

Noise Levels from Selected Religious Centres and Perceived Non-Auditory Health Effects Experienced by Residents in Owo Town, Ondo State, Nigeria

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Abstract

In recent times urban noise pollution has grown in magnitude and scope causing palpable effects on public life. Whereas studies have shown the pattern of noise pollution from traffic and industrial sources, little is known about noise from religious settings. We determined the noise levels and then assessed its non-auditory effects on residents. Twelve religious centers: Islamic worship centres (IWC) and Christian worship centres (CWC) were purposively selected based on potential noise generation capacities. Noise level measurements from the religious centers were taken at three times of the day (5-8am, 11am-2pm and 5-8pm) using AEMC sound meter for 8 consecutive weeks. Values obtained were compared with WHO guidelines limit. Information on perceived non-auditory health problems was obtained with an interviewer semi-structured questionnaire from consenting residents. Data were analyzed using descriptive statistics, ANOVA and T-test at 5% level of significance. The highest mean noise level 83.6 ± 7.5 dB was recorded between 5-8am at IWC. Mean noise levels (69.1 ± 9.2 dB) at the 12 religious centers were above WHO guideline limits for noise exposure (55dB) in residential environments. Most of the participants (42.8%) had sleep disturbance and 28.1% were highly annoyed as a result of religious noise. Other non-auditory health problems were loss of concentration (17.5%), speech interference (12.8%) and aggressiveness (12.5%). Residents living contiguous to religious houses are highly vulnerable to non-auditory health effects due to their exposure to excessive noise. Health education to the religious bodies on the adverse effects of excessive noise in the residential environment is advocated.

Introduction

Noise pollution is defined as a form of air pollution that is an audible unwanted sound that

poses a threat to a person's health and well-being (Goines and Hagler, 2007). Religious noise occurs when this unwanted environmental

sound signal is from religious activities. Unwanted is on the premise that what is pleasant to some ears may be extremely unpleasant to others, depending on a number of psychosocial factors. Noise may not seem as harmful as the contamination of air or water, but it is a pollution problem that affects human health and can contribute to a general deterioration of environmental quality. Exposure to noise constitutes a health risk. There is sufficient scientific evidence that continuous exposure to noise above standard limits can induce auditory and non auditory effects. Auditory effects include hearing impairment and tinnitus (Berglund and Lindvall, 1995), while non auditory effects includes annoyance reactions (Guski *et al.*, 1999), sleep disturbance, interference with spoken communication, cardiovascular disturbance, cognitive effect or impaired task performance and disturbance in mental health (Evans *et al.*, 1993; Babisch *et al.*, 2002; Stansfield *et al.*, 2003; Ising *et al.*, 2004; Babisch *et al.*, 2005).

For other effects such as changes in the Immune system and birth defects, the evidence is limited. A high priority study subject is the effects of noise on children, including cognitive effects and their reversibility. Noise exposure is on the increase, especially in the general living environment, both in industrialized nations and in developing world regions. This implies that in the twenty-first century noise exposure will still be a major public health problem (Willy and Wim, 2000). Religion is very sacred and central to the existence of most Nigerians irrespective of social class or status. The edifices of churches on our streets and neighborhood bear testament to this fact (Izere Imosemi, 2012). The blaring prayers that emanate from the public address systems in these religious centers along with the ecstatic religious activities pose an environmental problem. Sleep disturbance, and decreased school performance.

Non-auditory health effects such as sleep disturbance and annoyance are the most common effects described by most residents living in close proximity to religious houses and their complaints are often very strong (Mrmayor,

2006; Temitayo, 2012). The disturbances usually occur whenever they have services, as they place their loudspeakers outside and the noise that emits from them disturbs residents. More annoying is when they hold vigils and they increase the volume of the loudspeakers, thereby denying residents their sleep. (Daily independence, 2011).

A report published by Stockholm University for the World Health Organization in 1995 has concluded that noise levels outside dwellings should not exceed 55dB (A) to protect the majority of people from being seriously annoyed, and that 50dB(A) should be considered the maximum desirable (Berglund and Lindvall, 1995; WHO 2001). The population in Nigeria has been on the steady rise since independence. With the rising population is increased urbanization and associated proliferation of worship centers, some of which are located in the heart of dense residential areas. The poor location, coupled with the unfriendly manners of siting external public address systems and the noise generated constitute a rising source of environmental pollution. Emanated from movement against the noise pollution has not been effective as most people do not consider such kind of noise as pollution but a part of routine and socio-religious life (Vibha and Bhopal, 2004). Findings revealed that many religious houses were not aware of the noise level stipulated by law and some of those who were aware had no way to determine if they were operating within the approved decibel (Kunle Falayi, 2012).

