Evaluation of Noise Pollution Level of Selected Orthodox Church in Khana Metropolis of Rivers States, Nigeria.

ABSTRACT

The Evaluation of the selected Orthodox Church noise pollution level in Khana Local Government Area of Rivers State, has been carried out with the use of sound level metre (S/N 18017328) with a range of 30-130 dBA. Fifteen (15) strategic sections of the church was considered for the measurement of the noise pollution level during Sunday service. The obtained results from noise pollution level of the selected sections of the church are relatively high with value range from 80.8 - 105.8 dBA and 890.0-104.4 dBA. Higher percentage of noise pollution level was obtained with the choir and musical section of the church. The higher percentage recorded within this two section might be due to the closeness to the noise generating sources of the church while the least percentage was obtained at the children section of the church. The average results obtained from the selected sections of the church was all higher than the stipulated standard value of 55.0 dBA as recommended by the National Environmental Standards and Regulations Enforcement Agency (NESREA) and Environmental Protected Act (EPA) for residential areas.

KEYWORDS: Noise level, Church, Section, Health Risk and Human ear.

Introduction

Environmental noise is on the increase size on daily bases within our society due to human activities both commercial and industrial activities within the cities either small or big of the country. Noise are unpleasant sound, unwanted sound or unfriendly sound which causes uncomfort or unwanted effects to individual or group of individual within the immediate environment [1].

Environmental noise pollution are often called a silent killer, it has been detected that environmental noise is an essential health dispute that the publics should be more conscious of within our recent time

due to city modernisation [2]. Noise produced within the immediate environment are one of the common environmental noise nuisance, a noticeable menace to the environment and it comes with some of the health effects which includes, sleep disturbance, hearing deficiency, nervousness, psychological stress, unhappiness, irritabilit and unnecessary annoyance [3].

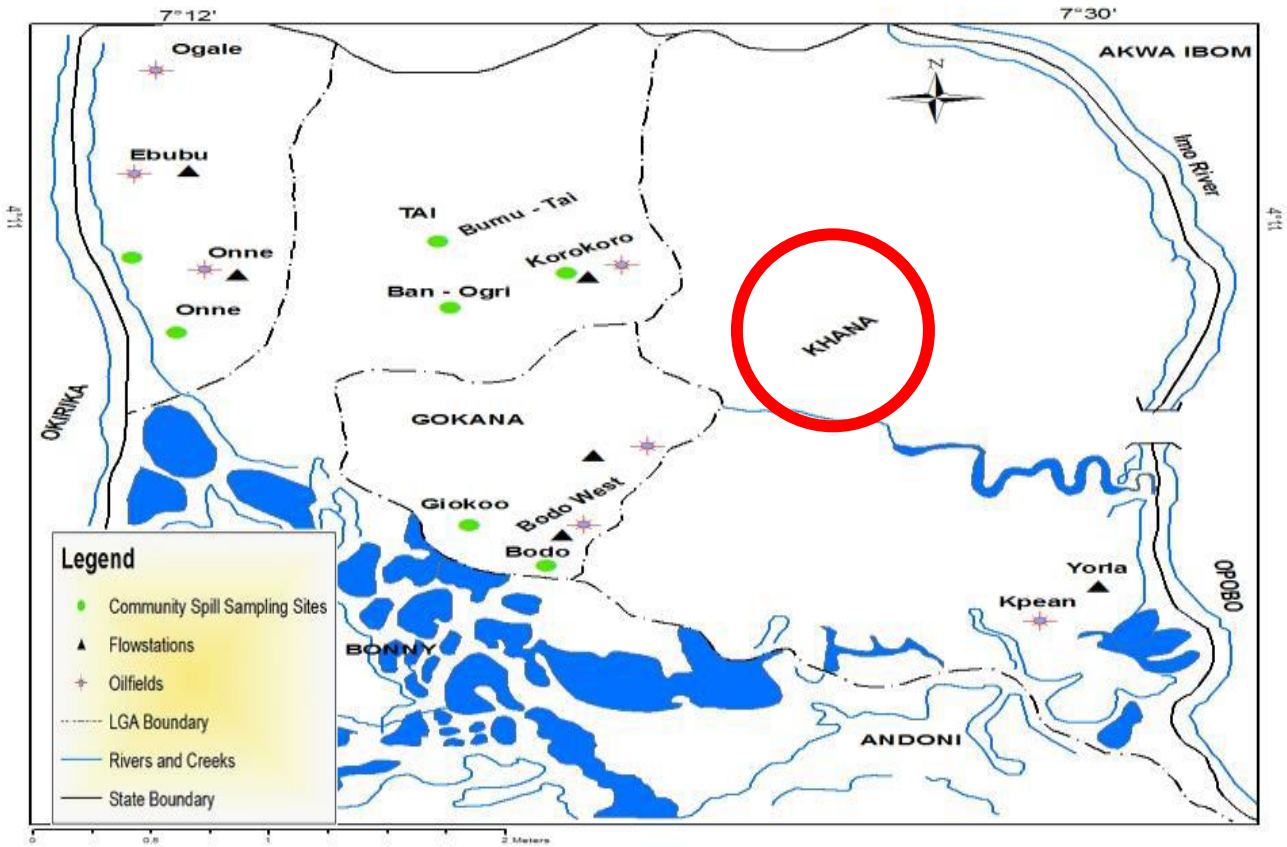
Noise emalating from the inmmediate environmental are emitted from several sources within the environment, except noise from industrial environment. The environmental noise pollution are ranked among the third peak hazardous kinds of pollution after air and that of water pollution [4].

