

Analysis of the effects of environmental noise on people in Akwa Ibom North East, Nigeria

Ekott, E. E., Umoh, A. A., Essien, I. E., Nyong A. B., Umoh, U. A.
Department of Physics, University of Uyo, Akwa Ibom State, Nigeria

Abstract:- Noise pollution has negative effects on people exposed to it. Sources of the noise and the extent to which they have affected the populace have to be determined. This research work therefore presents the analysis of the effects of environmental noise on people in Akwa Ibom North East. In this case, after taking the noise level measurements, a developed research questionnaire was distributed in the areas of high noise levels. The data obtained were analysed by using the percentage analysis method for clarity. In this research work, any adverse effects created by noise to the people were considered as bother. It was established that people in the area are bothered by environmental noise. It was observed that churches, power generators, compact disk sellers are among the major sources of noise. Here, noise of churches adversely affected 68% of the 75% that heard it. The results further indicate that there are many sources of noise in the area, while car noise bothered the people of the area most.

Keywords:- Analysis, Akwa Ibom North East, effects, environmental noise, Nigeria, people.

I. INTRODUCTION

Domestic noise is described by World Health Organisation (WHO) as environmental noise or residential noise or community noise [1]. Air, municipal work, road and rail traffic, neighbourhood, and the construction plant are some of the major sources of noise. Aeration systems, home appliances; office machines, and neighbours are the major sources of indoor noises. Noise was identified by the Environmental Protection Agency (EPA) of the United States of America as a nuisance back in the 1970s [2]. Subsequently, it undertook a major research on noise. It continues to carry out further studies in order to update its findings. This simply indicates that the research on noise is a continuous process. Noise debases the quality of our surroundings. Currently, noise is one of the most important hazards to the supremacy of our survival. The growing levels of economic affluence and the ever escalating figure of people in the world can be causes to this increase in noise [3].

Here, noise can be considered as harmful sound [4]. It can also be defined as unwanted sound. The level of “unwantedness” is typically a psychological matter since its negative impacts can vary from mild annoyance to interminable loss of hearing, and possibly taken in a special way by various people [5]. To this end, it is often not easy to determine the benefits of dipping a certain noise. The

populace, humans, fauna and others in their natural environment are being affected by noise. Noise from industry is among the highest noise complaints [6]. High sound levels of appropriate time of exposure can cause problems in hearing. Especially, those working in industrial plants or operating machinery. Residential noise intrusions like traffic noise can interfere with sleep and relaxation, impede speech communication, and reduce the ability to execute complicated jobs [7].

The European Union (EU) Directive (86/188/EEC) is on the protection of workers from the risks related to exposure to noise at work. Its objective is to reduce the level of noise at the noise source.

- Equation (1) gives the daily personal noise exposure of a worker [7].

$$L_{EP,d} = L_{Aeq,T_c} + 10 \log_{10} \frac{T_c}{T_0} \quad (1)$$

where,

$$L_{Aeq,T_c} = 10 \log_{10} \left\{ \frac{1}{T_c} \int_0^{T_c} \left[\frac{P(t)A}{P(0)} \right]^2 dt \right\} \quad (2)$$

T_c = daily duration of a worker's exposure to noise.

$$T_0 = 8h$$

P_A = A – weighted instantaneous sound pressure in Pascal (Pa)

The directive maintains that when the daily exposure noise level is greater than 85 dBA, workers are trained of the adverse effects. They are also advised to use ear protectors. However, a design to reduce levels of noise must be put in place if the daily exposure level is greater than 90 dBA.

The highest tolerant noise level of 85 dB in a work place has been set by the British Columbia Work's Compensation Board. [8]. Findings show that stable level of noise above 55 dBA is associated with severe bother, while above 50 dBA can cause moderate bother in residential areas [9]. In a non-work place, the respective safe noise levels for outside and inside are 55 dBA and 45 dBA. The acceptable levels of noise for schools and hospitals are 35 dBA [1].

