

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

ABSTRACT

The Evaluation of noise pollution level of selected Orthodox Church in Khana Local Government Area of Rivers State, has been carried out using sound level meter (S/N 18017328) with range of 30-130 dBA. with the aim of evaluating the noise pollution level of the church during Sunday service and its effects on members. Fifteen (15) strategic sections of the church was considered for the measurement of noise pollution level during Sunday service. The obtained average value of the noise pollution level of selected sampling points within the church during the Sunday service is 95.6 dBA, 96.5 dBA, 84.7 dBA and 89.6 dBA for Praise time, offering time, Bible reading time and Preaching time respectively. The obtained mean value is all higher than the stipulated standard of 55.0 dBA for residential area as recommended by NESREA. Higher percentage of the noise pollution level was obtained with the Choir and Musical sections of the church. These higher noise percentages within these two sections of the church might be due to it closeness to the noise generating sources within the church while the least percentage was obtained at the children section of the church. This high noise pollution level within the church during service hours' could be due to the positioning of the noise generating sources. Over exposure of Church members to noise pollution during the church service might lead to hearing impairment or hearing lost and other related health effects. Therefore, the church should be protected with noise absorbing equipment, for conducive Sunday service and also to reduced other related health risk on members.

KEYWORDS: Noise level, Church, Section, Health Risk and Ear.

1. Introduction

Environmental noise pollution 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, with a noticeable menace to the environment and it comes with its related health effects which includes, sleep disturbance, hearing deficiency, nervousness, psychological stress, unhappiness, irritabilit and unnecessary annoyance [3].

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

Greater causes of the environmental noise includes growing global population, increase in human activities through the daily utilization 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. Vehicular traffic noise Pollution are also a major source of noise pollution within the environment, which can lead to human upset or lack of concentration within the environment or academic environment and it is a noticeable menace to student's health or student's environment [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 20.0×10^3 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 80.0 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's ear to noise pollution level greater than the recommended stipulated 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].

2. 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 lies between $4^{\circ}67^0$ North latitude $7^{\circ}36^{\circ}$ 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.