Greater causes of the environmental noise includes growing global population, increase in human activities through the daily ultilization of technological equipments in both commercial and industrial sectors [5]. Societal noise pollution sources includes noise from traffic post, highly amplified music from record shops, churches activities,hotels,polical rally, construction companies, industrial activities areas, private electricity. Generating plants, religious institutions, loudspeakers, sporting events, political rallies, bells rung incessantly by peddlers, hawkers, road advertisements and grinding machines among others and this Noise pollution has been linked to several health-related weaknesses such as depression, anger, weak concentration and hearing deficiencies [5]. The asseement of noise and its associated health effects on students of some selected secondary schools in Ibadan. The assessment shows that over 60% of sampled respondents supported that vehicular traffic noise was their major source of noise leading to lack of concentration within the academic environment and a noticeable menace to student's health [6]. Some related studies on assessment of noise pollution level, and its relative possible health effects on the selected residential neighborhoods of Ibadan metropolis shows that within the periods at which the noise pollution level will reach its peak varies with the population density [7]. The human's ears are more sensitive to sound levels at different frequencies within 20.0 Hz to 20.0 $x10^3$ Hz, this sensitivity level depends on the individual ear's closeness to the environmental noise pollution sources within the range

of 45.0 dBA and 60.0 dBA. The environmental noise limit of 80 dBA will unsympathetically affects the human's ears, while limits greater than 130 dBA are considered harmful to humans ear [8]. The daily exposure of human ear to noise pollution greater than the recommended standard noise pollution level for residential areas may lead to human depression, reduction in efficiency, interference with speech and hearing impairment or inability to communicate effectively [9].

Study Area

The study is carried out in Khana Local Government Area of Rivers State. Bori is The headquarters of Khana Local Government Area which is the traditional headquarter of Ogoni. Bori is one of the small cities in Rivers State of Nigeria, with a total population *of* 11,693 [10]. The city Bori lies between $4°67^0$ North latitude 7°36° east, Longitude and 201metres elevation above the sea level. It serves as commercial center for the nearby Local Government Area such as Opobo and Andoni Local Government Area.



picture:1. Map of the Study Area [10]

Materials and Methods

The evaluation of noise level was carried out in selected orthodox churches within khana Local Government Area in Rivers State, Nigeria with the use of a Sound level meter (s/n 18017328) with range of 30.0 dB to 130.0 dB, accuracy of ±1.5 dB and frequency of 31.5 Hz to 8.0 kHz. The noise meter contains an AC and DC output socket for analog output. The noise meter was placed at a distance of 1.5 m from the ground level for accurate noise level measurement. The obtained noise level of the selected sampling points was displayed on the screen (LCD) panel of the noise metre decibel (dBA) and the noise meter was switched off after taking each reading for accurate measurement.

The noise level measurement of the selected orthodox church was carried out during the Sunday service in order to ascertain the noise pollution level during the Sunday service. Three different reading were taking at the selected sampling points within the church and the average was recorded and fifteen arbitrary points was selected for the purpose of the study. The church service last for five hours, starting from 8:00am and end by 1:00 pm. The church was grouped into fifteen section for effective evaluation of the noise pollution level during the Sunday service of the church.