A recent study by [10] establishes that noise during sleep has many adverse effects on people. The results of a research show that sleep is a chief modulator of cardiovascular duty [11]. Irregular noises, such as clicks or bangs, may have adverse effect on performance at reduced noise levels. As a result, it is advantageous to get rid of such characteristics from the surroundings noise. Cornell University conducted a study in 1993 and the results revealed that noise has negative impacts on children during classes. Explicitly, disturbance on surroundings during classes frequently linked to dysgraphic (writing learning mutilation) [12]; [13]. It is observed that noise can have adverse effects on body tissue resonances and hearing. Noise causes discomfort and annoyance to people exposed to it and at certain levels, it can also cause heart attack [14]. Additionally, the end result of elevated noise levels on small children has been established to be connected to physical health injures [15]. In the day, it is determined that noise levels less than 50 dBA outside create temperate discomfort in the living environment [16]. Annoying sound has been related to critical cardiovascular health hazards. Researches show that at night, noise levels of 50 dB(A) may also increase the risks of myocardial infarction by persistently fostering cortisol production [20].

Unpleasant sound exposure is taken to be mostly menacing when it occurs between 15 - 60 days after conception. This is simply because during this time the central nervous system and the main internal organs are developed. Also, researches suggested that a little decline in birth weight occurs when pregnant women are exposed to 76.5 dBA of airplane noise [17]. In addition, noise has negative impacts on children’s health [18], [19]; [20].

The associations between noise and mental-health indicators, such as rating of well-being, mental-hospital admission rates, use of psychoactive drugs and sleeping pills, and sign profiles are recommended by the population studies. Those with fundamental depression, children and elderly may be mostly in contact with these effects of sound because they may not have enough existing methods. Studies show that children in rowdy areas find high sound level annoying and show low value of continued existence [13]. The analysis [3] was conducted in six towns in Nigeria. The towns were Calabar, Lagos, Ibadan, Kaduna, Enugu and Port Harcourt. It was established that the most important noise source that disturbs the populace is the traffic. Sounds that do not cause temporary loss of hearing after 2- 8 hours of occurrence may not create permanent hearing impairments if continued longer [6]. Therefore, this research on noise pollution is very necessary for more awareness creation on the negative effects of noise. In this research, the analysis of the effects of environmental noise on people in Akwa Ibom North East, Nigeria shall be carried out.

II. MATERIALS AND METHODS

Physical measurements of noise levels were made around people’s homes and offices by using a sound level meter, model WensnWS1361. Based on the results of the physical measurements, some major areas in Akwa Ibom North East were chosen as interview centres. A developed research questionnaire was distributed in the areas of high noise levels. In this research work, any adverse effects created by noise to the people were considered as bother. Tricycles/motor cycles, children, cars, aircrafts, churches, animals, traders, workshops/factories, compact disk sellers, lorries, ships/engine boats, night clubs and power generators were the various noise sources contained in the research questionnaire. The idea was to know what types of noise sources people are exposed to and to what extent the people are being adversely affected by the noise sources. This addressed the impact of environmental noise pollution. Therefore, those interviewed were asked to tick the noise sources they were exposed to and to show how the noise sources affect them. In the survey, out of 582 copies of the research questionnaire that were distributed in the area, 477 of it were collected and used. The data obtained were analysed by using the percentage analysis method for clarity [21]. Formulae used are presented as equations (4) and (5):

$$\% \text{ Heard} = \frac{\text{Number heard} \times 100}{\text{Total number of respondents}} \quad (4)$$

$$\% \text{ Bothered} = \frac{\text{Number bothered} \times 100}{\text{Total number of respondents}} \quad (5)$$

III. RESULTS AND DISCUSSION

The results are presented on Table 1 and Figure 1.

