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Implication of Noise Pollution in Academic Environment: A Case Study of the University of Africa, Toru-Orua, Bayelsa State, Nigeria

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ABSTRACT

This study presents a novel approach to evaluating the noise level. The aim is to examine the implication of Noise Pollution in Academic Environment using University of Africa, Toru-Orua in Bayelsa State, Nigeria as a Case Study. This work was carried out in three (3) different locations (Faculty of Basic and Applied Sciences, Science Laboratories and the Student Hostels) within the University Campus. A digital sound level meter was employed. Two (2) sessions were considered (During Off Session and During Academic Session). On comparing the noise level for the various locations, Faculty of Basic and Applied Science has the highest noise level value of 79dB(A) during session, followed by science laboratories at 78dB(A) during session while the Student Hostels has the least noise value at 75dB(A) during session. The noise level when compared to World Health Organization's recommended standard level of 75dB(A) shows that Faculty of Basic and Applied Science and Science Laboratories noise level were high, and this could be as a result of academic activities during session.

Keywords: *Noise pollution, Noise Exposure, Environment, Sound level*

INTRODUCTION

Sound is often characterised by its irregular frequency. It could also be described as a bothersome sound that can lead to difficulties in communication and hearing impairment (Ogobiri et al 2014). Noise pollution is a significant environmental concern that is frequently linked to human activities, including industrial, commercial, institutional, and recreational pursuits. These activities can have various impacts on individuals, as noted by Ugbebor et al. in 2017. Long-term exposure to excessive noise can lead to a range of health issues, affecting both the body and mind (Akpan et al 2003). Sound levels can determine the classification of noise, which can be divided into domestic, commercial, and industrial categories. (Ogobiri et al 2014) observed that noise in educational institutions can have a negative impact on undergraduate students. This can manifest in various ways,

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such as difficulties in reading, comprehension, listening, speech, and memory. These challenges can ultimately affect academic performance due to issues like lack of focus, decreased motivation to learn, and impaired memory. In a recent study conducted by Ogobiri et al in 2019, the researchers focused on assessing the noise levels in various areas of the Niger Delta University campuses. Their findings revealed that the Auditorium and Lecture theatre in the Glory Land Campus exhibited the highest levels of noise, measuring at 86.3 dB(A) and 85.4 dB(A) respectively.

MATERIALS AND METHOD

The equipment used in conducting this research work includes a Digital Sound Metre, Global Positioning System (GPS), and a Microsoft Excel package..

Physical and Acoustic Measurement

For this investigation, an A-weighted digital sound level metre was used. An assumed average ear-to-ground distance of 1.2 metres was used to hold the sound level meter's microphone at a safe distance from the ground.

Field Measurement

The noise levels for the different locations were measured and recorded within the campuses of the University and the locations are as follows, Faculty of Basic and Applied Science, Science laboratories and the student hostels all within the campuses. Since the A-weighting network is the most popular for measuring environmental noise, it was set to the digital sound metre to provide sufficient precision throughout the measurement. The result is that it zeroes down on low-frequency sound waves that elicit positive responses from humans. The notation dB (A), where A denotes an A-weighting network, was used to record the readings. Features of the digital sound level metre include the following: a frequency range of 30 Hz to 12 kHz

Low	30-80 dB (A)
Medium	50-100 dB (A)
High	80-130 dB (A)

Weighting Selector

The A-weighting is use for noise level determination, while the C-weighting is for measuring sound level acoustic mater.

STUDY AREA

Toru-Orua, in the Sagbama Local Government Area of Bayelsa State, Nigeria, is where the university is situated. College of Africa The state-owned university Toru-Orua was established in 2016 and began its first academic session in 2017. Its primary goal since

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inception has been to pioneer a new model for the administration and provision of higher education by fusing the advantages of robust public funding with the innovative spirit of the private sector. The four departments that make up the university are the following: agricultural, basic and applied sciences, arts and education, and social and management sciences.