Results and Discussion

Table 1: Noise Level during Church Praises and Offering Time (8:0 AM -1:0PM)

S/n	Sampling Points	Church Praises Time (dBA)			Church offering Time (dBA)		
		Min.	**Max.**	**Average**	**Min.**	**Max.**	**Average**
1	Alter Section	90.8	98.7	94.75	89.9	99.7	94.8
2	Choir Section	94.3	101.7	98	99.9	105.1	102.5
3	Men's Section	95	96.7	95.85	90	99.1	94.55
4	Women's Section	94.1	96.4	95.25	96.7	100	98.35
5	Youth Section	95.6	97.7	96.65	89.7	94.1	91.9
6	Teenager Section	90.8	98.1	94.45	91.8	104.3	98.05
7	Musical Section	100.9	105.8	103.35	99.9	106.6	103.25
8	Vestry	90.9	101	95.95	99.9	105	102.5
9	Entrance	89.9	97.9	93.9	94.2	99.9	97.05
10	Ushers stand one	97.1	100.8	98.95	95.8	100.4	98.1
11	Ushers stand Two	89.9	99.9	94.9	89	99.3	94.15
12	Ushers stand Three	96.9	104.8	100.85	95.9	100	97.95
13	Children section	80.8	87.2	84	79.9	88.8	84.35
14	Church manse	88	98.9	93.45	88.9	99.2	94.05
15	Financial Record Stand	90.1	98.9	94.5	92	98.4	95.2
	Mean	**92.34**	**98.97**	**95.65**	**92.9**	**99.99**	**96.45**
	EPA [11]	**55.0**	**55.0**	**55.0**	**55.0**	**55.0**	**55.0**

Table 2: Noise Level during Church Bible Reading and Preaching Time (8:30 AM -1:0PM)

S/n	Sampling Points	Church Bible Reading Time (dBA)			Church Preaching Time (dBA)		
		Min.	**Max.**	**Average**	**Min.**	**Max.**	**Average**
1	Alter Section	89.1	90.1	89.6	89	95.1	92.05
2	Choir Section	84.9	92.2	88.55	95	101	98
3	Men's Section	89.4	90.8	90.1	90.3	95.7	93
4	Women's Section	84.9	89.9	87.4	92.3	98.4	95.35
5	Youth Section	83.4	88.7	86.05	89.3	94.3	91.8
6	Teenager Section	80.2	84	82.1	90.7	96.3	93.5
7	Musical Section	90.5	99.8	95.15	94.1	102.8	98.45
8	Vestry	78.9	89.9	84.4	80.9	94	87.45
9	Entrance	68.9	90	79.45	79.8	94.4	87.1
10	Ushers stand one	79.8	88.9	84.35	83.6	98	90.8
11	Ushers stand Two	79.9	87.9	83.9	84	90	87
12	Ushers stand Three	79.9	90.8	85.35	80.3	94.9	87.6
13	Children section	68	79.9	73.95	70	80.9	75.45
14	Church manse	70.9	80.7	75.8	77.8	86.9	82.35
15	Financial Record Stand	80.1	88.7	84.4	80	86.9	83.45
	Mean	**80.58667**	**88.82**	**84.703**	**85.14**	**93.97333**	**89.557**
	EPA [11]	**55.0**	**55.0**	**55.0**	**55.0**	**55.0**	**55.0**