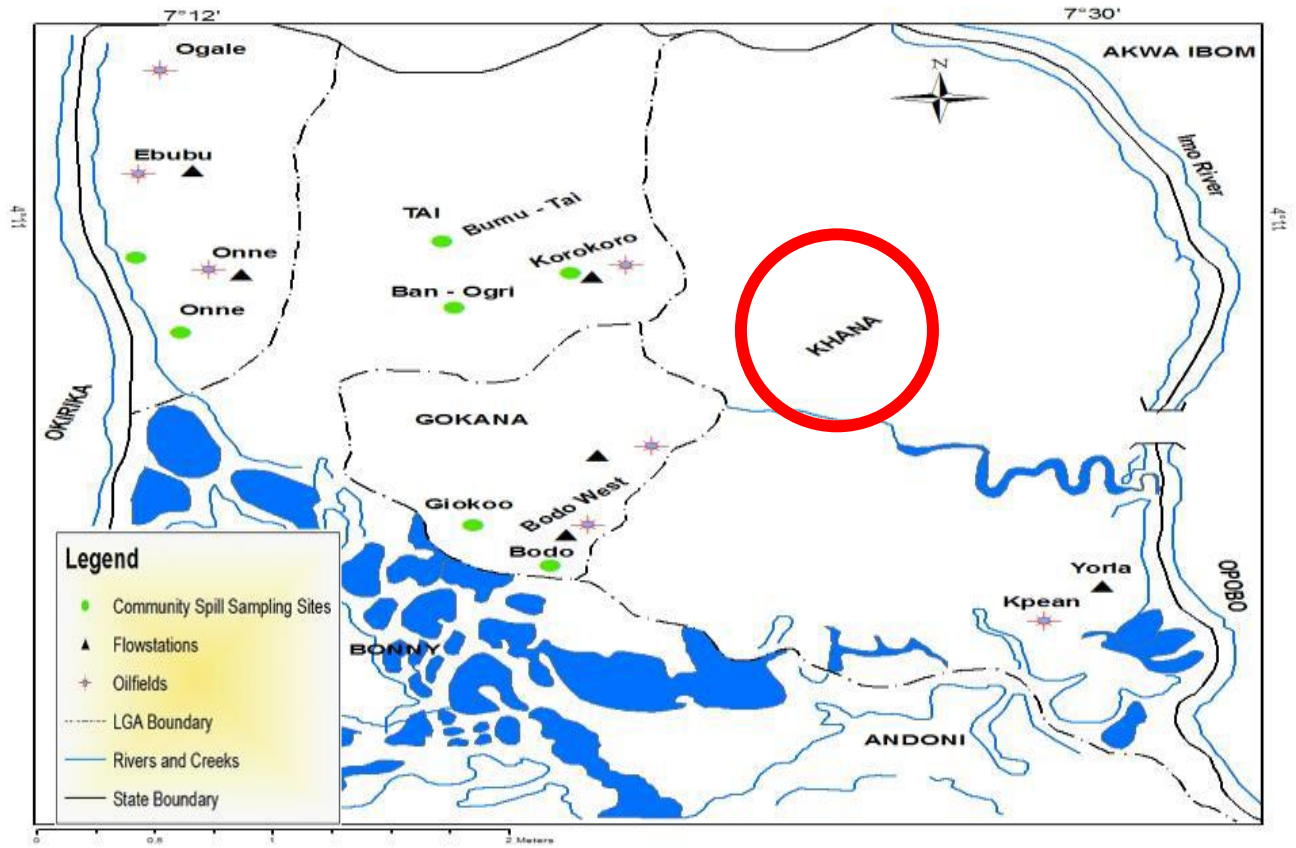


Fig:1. Map of the Study Area [10]

3. 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 meter decibel (dBA) and the noise meter was switched off after taking each reading for accurate measurement.

Noise pollution level measurement of the selected orthodox church was carried out within 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, its 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.

4. Results and Discussion

Table 1: Noise Level during Church Praises and Offering Time

S/n	Sampling Points	Church Praises Time			Church offering Time		
		(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(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
	NESREA [12]	55.0	55.0	55.0	55.0	55.0	55.0

Table 2: Noise Level during Church Bible Reading and Preaching Time

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	84.70	85.14	93.97	89.557
	NESREA [12]	55.0	55.0	55.0	55.0	55.0	55.0