Community annoyance may bring the attention of some religious adherents to the perception of residents in their neighbourhood to the noise emanating from their religious activities and this may form the basis for dialogue with heads of religious bodies on internal policies within the organisation on noise control, ahead of any government policy. This study aims at identifying the adverse effects of persistent religious noise exposure as a basis for a mass enlightenment campaign to curtail the rising religious noise, using Owo town in Owo Local Government as a case study.

Materials and Methods

Study Area

Twelve religious locations (Islamic worship centres and Christian worship centres) were purposively selected based on potential noise generation capacity in Owo town, Owo local govt. Area. Owo is a town in Nigeria, located in Ondo State with Latitude $7^{\circ} 11' 55''$ N and Longitude $5^{\circ} 35' 46''$ E. The population is between 100,000 and 250,000.

Study Design

This study was carried out using a descriptive cross sectional survey that involves noise level measurements, on-site observation and questionnaire administration among residents in the selected locations. Residents who live in close proximity within 100m, 200m and above 200m from the religious centres constitute the focus of the study.

Study Population

The study population includes 381 randomly selected residents living within predetermined distances (100m, 200m and above 200m) from the selected religious centres, above 12 years of age in Owo town, who have given informed consent to participate in the study. Sampling locations are shown in Table 1.

Materials and Tool

The study methods were grouped into two namely; Survey method (Structured Questionnaire and on-site observations) and Environmental field sampling (Noise level assessment). Noise level measurements from the religious centers were taken within the distances at three specific times of the day (5-8am, 11am-2pm and 5-8pm) three days weekly using Advanced Environmental Monitoring and Control (AEMC) sound meter for 8 consecutive weeks. Values obtained were compared with WHO guidelines for noise exposure in the residential environments. Information on perceived non-auditory health problems experienced by residents was obtained with an interviewer administered semi-structured questionnaire.

Statistical Analysis

Data were entered into Microsoft Excel and then analyzed using the Statistical Package for Social Sciences (SPSS) version 16. Frequency distribution tables and other descriptive statistics were used to summarize study data in both tabular and graphical format. Data were also analyzed at 5% level of significance.

Results and Discussion

Tables 2, 3 and 4 above shows the mean noise levels at the specified distances (100m, 200m and above 200m) across locations at different periods respectively. The tables reveal that there was a significant difference between noise levels taken at various distances and time of measurement ($p < 0.05$). Table 2 shows that the highest mean noise level 83.6 ± 7.5 dB was recorded between 5-8am at Islamic worship centres while 76.9 ± 13.1 dB was recorded between 5-8pm at Christian worship centres. Figures 1, 2, and 3 above shows the comparison of mean noise level within 100m with World Health Organization (WHO) guideline limit for all the 12 locations in the morning (5a.m - 8 am), Afternoon (11am - 2 pm) and Evening (5pm - 8 pm) respectively. Figure 1, 2, and 3 reveals that mean noise levels at the 12 religious centres were above WHO guideline limits for noise exposure (55dB) in residential environment (Berglund and Lindvall, 1995; WHO 2001).

The noise readings within the 100m distance from the worship centre within the duration of 5-8am revealed that the noise reading within this period is significantly different compared to noise reading within the duration of 11-2pm and 5-8pm of the same distance (p -value < 0.05). Noise readings within 200m and above 200m are comparable and there is a significant reduction in noise levels above 200m away from the religious centers. Conclusively, the highest noise exposure is in those within 100m of the religious centers. Many of the respondents reported having experienced sleep disturbance as a result of religious noise once a week (11.8%), once or twice a week (26.5%), three or more times a

Table 1: Description of Sampling Locations

S/N	Sampling area	Sampling code	Description
1	Iselu Mosque	L1	Masjidu-R-Raham, Iloro-layout, Iselu, Owo.
2	LFG Church, Iselu	L2	Living Foundation Gospel Church, Iselu
3	Afusi Mosque	L3	Safwatullah Mosque, Afusi street
4	C&S Church	L4	Cerebrum and Seraphim church, Okedogbon
5	Okedogbon Mosque	L5	Okedogbon
6	CAC Oke Irorun	L6	Christ Apostolic Church, Okedogbon
7	Aderonmu Mosque	L7	Aderonmu Street
8	Sotg Church,	L8	Spirit of the Gospel Church, Aderonmu Street
9	Community Mosque	L9	Arailepo Street
10	CAC	L10	Christ Apostolic Church, Oke Imole
11	Arailepo Mosque	L11	Arailepo Street
12	JLHC Egberin	L12	Jesus is Lord Holy ghost Chapel, Egberin Street