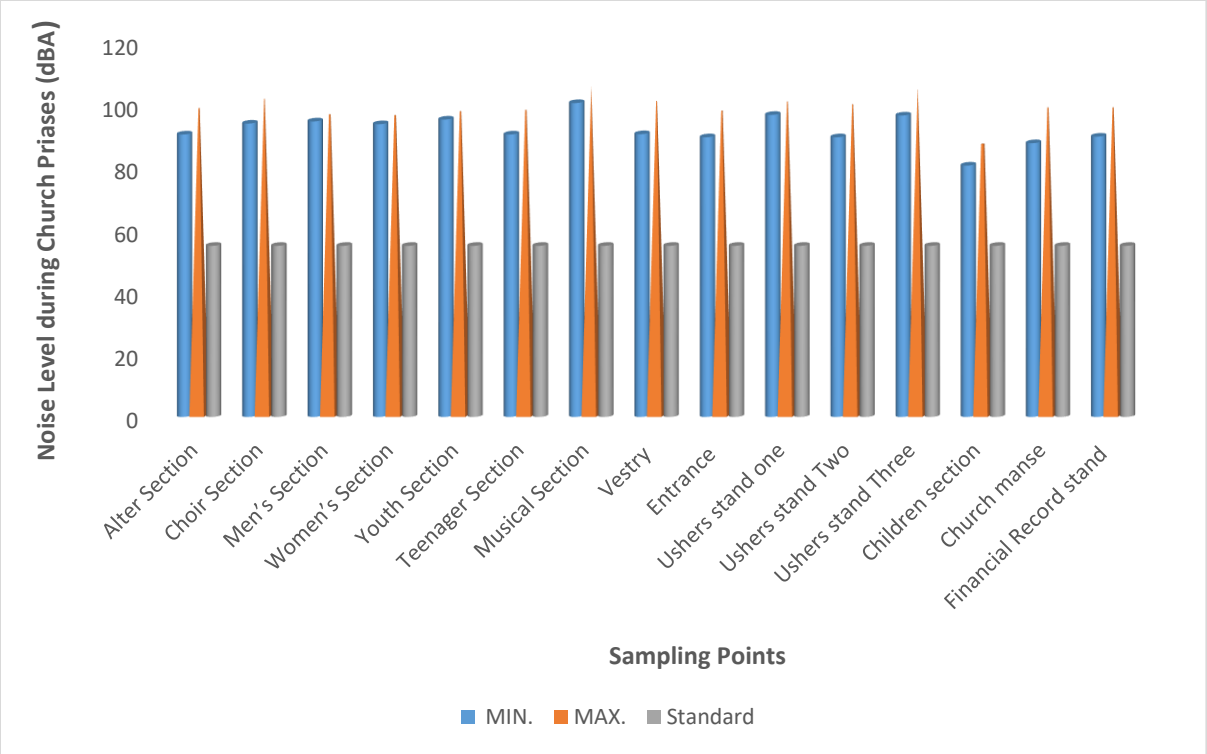


Figure1: Noise Level during praise and worship

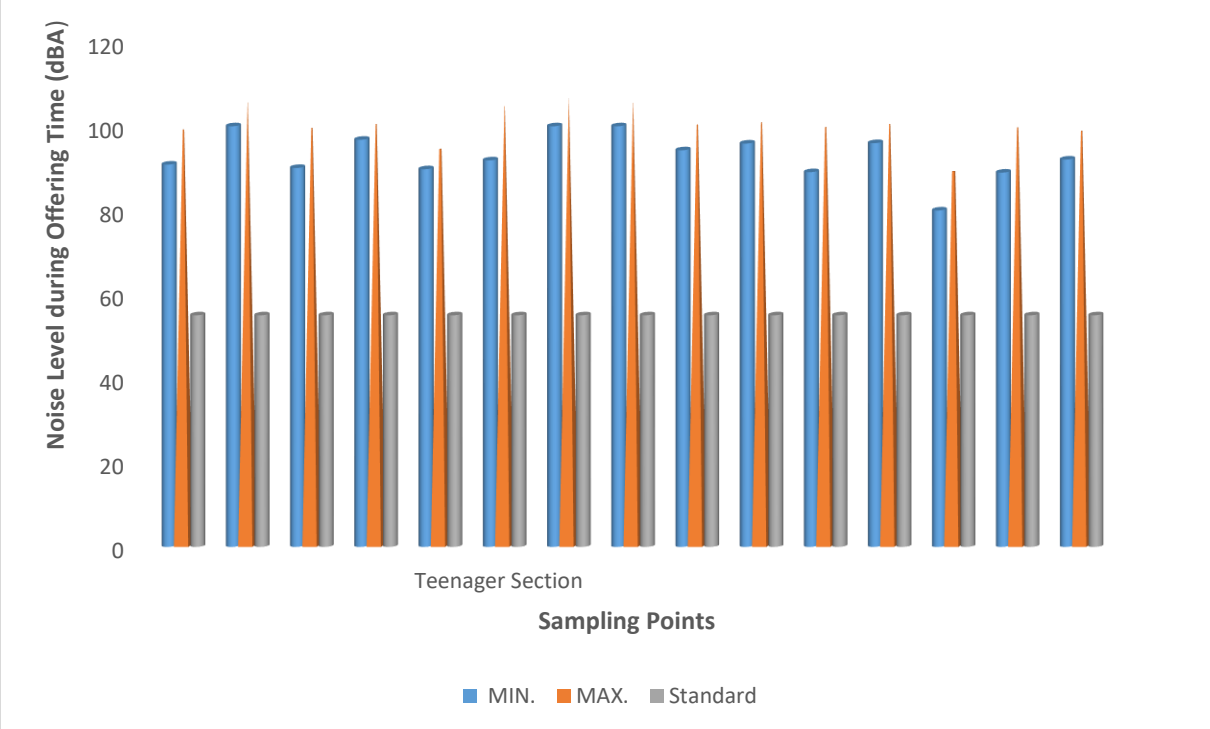


Figure 2: Noise Level during Offering Time

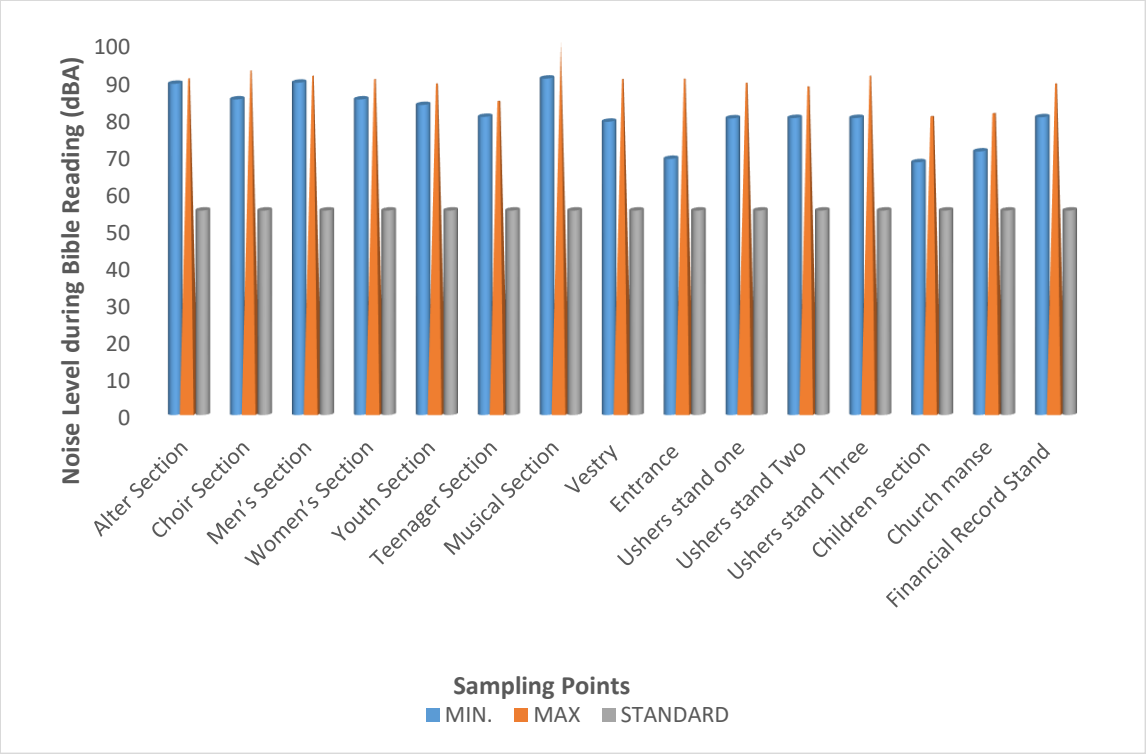


Figure 3: Noise Level during Bible Reading

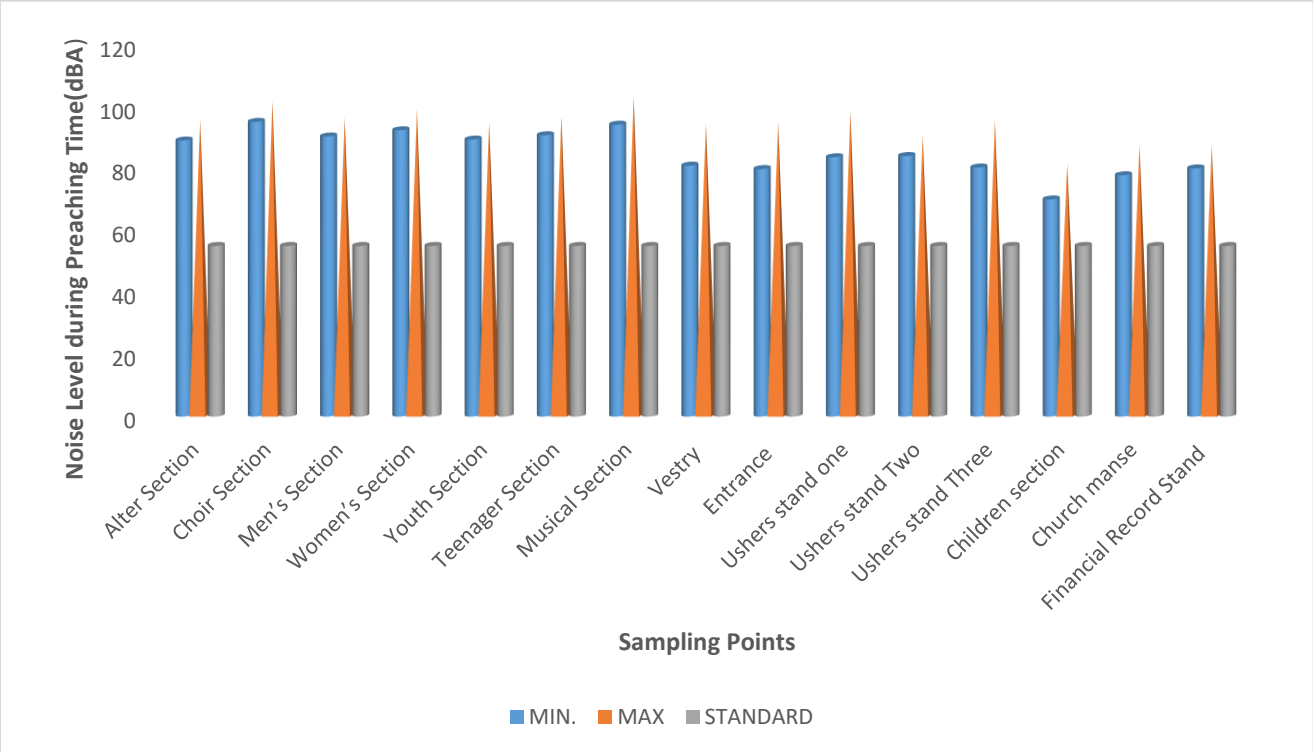


Figure 4: Noise Level during Preaching Time

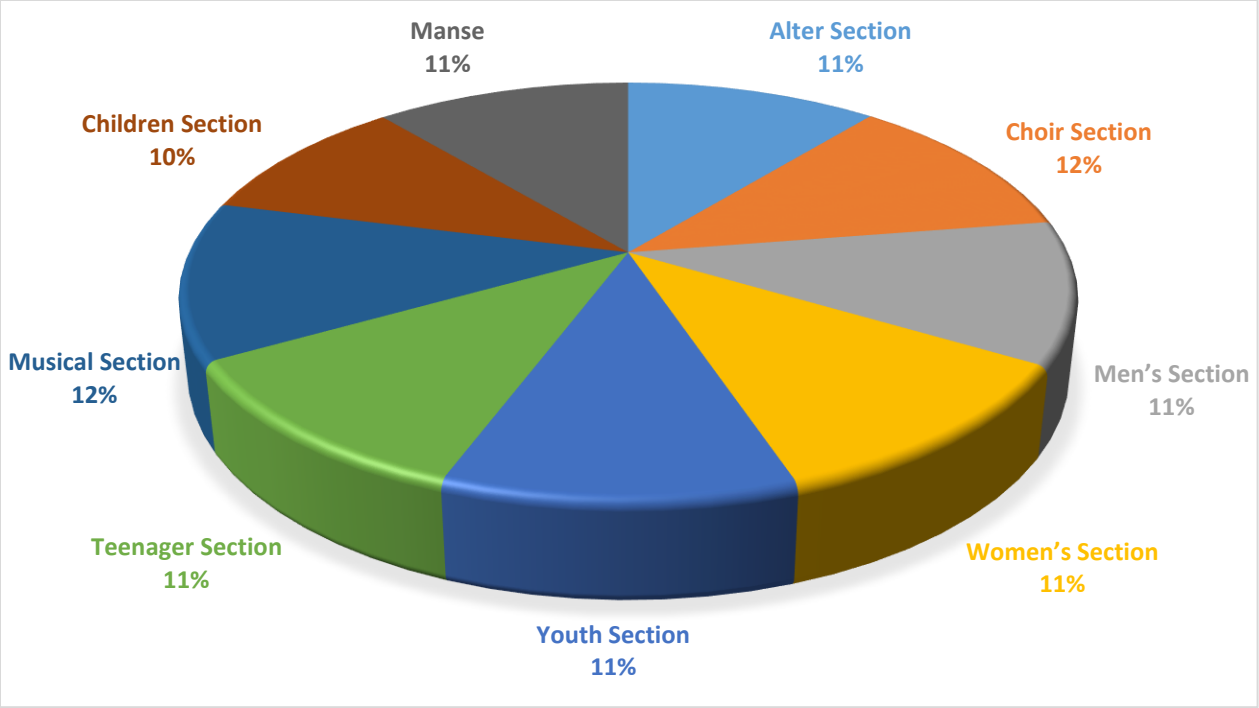


Figure 5: Percentage of Noise Level during Preaching

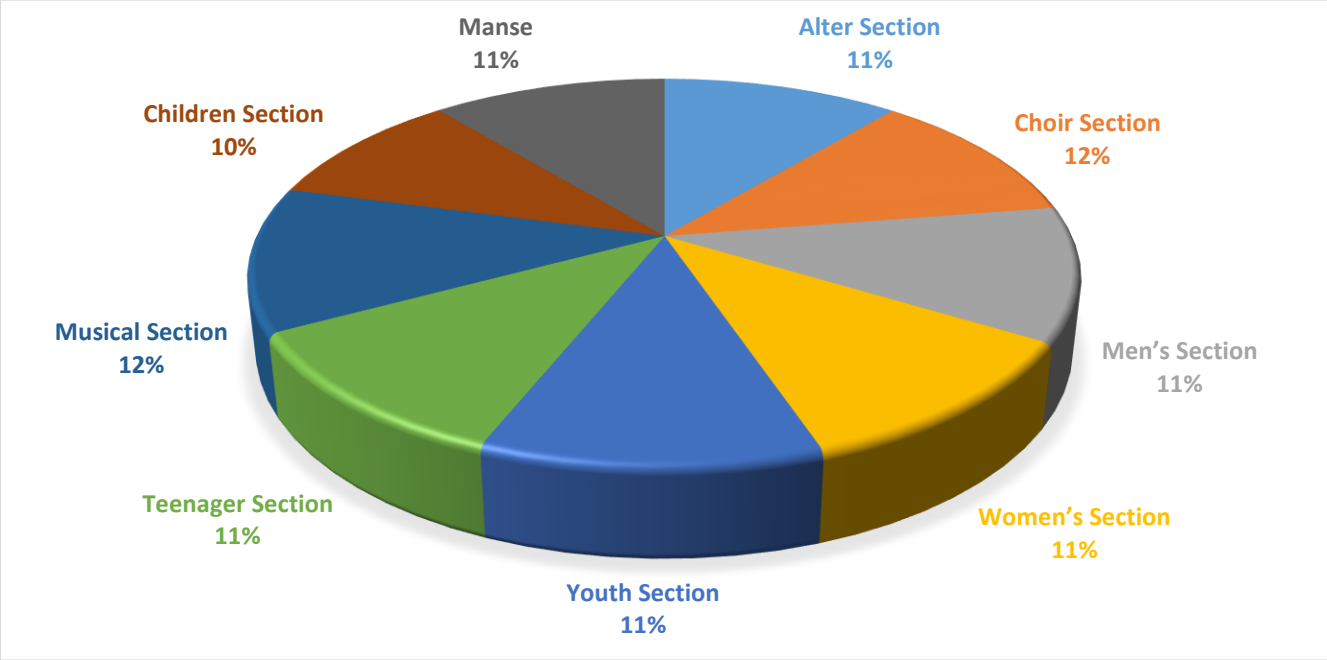


Figure 6: Percentage of Noise Level during Praises

Discussion

