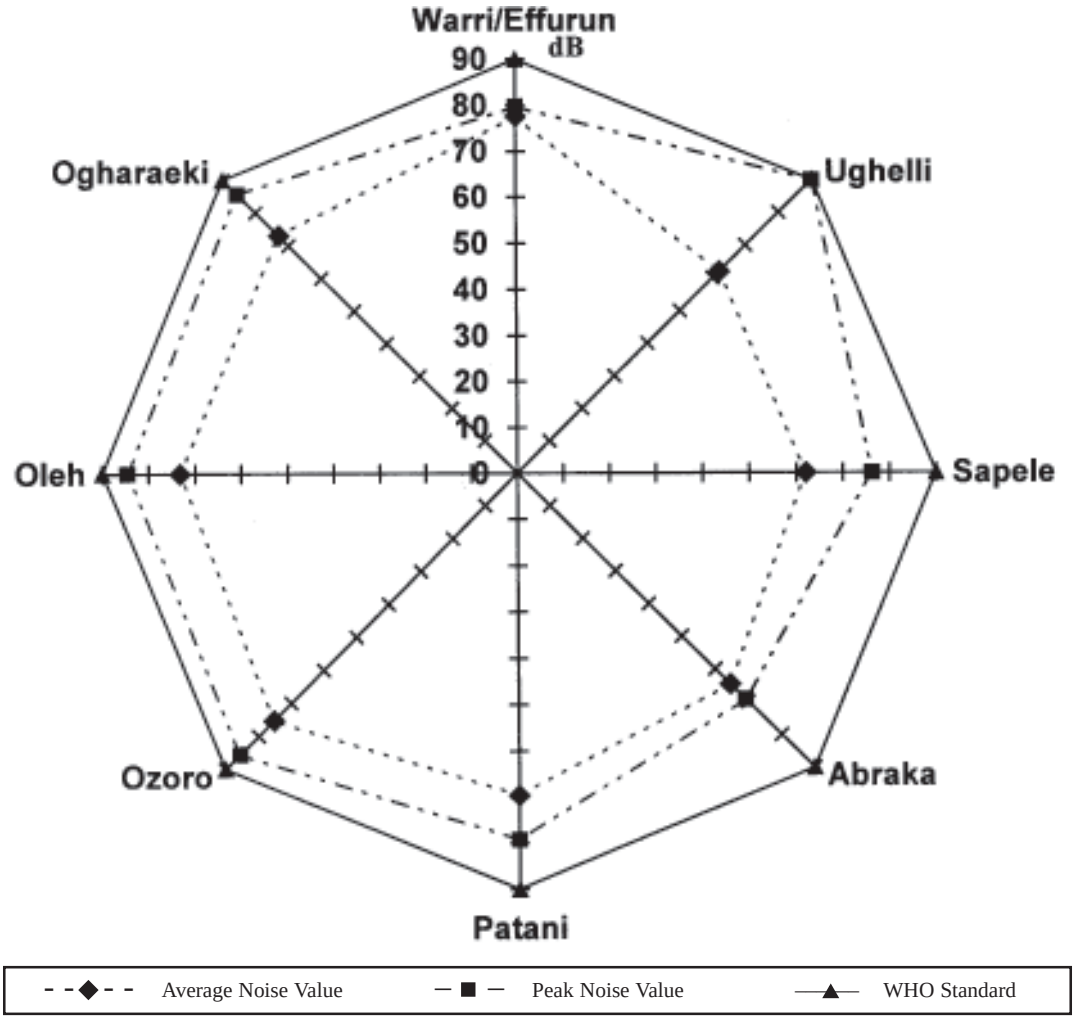

Fig. 3. Radar representation of the Noise level in the different locations for night measurements

quiet at night except for a few stations where some commercial/industrial activities took place. The noise can also be reduced through pulbic awareness education.

The day and night time measurements for Sapele town showed that the average noise level during the day was 79.7 dB while the peak was 99.8 dB. The relatively high peak value for Sapele was the result of high commercial activities in some areas with high traffic plying those places. At night, Sapele had an average noise level of 62 dB and a peak of 69 dB. The low values of noise in Sapele at night was because of industrial activities, less automobile built up at junctions and less use of electrical generating equipment at night. With these observations, one could say that Sapele is a quiet place to live in.

The noise measurement made in Abraka showed that the average noise and peak noise measurements were 75.2 dB and 85.7 dB, respectively. These values are lower than the WHO recommended value. For night time measurements,

the average noise level was determined as 64.6 dB while the peak was 69.2 db. One can conclude that Abraka is quiet. However, the rapid increase in the use of electricity generating equipment due to the inefficiency of NEPA and insufficient supply of electricity will make these values increase at a very fast rate. Also, the increase in automobiles and commercial motorcycles users needs to be controlled as they are capable of increasing the noise level in Abraka since the town is a fast growing university town.

The measurements at Ogharaeki showed that the average day time noise level measured was 82.3 dB while the peak was 113.7 dB. At night, the average noise level was 73 dB while the peak was 94.2 dB. From these values, Ogharaeki may be said to maintain an average noise level that was below WHO value for day and night. But there were spontaneous noises that gave rise to the peak noise level increasing above the WHO value. These noises were observed to be coming from automobiles, generators, recording houses, barbering salons and industries in the area. At night, Ogharaeki was relatively quiet with a few pockets of noise at certain locations. With public awareness education, the noise level in this area can be controlled and reduced.

The noise data obtained from measurements carried out in Patani as presented in Table 1 and 2 showed that the average noise level for measurements made during the time was 83.1 dB while the peak noise level for the same period was 92.8 dB. During the night, the average noise level was 69.6 dB while the peak was 79.3 dB. The data abviously showed that the noise level of Patani lies within the noise level recommended by WHO.

The measurements of noise levels obtained at Oleh showed that the average noise level during the day was 84.9 dB while the peak was 96.3 dB. For measurements obtained during the night, the average noise level was 73.2 dB while the peak was 84.67 dB. From this data, one could say that Oleh was safe to live in, noise wise. However, the mean value of 84.9 dB was very close to the WHO maximum permissible value of 90 dB and, hence, will need to be checked to forestall any increase while ways to reduce it put in place.

The measurements carried out in Ozoro showed that the average noise level for measurements carried out in the day was 87 dB while the peak was 104.1 dB. For measurements carried out during the night, the average nose level was 75.3 dB while the peak was 85.6 dB. Ozoro, like Oleh, is safe for living in as a residential area. However, the values were too close to the WHO maximum permissible limit of 90 dB. These relatively high values were attributed to noise from commercial motorcycles and musical/recording stores.

Conclusion

The determination of the noise level in some major towns in the Delta State, Nigeria, shows that most are caused because of lack of public awareness education and the ignorance of the people to the effect of subjecting themselves to loud noises. The study showed that the noises from most of the towns are caused by automobiles, commercial motorcycles, recording houses and the use of electricity generating equipment. The people in the study area can avoid excessive noise if everybody is aware of the harm caused by excessive noise making. It is recommended that the effect of noise to public health should be placed as jingles on television and radio while the government also puts in place the necessary legislation on noise level for imported machines, and the appropriate punishment for noise offenders.

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