Source of Noise	% Heard	
	Heard	Bothered
Aircrafts	26	17
Animals	48	25
Cars	90	81
Churches	75	68
Children	82	50
Compact Disk Sellers	68	47
Lorries	87	80
Traders	70	61
Tricycles/Motor Cycles	82	70
Night Clubs	40	31
Power Generators	72	62
Ships/Engine Boats	9	5
Workshops/Factories	87	80

Table 1:- Akwa Ibom North East Noise Botherers Response (2018)

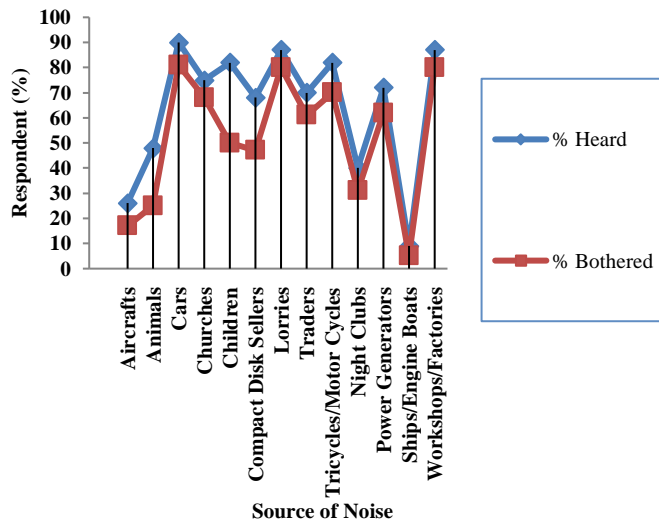


Fig. 1: Akwa Ibom North East noise bothers response

IV. DISCUSSION

The results of the surveys (Table 1 and Figure 1) show that noise of car bothered 81% of the 90% that heard it. Noise of lorries was heard by 87% and 80% were bothered by it. Similarly, noise of workshops/factories annoyed 80% of the 87% exposed to it. The results indicate that annoyance of 70% of the 82% exposed to noise of tricycles/motorcycles was recorded. However, the most major sources of noise in Akwa Ibom North East are Cars, Lorries, workshops/factories and tricycles/motorcycles.

Churches, traders, power generators, compact disk sellers and children are the other major sources of noise in the area. Here, the results of the findings clearly reveal that church noise has adverse effects on the 68% of the 75% exposed to it. Noise of generator creates negative impacts on 62% of the 72% exposed to it. It was observed that 70% of the respondents heard noise of traders, while 61% were disturbed by it. Children noise disturbed only 50% of the 82% that heard it. Noise of compact disk sellers negatively affected 47% of the 68% exposed to it. The results of the survey further show that noise of aircrafts disturbed 17% of the 26% that heard it. Noise produced during night clubs was heard by 40% of the respondents, while 31% were annoyed by it. The results hereby indicate that animals, aircrafts, ships/engine boats and night clubs can be classified as the minor noise sources in the area. The classification is simply because their percentages of respondents are less than 50.

In generally, noise of cars bothered the people of Akwa Ibom North East most.

V. CONCLUSION

In conclusion, noise has adverse effects on the people in the area. Finally, the area has many noise sources.

VI. ACKNOWLEDGMENT

We wish to thank all those who assisted us during the field works.