Table 2: Mean noise level within 100m across locations at different periods

Locations	5a.m -8 a. m	11a.m -2 p. m	5p.m - 8 p.m	P- value
L1	81.1740±11.26031	76.8208±2.87081	65.7250±10.65516	<0.05
L2	63.0708±6.53888	72.8542±2.81823	76.9750±13.07534	
L3	66.9333±8.30352	74.5000±2.53555	63.7750±7.35073	
L4	63.8917±8.95724	74.3708±2.56700	67.4083±9.24295	
L5	66.1667±11.73237	78.1458±2.85139	64.3292±8.86701	
L6	65.7333±10.65281	70.3750±2.83489	66.3917±8.65468	
L7	70.7500±7.40012	73.6500±2.60879	63.6708±9.72288	
L8	56.8708±7.97706	70.7167±2.71088	65.8750±13.36274	
L9	76.0625±10.34437	75.8250±2.82158	67.6042±11.67031	
L10	65.6083±5.33218	73.3958±2.82069	70.4125±9.23977	
L11	83.6167±7.45541	78.0458±2.22820	70.1667±13.42262	
L12	72.2167±9.29893	75.3496±2.36361	75.0208±13.75977	

Table 3: Mean noise level within 200m across locations at different periods.

Locations	5a.m -8 a. m	11a.m -2 p. m	5p.m - 8 p. m	P- value
L1	64.4583±3.14531	68.1208±6.61217	66.0750±4.76119	<0.05
L2	64.6375±5.24404	67.3667±8.51764	67.3292±4.97887	
L3	61.2583±6.93820	67.3292±6.10876	64.6708±4.54643	
L4	60.7292±4.85624	66.2750±7.34553	63.6833±5.43664	
L5	57.9417±5.90460	66.1250±6.39451	66.2208±7.81787	
L6	55.4250±4.99724	66.2958±9.94775	65.2583±5.87640	
L7	58.3000±6.12997	61.1417±9.85905	58.7833±5.94852	
L8	64.8417±6.42244	61.3083±7.85460	62.5875±6.24203	
L9	67.6042±5.50975	64.7542±11.24946	62.4917±7.16404	
L10	62.9458±5.82406	65.0125±7.29427	64.0792±5.86774	
L11	65.0167±5.20760	69.8583±6.29036	67.5875±6.38662	
L12	63.0792±6.11696	71.0583±8.51106	67.8833±5.38716	

Table 4: Mean Noise Level above 200m Across Locations at Different Periods

Locations	5a.m -8 a. m	11a.m -2 p. m	5p.m - 8 p. m	P- value
L1	58.6583±3.51802	65.6542±5.19322	63.9000±3.58475	<0.05
L2	57.2083±3.27267	64.2500±4.47942	64.4208±3.44371	
L3	60.4583±4.73065	65.6000±6.83749	63.4167±5.23406	
L4	59.2792±4.83025	65.4292±8.82632	64.1875±4.43007	
L5	58.0417±5.05732	64.6500±9.72576	61.5875±6.01363	
L6	56.3167±5.25205	63.2000±8.09557	60.9250±5.26244	
L7	62.3958±4.64491	66.2042±7.38114	65.3208±7.51103	
L8	60.9917±4.03624	65.1542±6.32758	64.3667±5.35006	
L9	65.4458±7.51022	65.5042±8.39055	63.3958±6.71018	
L10	63.2667±5.60129	64.6208±6.76301	65.3333±7.93291	
L11	64.9208±3.83678	64.6125±5.50133	66.9417±6.61066	
L12	64.4667±6.00823	65.7583±5.72963	68.7375±5.67027	

Source: Author's Field Survey, May, 2013.

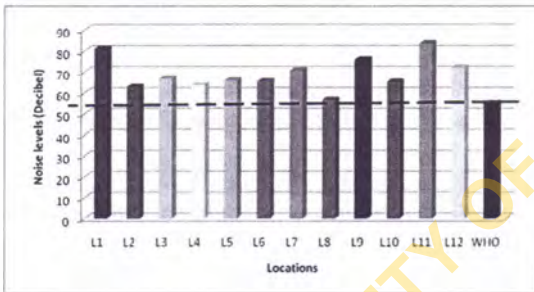


Figure 1: Comparison of mean noise level within 100m (5a.m.-8a.m.)

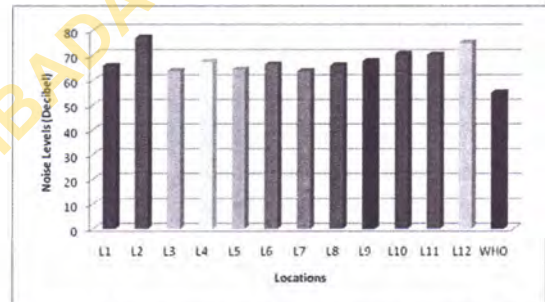


Figure 3: Comparison of mean noise level within 100m (5pm - 8 pm).

