

# ENVIRONMENTAL NOISE IMPACT ASSESSMENT IN NSIT ATAI LOCAL GOVERNMENT AREA OF AKWA IBOM STATE, NIGERIA

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**Abstract:** Environmental noise produces many negative impacts to people exposed to it. As a result of the strong biased factor in the sensitivity of noise, physical measurements of noise give only fractional representation of the real problem. Public opinion is one of the most reliable indices of the problem. Therefore, this paper presents the environmental noise impact assessment in Nsit Atai Local Government Area of Akwa Ibom State, Nigeria. Physical measurements of noise levels were made around people's homes and offices by using the sound level meter (SLM), model WensnWS1361. The selected locations were market (MT), airport area (AA), roads/streets (R/S), churches (CH), road junctions/parks (J/P), workshops (WS) and schools (SH). The data obtained were compared with WHO standard levels. Based on the results of physical measurement, some major locations in the area were chosen as interview centres. Sources of noise like aircrafts, tricycles/motor cycles, cars, churches, children, animals, workshops/factories, lorries, compact disk sellers, traders and ships/engine boats, power generator and night clubs were presented to the interviewees. Here, the interviewees were asked to tick the sources of noise they were exposed to and to indicate how the noise sources affect them. The data obtained were analysed using Percentage Analysis Method. The results of the physical measurements show that all the selected locations had noise levels above the tolerant levels, while the results of the social survey reveal that there are many sources of noise in the area, The results of the noise bothers survey reveal that noise of aircrafts bothered only 42% of the respondents, while 60% were exposed to it. This Local Government Area forms part of the Akwa Ibom international airport area where an average noise level of 92.43 dBA was recorded. The result may be due to the fact that the airport is located a far distance from the residential areas. The people in Nsit Atai are exposed to the noise of lorries most. Here, lorry noise was heard by 77% of the respondents while 54% were bothered by it.

**Keywords-** Aircrafts, environmental noise, impact assessment, Nsit Atai Local Government Area.

## I. INTRODUCTION

Noise demeans the value of our environment and is known to produce various negative effects both on structures and on humans. Noise has escalated to the point where it is currently the most important peril to the superiority of our existence. Noise was identified as a hindrance by the Environmental Protection Agency (EPA) of the United States of America since in the 1970s (Menkiti and Ekott, 2014). The agency continues to carry out its findings in order to bring up to date its results. This indicates that the study of noise is a continuous phenomenon. This increase in noise can be attributed to the ever increasing number of people in the globe and the growing levels of economic affluence (Menkiti, 2001).

Noise in this context is defined as unpleasant sound (Schmidt, 2005). However, noise can be described as the unwanted sound in the unwanted location at the unwanted occasion. The degree of "unwantedness" is usually a psychological issue since the effects of noise can range from temperate irritation to everlasting hearing loss, and may be rated in a different way by special observers (Ekott, *et al.*, 2018). Noise does affect the inhabitants, humans and fauna in the natural environment. Some definite places influence noise contacts; so it is invasive that it became difficult to run away from it. The social surveys almost always rank noise in the list of the most bothersome residential irritations. General noise sources are industry, neighbourhoods and traffic. The industrial noise is one of the most annoying sources of noise complaints (Ekott, 2011).

Elevated residential noise levels of adequate exposure time can result in various health problems such as short-term or permanent hearing damage, annoyance and stress, among others. This is generally related to those working in industrial plants or operating machinery but can also take place at discotheques or near to aircraft on the ground if the duration is long enough. However, measurable hearing loss from many industrial sounds involves daily exposure for a number of years. On the other hand, community noise intrusions like traffic noise can obstruct speech communication, interfere with sleep and relaxation and disturb the capacity to perform difficult tasks (Kiely, 1998).

The British Columbia Work's Compensation Board has set 85 dB as its highest tolerant level in the work place. Above this limit hearing protection should be used. It states that the threshold of pain is attained at 120 dB and it classifies 140 dB as excessive hazard level. WHO safety noise levels are similar while EPA of Nigeria tends to have even a stricter standard of 70 dB as a maximum safe level of noise in work place. They gave the safe level around home to be 50 – 55 dB (Ekott and Menkiti, 2015). Researchers have shown that constant noise above 55 dBA causes serious annoyance and above 50 dBA moderate annoyance at home (WHO, 2007). In a non-work place and for health and safety purposes, 55 dBA is set as a safety noise level for outside and 45 dBA inside. Hospital and school permissible levels of noise are 35 dBA (WHO, 1999) Noise beyond harmless levels leads to numerous health impacts which include high blood pressure, annoyance, sleep loss, stress, hearing impairment, loss of productivity and the ability to concentrate, among others (Ekott, 2018).

A study indicates that children exposed to noise during classes experienced problem with various cognitive developmental delays in addition to words discrimination. Specifically, the writing learning mutilation called dysgraphic is usually related to stress on environment during classes (Clark, Head and Stansfeld, 2013 and Stansfeld *et al.*, 2005). Studies show that excessive noise can cause hearing impairment, that certain levels and types of noise can cause heart attack, that body tissue resonances can be adversely affected by noise and that noise generally causes discomfort and annoyance to people exposed to it (E. E. C, 1978). In addition, the consequence of elevated levels of noise on small children has been found to be related to physical health damage (Goran, 2008). A study by Obisung *et al.* (2016) shows that sleep interference by noise causes great annoyance to many people. A study by Halperin (2014) shows that sleep is an important modulator of cardiovascular function. Intermittent or impulsive noises are particularly disturbing. Because of differences between locations and people, it is not easy to establish the level of noise which will not cause sleep interference (WHO, 2009 and Kiely, 1998). When work does not involve spoken communication it is taxing to determine the impacts of levels of noise on performance. High noise levels may reduce the accuracy of the work being undertaken rather than the quantity. Steady noises appear to have little effect on work performance unless the A-weighted noise level exceeds about 90 dB (Davis and Cornwell, 1991). However, irregular noises, such as bangs or clicks, may interfere with performance at lower noise levels. Consequently, it is desirable to remove such features from the background noise.