REFERENCES

- [1]. World Health Organisation (WHO) (1999). *Guidelines for community noise*. Retrieved June 25, 2017 from <http://www.who.int/docstore/peh/noise/index.html>.
- [2]. Menkiti, A. I. & Ekott, E. E. (2014). Determination of noise levels with respect to distance at selected workshops/factories in Itu Local Government Area of Akwa Ibom State, Nigeria. *IOSR Journal of Applied Physics (IOSR-JAP)*, 6(3), 43-53.
- [3]. Menkiti, A. I. (2001). Analysis of noise bother by survey method. *Global Journal of Pure and Applied Sciences*, 7(3), 545-550.
- [4]. Schmidt, C. W. (2005). Noise that annoys regulating unwanted sound. *Environmental Health Perspectives*, 113(1), 1–3.
- [5]. Ekott, E. E., Bassey, D. E. and Obisung, E. O. (2018). Modeling the Relation Between Noise Levels and Distance from a 500 kVA Power Generator. *World Journal of Applied Science and Technology*, 10 (1B), 124 – 130.
- [6]. Ekott, E. E. (2011). Impact of noise on the environment: Using Itu Local Government Area of Akwa Ibom State, Nigeria as case study. Unpublished Master of Science Dissertation, Faculty of Science, University of Uyo, Nigeria.
- [7]. Kiely, G. (1998). *Environmental engineering*. Singapore: Irwin/McGraw-Hill, 231pp
- [8]. Ekott, E. E. & Menkiti, A. I. (2015). Assessment of noise levels in parts of Akwa Ibom State, Nigeria. *World Journal of Applied Science & Technology*. 7(2), 170-175.
- [9]. World Health Organisation (WHO) (2007). *Night Noise Guidelines for Europe*. Bonn: WHO, Regional Office for Europe, Retrieved June 30, 2017 from http://www.euro.who.int/__data/assets/pdf_file/0017/43316/E92845.pdf.
- [10]. Obisung, E. O., Onuu, M. U., Menkiti, A. I. & Akpan, A. O. (2016). Road traffic noise-induced sleep disturbances in some cities in Eastern Nigeria. *British Journal of Applied Science and Technology*. 12(4), 1-15.
- [11]. Halperin, D. (2014). Environmental noise and sleep disturbances: A threat to health? *Journal of Sleep Science*, 7(4), 209-212.

- [12]. Clark, C., Head, J. & Stansfeld, S. A. (2013). Longitudinal effects of aircraft noise exposure on children's health and cognition: A six-year follow-up of the UK RANCH cohort. *Journal of Environmental Psychology*, 35(3), 1-9.
- [13]. Stansfeld, B. M., Dockrell, J. E., Asker, R. & Trachmatzidis, I. (2005). The effects of noise on the attainments and cognitive development of Primary School children-final report for department of health and the department ETR. Retrieved January 14, 2014 from www.noisesolutions.com.
- [14]. Environmental European Commission (E.E.C). (1978). *Damage & annoyance caused by noise*. Luxemburg: CEC EUR, 119pp
- [15]. Goran, B. (2008). Urban road traffic noise and blood pressure and heart rate in preschool children. *Environmental International*, 34(2), 226– 231.
- [16]. Organisation for Economic Co-operation and Development (OECD) (1986). *Environmental Effects of Automotive Transport*. Paris: The OECD Compass Project, OECD.
- [17]. Essiett, A. A, Akpan, R. E. & Uwak, S. O. (2010). Assessment of noise level in Ikot Ekpene Town, Nigeria. *International Journal of Biotechnology and Allied Sciences*, 5(1), 620 – 624.
- [18]. Klätte, M., Bergström, K., & Lachmann, T. (2013). Does noise affect learning? A short review on noise effects on cognitive performance in children. *Frontiers in Psychology*, 4: 578. Retrieved March 2, 2016 from <http://doi.org/10.3389/fpsyg.2013.00578>.
- [19]. Seabi, J. (2013). An epidemiological perspective study of children's health and annoyance reactions to aircraft noise exposure in South Africa. *International Journal of Environmental Research and Public Health*, 10(7), 2760-2777.
- [20]. Clark, C., Crombie, R., Head, J., van Kamp, I., van Kempen, E., & Stansfeld, S. A. (2012). Does traffic-related air pollution explain associations of aircraft and road traffic noise exposure on children's health and cognition? A secondary analysis of the United Kingdom sample from the RANCH project. *American Journal of Epidemiology*, 176(4), 327-337.
- [21]. Ekott, E. E. (2018). *Evaluation and Modelling of Environmental Noise Pollution in some Local Government Areas of Akwa Ibom State, Nigeria*. (Ph. D Thesis) submitted to the Department of Physics, University of Calabar, Calabar, Nigeria.