The noise pollution level during Sunday service of the selected orthodox church are presented on table 1 and Fig. 1-4 shows the comparison of the noise pollution level with recommended standard for residential area as stipulated by [12]. The obtained noise Pollution level during the church praise and worship varies from 80.8-100.9 dBA, 96.4 -105.8 dBA with a mean of 92.34 dBA and 98.97 dBA for minimum and maximum noise level respectively. The obtained noise level is within the reported noise level by [10]. The obtained noise Pollution level during church offering varies from 89.0 – 99.9 dBA, 91.9-103.23 dBA with main of 92.9 and 99.9 dBA for minimum and maximum respectively. The obtained result is within the range reported by [14]. The results revealed that greater noise pollution level was recorded at the choir and musical section during praise and offering time of the church which implied that the choir members and musical section member are exposed to higher noise level during the church services. The noise pollution level obtained during church praises and offering are higher than the stipulated standard value of 55.0 dBA for residential as stipulated by [15].

The obtained noise Pollution level during Bible reading varies from 70.9 -90.5 dBA, 79.9 - 99.8 dBA with mean of 80.59 dBA, and 88.82 dBA respectively. The obtained mean value for minimum and maximum noise pollution level during church bible reading are within the reported work of the musical institute [11] and higher than the stipulated standard noise pollution level of 55 dBA for residential areas [12]. The noise pollution level during preaching time varies from 70.0-94.1 dBA, 80.9-102.8 dBA with mean of 85.14 dBA and 93.97 dBA for minimum and maximum noise level respectively and it is within the range reported by [16]. The result shows that higher noise level was obtained with the choir and musical section of this church with an average value of 95.15 dBA, 88.55 and 98.45 dBA and 98.0 dBA for musical and choir section during bible and preaching time respectively.