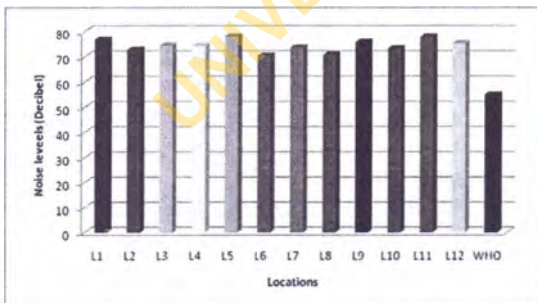


Figure 2: Comparison of mean noise level within 100m (11a.m - 2 pm).

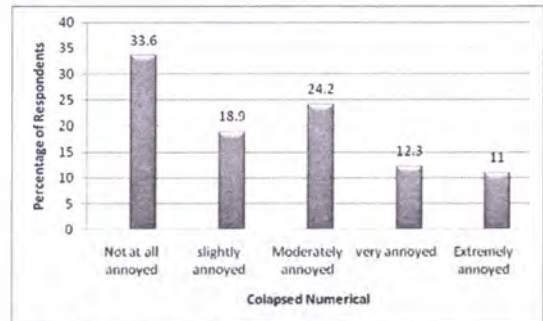


Figure 4: Annoyance level chart

week (42.8%). Figure 4 shows the percentage of respondents that were annoyed by religious noise. The results from the numerical scale using the ISO/TS 15666 recommended questions for assessing community annoyance were collapsed according to the following

breakpoints 0+1= not at all annoyed (33.6%), 2+3=slightly annoyed (18.9%), 4+5+6= moderately annoyed (24.2%), 7+8=very annoyed (12.3%), 9+10= extremely annoyed (11%). The mean noise levels recorded are all consistent with serious annoyance (noise level

>55dB) as showed by a published report by Stockholm university for WHO in 1995.

Other non-auditory health problems experienced were loss of concentration (17.5%), speech interference (12.8%) and aggressiveness (12.5%).

Conclusion

Noise levels from religious houses in Owo town exceeded the WHO guideline limits for noise in residential environments and non-auditory health effects were found among most of the respondents living contiguous to the religious houses.

Considering the adverse effect of noise pollution on human health and environment, it is of significant to address the issue of religious noise in Nigeria. This study recommends that religious bodies in residential environment be informed on acceptable noise levels for residential areas. Public awareness campaign should be carried out through the mass media to sensitize people on the hazards of noise and encourage religious leaders to promote piety without noise pollution.

Religious houses in residential areas should be encouraged to engage the use of sound proofing of walls, ceilings and doors to contain excessive noise while state and local government should enact town planning laws that separate residential areas from religious houses.

References

- Babisch W (2002) The noise/stress concept, risk assessment and research needs. *Noise and Health*, 4:(16) 1-14.
- Babisch W, Beule B, Schust M (2005) Traffic noise and risk of myocardial infarction. *Epidemiology*;

16:33-40.

- Berglund B, Lindvall T (1995) Community Noise. Archives of the Center for Sensory Research, 2 (1): 1-195. Retrieved on 18th July, 2008 from www.who.int/peh/.
- Daily independence (2011, may 17) Nigeria: Noise pollution and religious bodies. Retrieved from <http://www.allafrica.com>
- Evans GW, Lepore SJ (1993) Nonauditory effects of noise on children. *Children's Environment*, 10: 31-51.
- Temitayo Famutimi (2012, September 13) Church members, man fight over noise pollution. The punch.
- Guski R, Schuemer R, Felscher-Suhr U (1999) The concept of noise annoyance: how international experts see it. *Journal of Sound Vibration*. 223: 516-527.
- Goines L, Hagler L (2007) Noise Pollution: A Modern Plague. *Southern Medical Journal*, 100(3):287-293.
- Ising H, Kruppa B (2004). Health effects caused by noise: evidence from the literature from the past 25 years. *Noise Health*, 6:5-13.
- Izere Imosemi, (2012, September 17) Religion and the Nigeria Society. The punch.
- Kunle Falayi, (2012, February 1) Noise pollution: Religious leaders deny knowledge of approved decibel. The Punch.
- Mrmayor M. (2006, December 15) Nigerian Churches And Noise Pollution - Religion - Nairaland. Retrieved from <http://www.thetidenews.com/article>
- Stansfeld SA, Matheson MP (2003) Noise pollution: non-auditory effects on health. 68:243-257.
- Vibha S, Bhopal (2004). Noise pollution vis-à-vis religion-<http://www.goforthelaw.com/articles>.
- Willy Passchier-Vermeer, Wim FP (2000) Noise Exposure and Public Health, *Environ Health Perspect*. 108(1):123-131.
- World Health Organization (WHO) (2001) Occupational and Community Noise: A fact sheet. Retrieved 21st September, 2009 from <https://apps.who.int/inf-fs/en/fact258.html>.