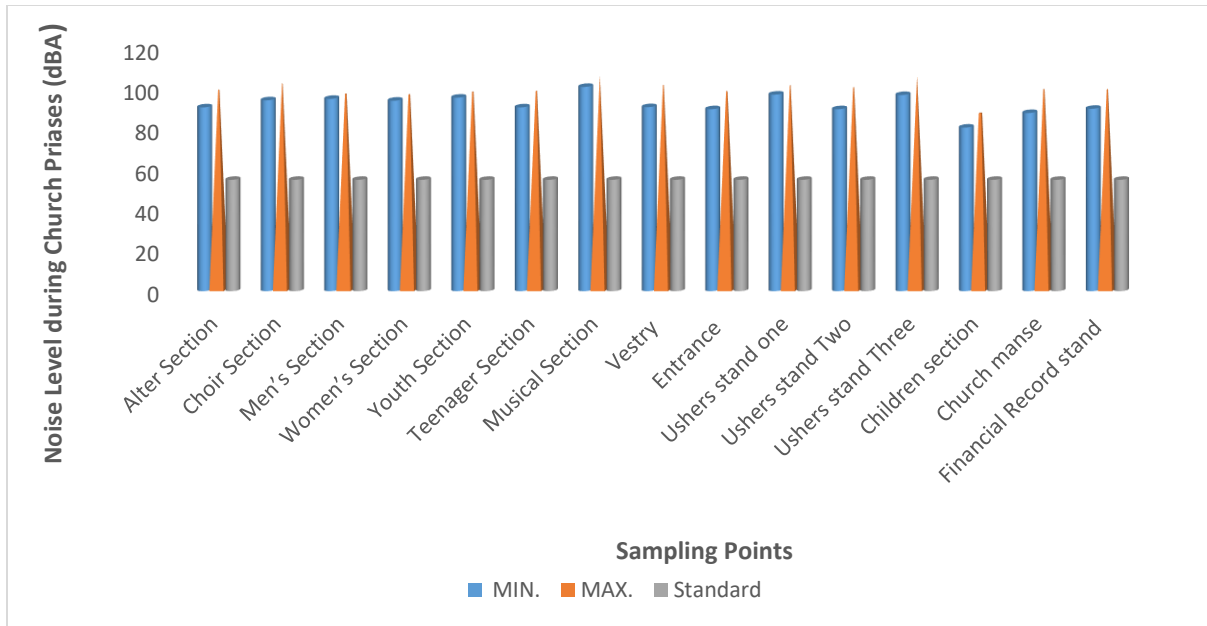


Figure2: Noise Level during praise and worship

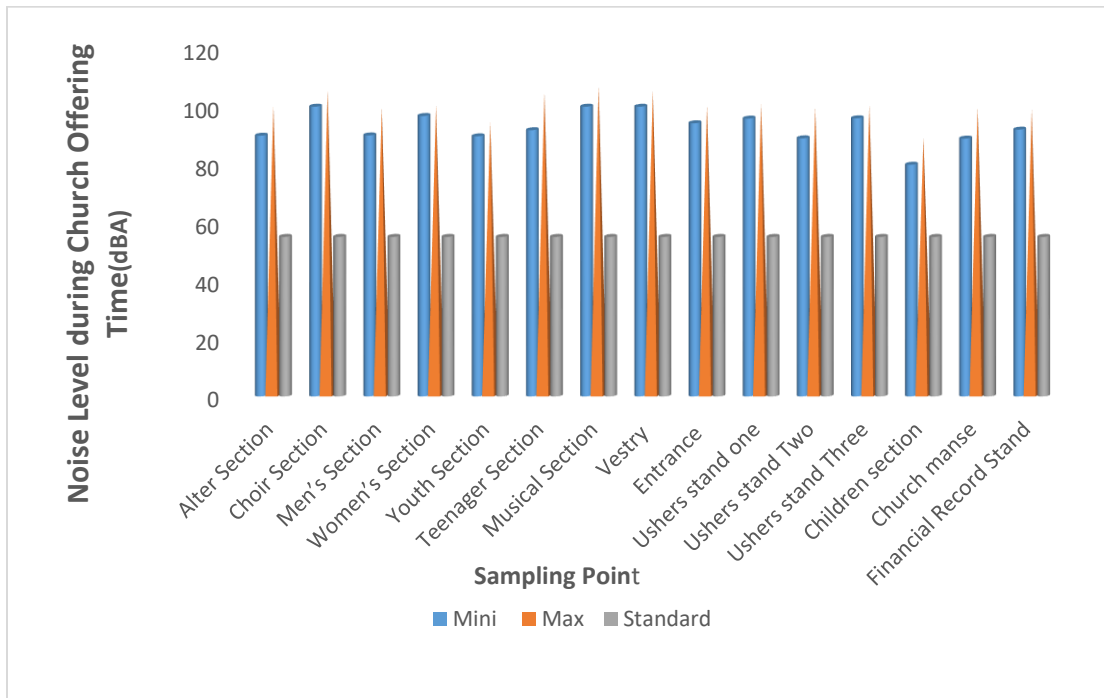


Figure 3: Noise Level during Offering Time

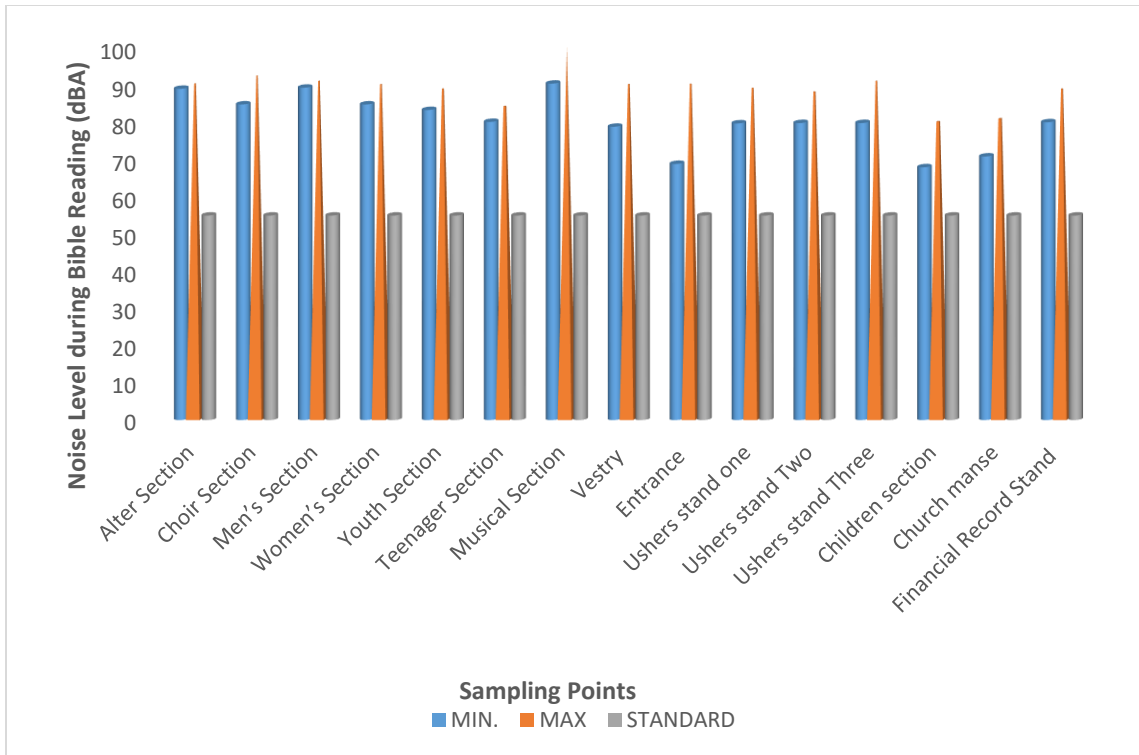


Figure 4: Noise Level during Bible Reading

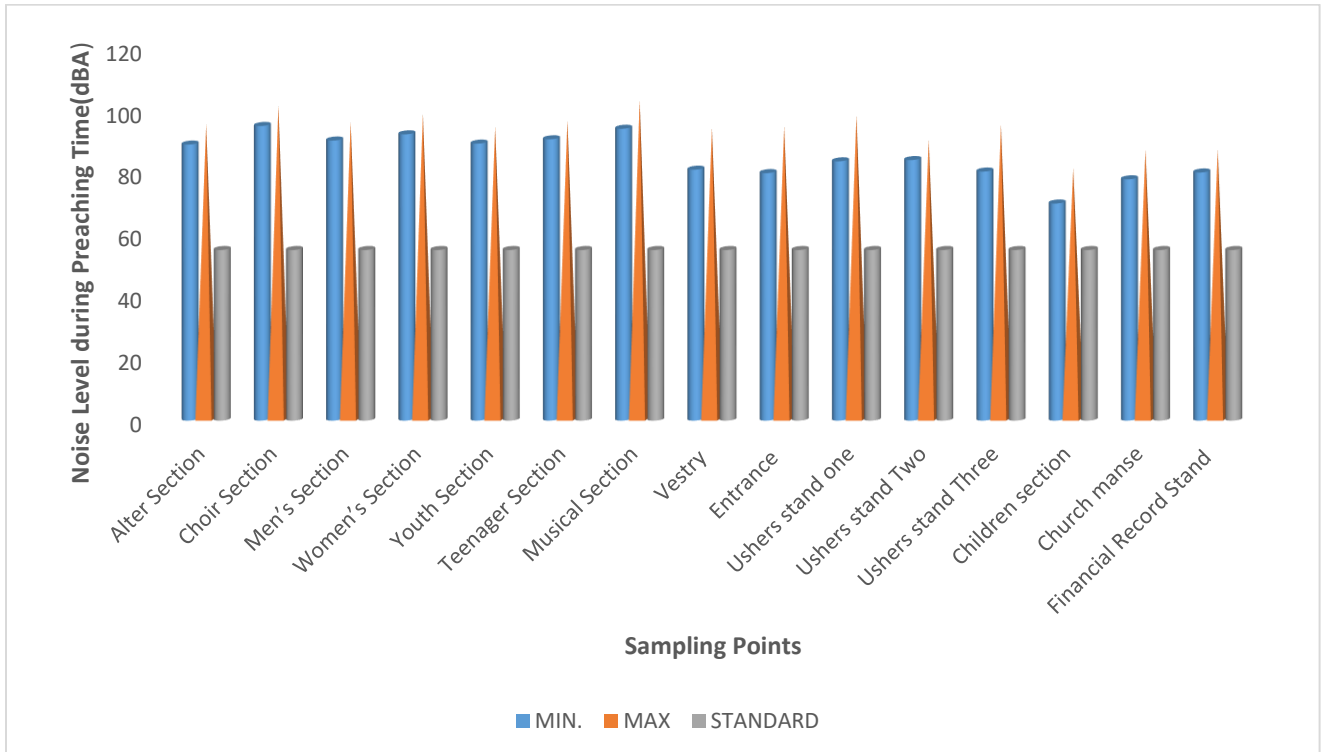


Figure 5: Noise Level during Preaching Time

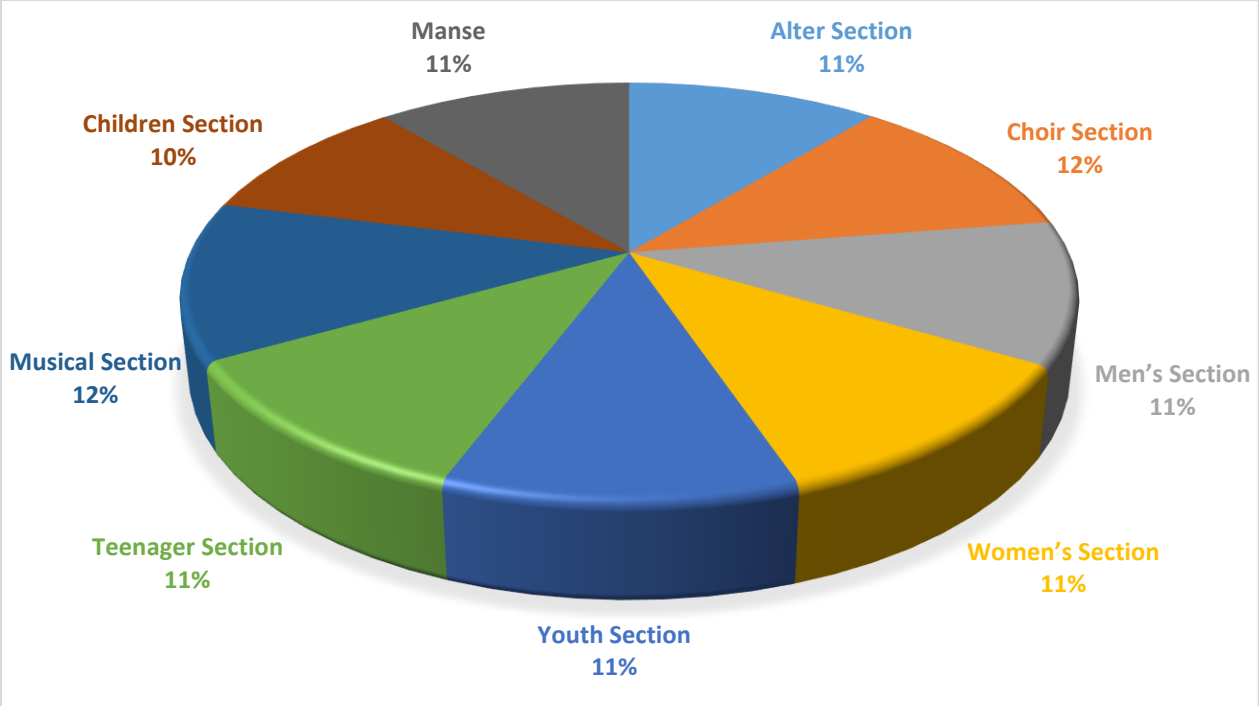


Figure 6: Percentage of Noise Level during Preaching

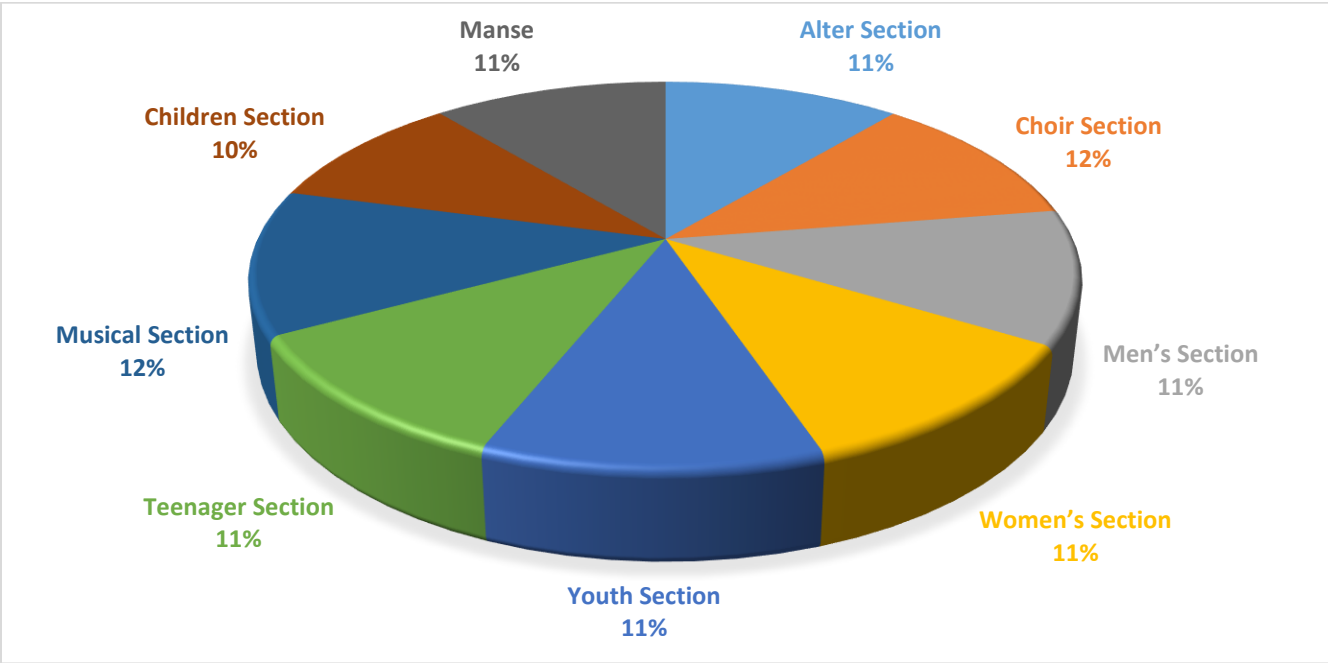


Figure 7: Percentage of Noise Level during Praises

The noise pollution level during Sunday service of the selected orthodox church are presented in Table 1-2 and Fig. 2-5 shows the comparison of the noise pollution level selected church sampling points with the recommended standard value for residential area as stipulated by [12]. The obtained noise Pollution level during the C hurch praise and worship of the church service varies from 80.8-100.9 dBA, 96.4 - 105.8 dBA with mean of 92.34 dBA and 98.97 dBA for minimum and maximum noise level