The percentage of noise pollution level of the selected sections of the church are presented in Figure 5 and 6. Greater percentage (12%) of the noise Pollution level was obtained within the musical section and

choir section during praises and offering time and during bible reading and preaching time respectively while the 10% of the noise pollution level was obtained within the children section of the church during praise, offering and bible reading and preaching time of the church. This lower percentage of Noise pollution level within children section of the church might be due to the distance from church generating noise sources during the service while the higher percentage recorded within the musical and choir sections of the church might be due to the closeness of these section to the noise generating sources of the church. The over exposure of church members to noise pollution during the Sunday service may lead to some health-related ailments such as anger, depression, weakness in concentration and hearing defects.

CONCLUSION:

The Noise measurement of selected orthodox church in Khana Local Government Area of Rivers State has been carried out using noise meter. Fifteen (15) selected members seating position during church services was measured in order to ascertain the noise pollution level on member during service. The obtained result indicates that members are exposed to higher noise pollution level within the range of 80.8 -105.9 dBA, 89.0-104.3 dBA during Sunday services. The obtained results are higher than the stipulated standard value of 55 dBA as recommended by [13] and [15] for residential areas. The results also revealed that members of the selected church sections are exposed to greater noise pollution level during Sunday service. The results show that church members are exposed to greater noise pollution during the Sunday services and members who may worship in the church for the rest of their lives might be at risk of induced hearing impairment at old age.

Hence there should be provision of noise absorbing structure within the church in order to reduce the noise pollution level in the church. Furthermore, church members should apply ear protection aid during Sunday service in order to reduce the health of noise pollution on members during Sunday services.

REFERENCES

1. Babisch W . c (2002) The noise/stress concept, risk assessment and research needs. Noise Health 4:
2. Clark C and Stanfeld SA (2007). The effect of transportation noise on health and cognitive development: a review of recent evidence. *Int. J. Comp. Psychol.* 20: 145-158.
3. Eriksson C, Nilsson, ME, Willers SM, Gidhagen L, Bellander T and Pershagen G (2012). Traffic noise and cardiovascular health in Sweden: The roadside study. Noise Health 14(59): 140-147.
4. WHO (2005). Adverse Health Effects of Noise. Guideline for Community Noise, Geneva, Switzerland: WHO Report on Pollution Effects and Control 21: 28-37
5. Nwabuogo OE and Stephen AO. (2017). Assessment of Environmental Effects of Noise Pollution in Auchi, Nigeria. Appl. Sci. Rep. 18(3):100-104.
6. Godson REA, Derek GS, Brown GE and Sridhar MKC (2009). Assessment of noise and associated health impacts at selected secondary schools in Ibadan.
7. Oloruntoba EO, Ademola RA, Sridhar MKC, Agbola S A, Omokhodion F O, Ana GRE and Alabi RT (2012). Urban environmental noise pollution and perceived health effects in Ibadan, Nigeria. Afr. J. Biomed. Res. 15: 77-84.
8. Baloye D.O and Palamuleni L. G. A. (2015). Comparative Land Use-Based Analysis of Noise Pollution Levels in Selected Urban Centers of Nigeria. Int. J. Environ. Res. Public Health, 12(10).
9. Basner M, Babisch W, Davis A, Brink M, Clark C, Janssen S and Stansfeld S (2014). Auditory and no-auditory effects of noise on health. *Lancet* 383: 1325-1332.
10. Impact of Local Government Corruption and Mismanagement on Primary Education and Primary Health care in Rivers State. Human Right Watch. Retrieved 17/7/2007. .
11. Francis Olawale Abulude, Samuel Dare Fagbayide, Akinyinka Akinnusotu (2018). Assessments of Noise Levels from Noise Sources in Akure, Nigeria: A Preliminary Study. Iraqi Journal of Science, 2018, Vol. 59, No.4C, pp: 2195-2210 DOI:10.24996/ijs.2018.59.4C.6

12. Environmental protection Act. (EPA.) (2013). "Noise pollution". Environmental protection agency. -10-28. City of Portland, Oregon. Audito, Retrieved 2013.

13. National Environmental Standard and Regulation Enforcement Agency (NESREA) (2009). National Environmental Noise Standards and Control Regulations Federal Republic of Nigeria official Gazzele 96(67):5 FGP104/102009/1,000(OL60) Federal Government printer.

14. Faroqiz Zhabir, zeeshan M., Neeshan N, Murtaza G, Hussain M.M and Ghan M.U (2020). Vehicular Noise Pollution. Its environmental implications and strategic control in Autonomous vehicle and smart traffic Intec open.

15 WHO 2009 Night Noise Guidelines for Europe World Health Organization Regional Office for Europe, Copenhagen.

16. Silva L.F and Cabral R. (2011). Noise exposure in Protestant Church. International Journal of occupational Safety Ergon.2011.17(1);79-86