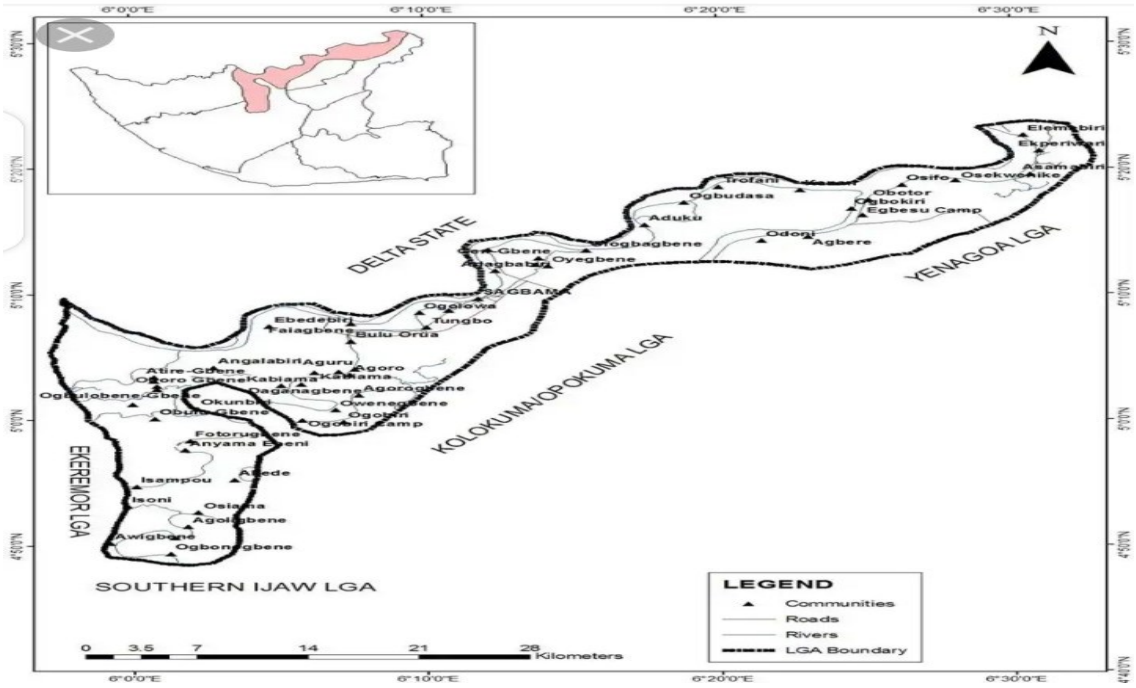

Fig 1: Showing Map of the Study Area. Source: ResearchGate.
GPS location of the study area, University of Africa Toru-Orua, Bayelsa State
Latitude 5.10017^0 North and Longitude 6.06609^0 East

RESULTS AND DISCUSSION

Table 1: The Noise Level in the Faculty of Basic and Applied Science

Locations	During Off Session dB(A)	During Academic Session dB(A)
Dean Office	45.3	72.2
Main Entrance Faculty block	36.4	74.4
Faculty Board Room	40.2	76.1
ICT Office	39.1	70.3
Class Room Upstairs	47.2	79.4
Class Room Downstairs	35.3	73.2
Average	**40.3**	**74.4**

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Table 2: The Noise Level in the Science Laboratory

Locations	During Off Session dB(A)	During Academic Session dB(A)
Physics LAB	45.2	75.3
Biology LAB	43.3	78.2
Chemistry LAB	48.4	75.1
University Library	35.1	70.1
CBT Hall	40.3	77.3
Establishment Office	43.2	78.4
Average	**42.3**	**75.5**

Table 3: The Noise Level in the Students Hostels

LOCATIONS	DURING OFF SESSION dB(A)	DURING ACADEMIC SESSION dB(A)
Hostel A	40.2	60.2
Hostel B	45.1	70.1
Hostel C	43.4	75.0
Hostel D	45.3	72.4
Hostel E	47.4	74.1
Hostel F	48.0	73.3
Average	**44.7**	**70.7**