respectively. The obtained noise pollution level during praise and worship of the church service level is within the reported noise level obtained 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 sections during praise and offering time of the church service which implied that the choir members and member within the musical section of the church are exposed to higher noise level during the Sunday service. The obtained noise pollution level during church praises and offering time are higher than the standard value of 55.0 dBA for residential area as stipulated by [15]. The noise Pollution level during Bible reading varies from 70.9 - 90.5 dBA, 79.9 - 99.8 dBA with a 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's within the range reported by [16]. The result shows that higher noise level is obtained with the Choir and Musical sections of the church with a mean of 95.15 dBA, 88.55 dBA, 98.45 dBA and 98.0 dBA during the Church Bible reading and Preaching time respectively.

The percentage of noise pollution level of the selected sections of the church are presented in Figure 6 and Figure 7. Greater percentage of the noise Pollution level was obtained within the musical section and choir sections during Church praises, offering time, during bible reading and the preaching time of the church respectively, while the least percentage of the noise pollution level was obtained within the children section of the church during praises time, offering time, 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 its distance from the main church and its noise generating sources while the higher noise percentage recorded within the musical and choir sections of the church might be due to the closeness of these sections 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 etc.

5. CONCLUSION

The Noise level measurement of the selected Orthodox Church in Khana Local Government Area of Rivers State has been carried out using noise meter. 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 for during Sunday services for minimum and maximum respectively. The obtained noise pollution mean value is higher than the stipulated standard value of 55 dBA as recommended for residential areas [13]. The results also revealed that members of the church are exposed to greater noise pollution level during the Sunday service. Hence, there should be provision of noise absorbing structure within the church in order to reduce the noise pollution level within the church. Furthermore, Church members should apply ear

protection aid during Sunday service in order to reduce the noise pollution on members during Sunday services.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that No generative AI Technologies such as Large Language Models and text-to-image generator have been used during writing or editing of this manuscript.

Competing interests

The authors declare that they have no competing interests.

Author's Contributions

All the authors contributed and are involved in the designing of the experiments, and data collection.

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