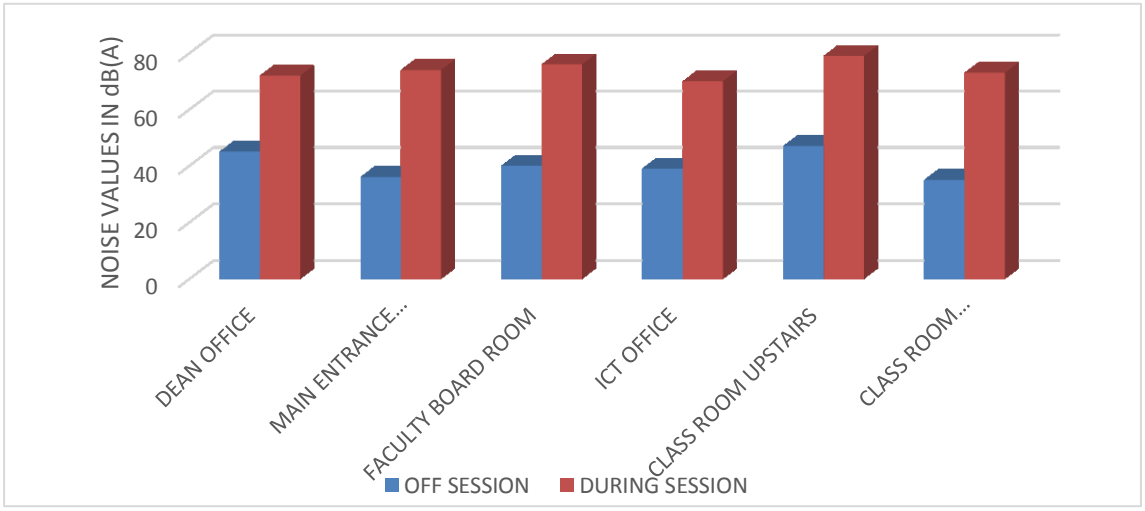

Fig. 1: Bar chart showing the noise levels during off session and during Academic session in the Faculty of Basic and Applied Science.

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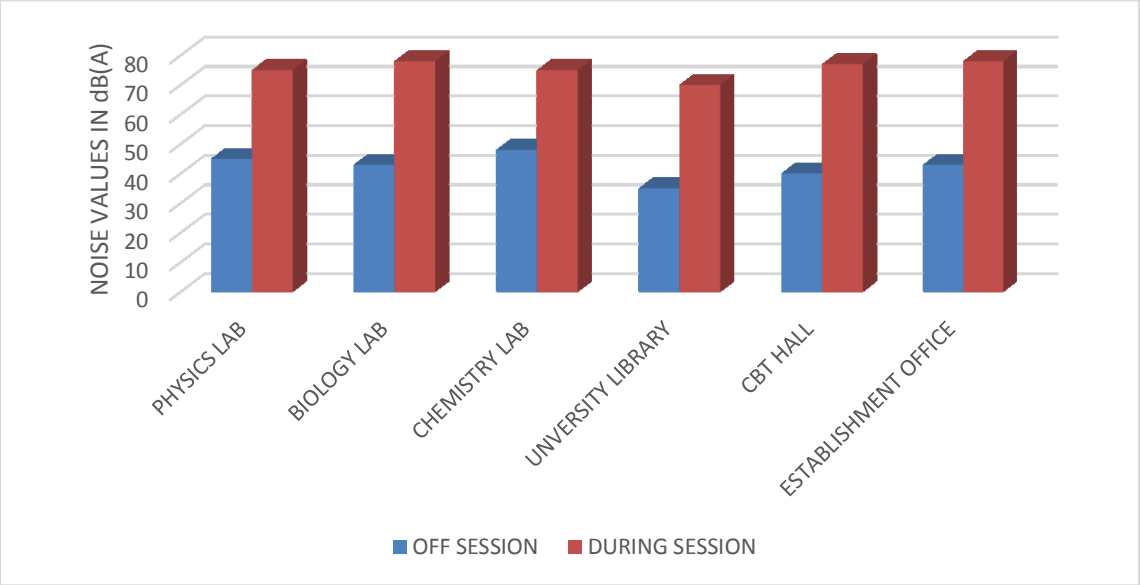

Fig. 2: Bar Chart showing the Noise Level during off Session and during Academic Session for Science Laboratories and other locations.

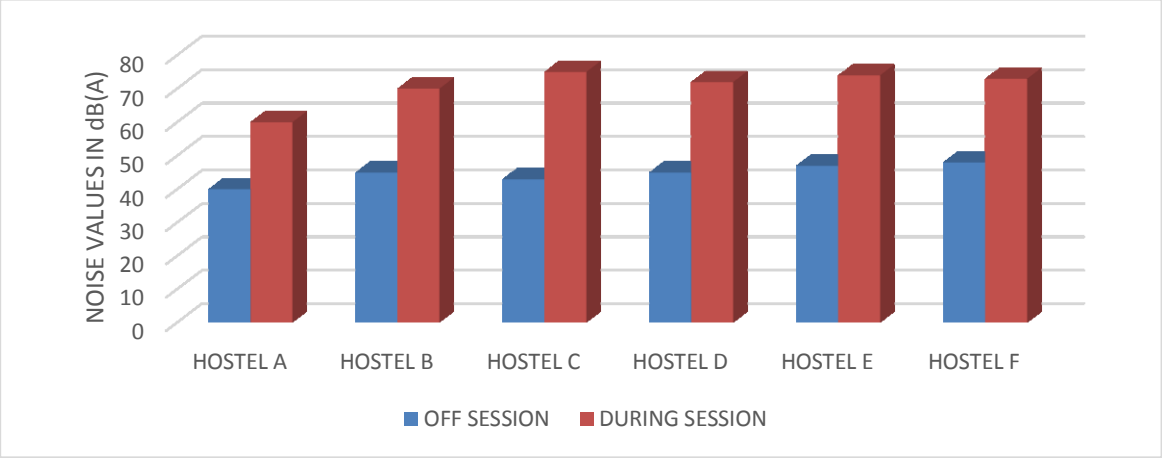

Fig. 3: Bar Chart Showing the Noise Level during Off Session and During Academic Session for Student Hostels

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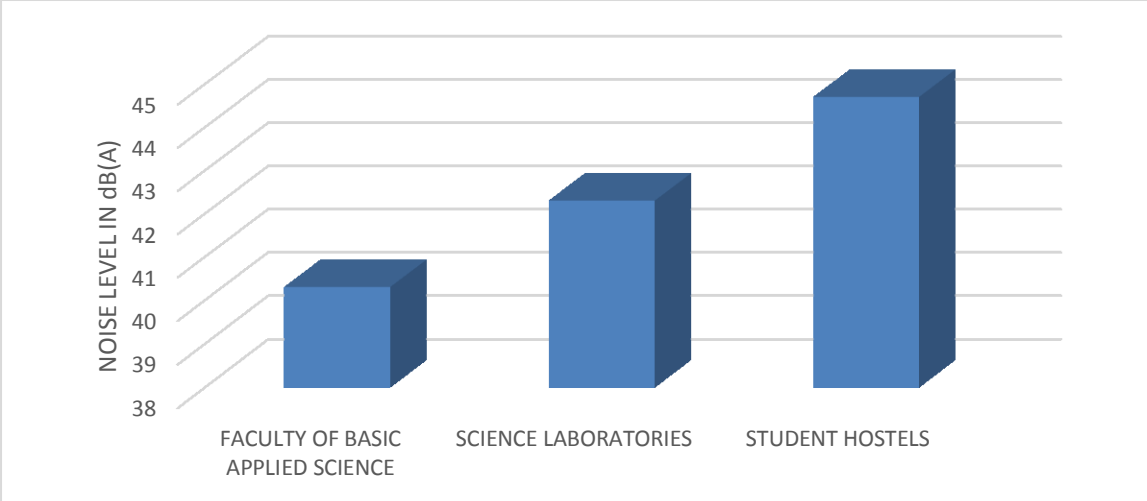

Fig. 4: Bar chart showing the mean noise levels during Off Session between Faculty of Basic and Applied Science, Science laboratories and Student Hostels, University of Africa Toru-Orua, Bayelsa State.

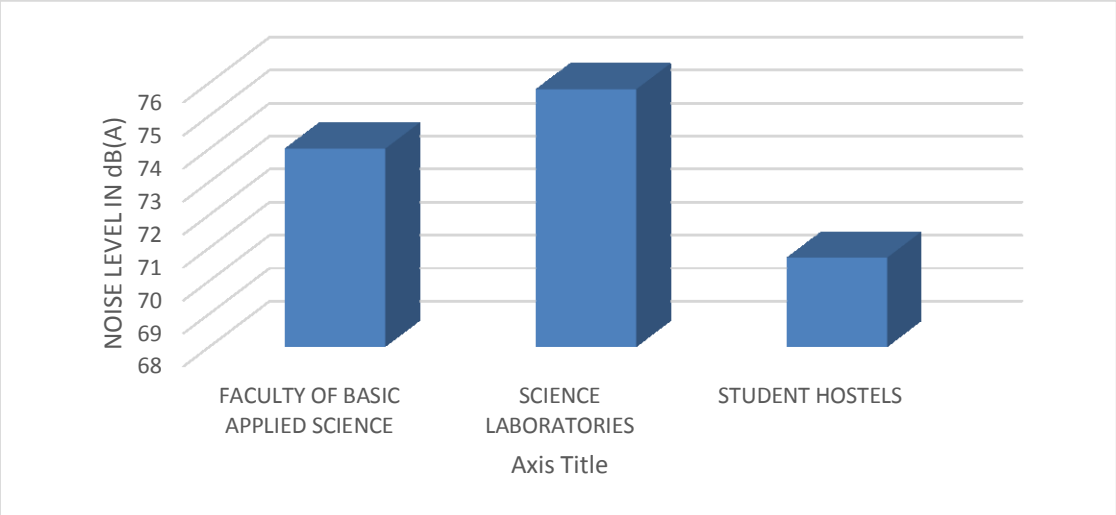

Fig. 5: Bar chart showing the mean noise levels during Academic Session between Faculty of Basic and Applied Science, Science laboratories and Student Hostels, University of Africa Toru-Orua, Bayelsa State.

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DISCUSSION

The potential harm caused by prolonged exposure to loud noise is a serious concern. The results in different areas of the university are presented in Tables 1-3. Figure 1-3 display the Bar chart illustrating the noise distribution levels at different locations in the university, both during the academic session and off session. Figures 4-5 display a Bar chart illustrating the average noise levels in different areas of the university during the academic session and off session. The Faculty of Applied and Basic Sciences building has recorded noise levels in different classrooms. During off session, the highest noise level was 47dB(A) in the upstairs classroom, while the lowest noise level was 35dB(A) in the downstairs classroom. The mean noise level during off session was 40.3dB(A).

During academic session, the highest noise level was 79dB(A) in the upstairs classroom, while the lowest noise level was 70 dB(A) in the downstairs classroom. The mean noise level during The University's science laboratories has varying noise levels. According to table 2, the chemistry laboratory recorded the highest noise value of 48dB(A) during off sessions, while the university library had the lowest noise value of 35dB(A), with an average of 42.3dB(A). During sessions, the ICT hall had the highest noise level of 79dB(A), while the university library had the lowest noise value of 70dB(A), with an average of 75.8dB(A). The noise levels in the student hostels vary depending on the session. During off session, the highest recorded noise level was 48dB(A) at hostel F, while the lowest was 35 dB(A) at hostel A. On average, the noise level during off session was 44.7dB(A). During the academic session, the highest recorded noise level was 75dB(A) at hostel C, while the lowest was 60 dB(A) at hostel A.

On average, the noise level during the academic session was 70.7dB(A). On a nut shell, the results show that the Faculty of Basic and Applied Sciences noise level during off session ranges from 35dB(A) to 47 dB(A), while during academic session, noise level ranges from 70dB(A) to 79dB(A) with the classroom upstairs recorded the highest noise level value of 79dB(A), For Science laboratories, the noise level during off session ranges from 35dB(A)- 48dB(A), while for during academic session, noise level ranges from 70dB(A) to 78dB(A) with biology lab and establishment office recorded the highest noise value of 78dB(A), Student Hostels noise level during off session ranges from 40dB(A)-48dB(A), while for during academic session recorded a noise level ranges from 60dB(A)-75dB(A) with Hostel C recorded the highest noise value of 75dB(A).

CONCLUSION

The research found that the noise levels at the University of Africa Toru-Orua in Bayelsa State are moderate, considering that the World Health Organisation recommends a limit of 75 dB(A) for schools. This is because the sites are adjacent to both commercial and traffic

operations. Noisy environments impair people's ability to learn, retain information, and use analytical reasoning, according to research. In light of this progress, the work is suggesting that suitable, accommodating environments be established for the different sites.

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