Researches on the noise impacts on children in the classroom show strong association between speech intelligibility and problems with absence of self-confidence, fatigue, irritation, uncertainty and concentration, among others (Clark *et al.*, 2013, Shield and Dockrell, 2003 and Stansfeld *et al.*, 2005). Noise has been connected to vital cardiovascular health risks. In 1999, the WHO drew a conclusion that the existing evidence shown predicted a weak relationship between hypertension and long term exposure to noise beyond 67 – 70 dBA (Ising, *et al.*, 1999). More current studies have recommended that noise levels of 50 dB(A) at night may also increase the risks of myocardial infarction by constantly enhancing production of cortisol (Essiett *et al.*, 2010). Fairly characteristic road levels of noise are adequate to reduce arterial blood flow and cause elevated blood pressures; in this situation it seems that a specific part of the populace is more vulnerable to vasoconstriction. This may occur because the noises bother leads to high adrenaline intensity to activate vasoconstriction (a reduction of the blood vessels) or separately through reactions from medical stress. Additional impacts of elevated levels of sound are high rate of vertigo fatigue, stomach ulcer and headaches.

Studies proposed that when pregnant women are exposed to 76.5 dBA noise of airplane, a little decline in birth weight takes place (Essiett *et al.*, 2010). Also, noise has adverse effects on children's cognition and health (Klatte, Bergstrom and Lachmann, 2013; Seabi, 2013; Clark *et al.*, 2012). Table 1 shows noise exposure limits for industrial worker in Nigeria. Children in boisterous vicinities find noise annoying and report a reduced value of life (Stansfeld *et al.*, 2005). The analysis (Menkiti, 2001) was carried out in six cities in Nigeria. The cities included Lagos, Ibadan, Port Harcourt, Enugu, Kaduna and Calabar and it was concluded that the major source of noise that bothers people most is the traffic. Hence, the study of noise is essential in order to create more awareness on the impacts of noise on the environment for the betterment of our society. In this research, the environmental noise impact assessment in Nsit Atai Local Government Area of Akwa Ibom State, Nigeria shall be carried out.

Table 1: Noise exposure limits for industrial worker in Nigeria

Exposure time (h/day)	Permissible exposure limits in dB
0.25 or less	115
0.5	110
1	105
1.5	102
2	100
3	97
4	95
6	92
8	90

Source: FEPA (1991)

## II. Materials and Methods

Physical measurements of noise levels were made around people's homes and offices by using the sound level meter (SLM), model WensnWS1361. The selected locations were market (MT), airport area (AA), roads/streets (R/S), churches (CH), road junctions/parks (J/P), workshops (WS) and schools (SH). The data obtained were compared with WHO standard levels. Based on the results of the physical measurements, some major locations in the Local Government Area were chosen as interview centres. A series of interviews of different sectors of the population of Nsit Atai Local Government Area was conducted. The idea was to have an insight into what types of sources people identify as noise and how they are bothered by these. A research questionnaire was developed for the interview. This section addressed the impact of noise on environment. Some major locations in the Local Government Areas were chosen as interview centres.. Different sources of noise included in the questionnaire were aircrafts (S<sub>1</sub>), animals (S<sub>2</sub>), cars (S<sub>3</sub>), churches (S<sub>4</sub>), children (S<sub>5</sub>), compact disk sellers (S<sub>6</sub>), lorries (S<sub>7</sub>), traders (S<sub>8</sub>), tricycles/motor cycles (S<sub>9</sub>), night clubs (S<sub>10</sub>), power generator (S<sub>11</sub>), ships/engine boats (S<sub>12</sub>) and workshops/factories (S<sub>13</sub>). Here, the interviewees were asked to tick the sources of noise they were exposed to and to indicate how the noise sources affect them. Finally, the Percentage Analysis Method was adopted for clarity.

## III. Results and Discussion

### 3.1 Physical measurements

The results of noise level measurements in Nsit Atai Local Government Area are presented on Table 2 and Figure 1. The results show that airport area had an average noise level of 92.43 dBA. Using the US Department of labour standard (Table 1), workers are advised not to be exposed to these levels of noise beyond 6 – 8 hours per day. Churches generated an average noise level of 80.18 dBA. Markets in the area produced an annoying average sound level of 70.93 dBA. The respective annoying average sound levels of roads/streets and road junctions/parks were 72.35 dBA and 75.68 dBA. These values are above the WHO tolerant level of 55 dBA for outdoor living areas. Hence, these values with exposure time base of 16 and 24 hours can cause annoyance and hearing impairment respectively. Schools had an average noise level of 60.01 dBA instead of the WHO tolerant level of 35 dBA. These can have adverse effects on speech intelligibility, information extraction and message communication during classes (WHO, 1999). Workshops average noise values were 81.79 dBA. In this case, the workers should be advised to wear ear protectors and the workshops should not be sited around the residential areas. The results of the finding agree with the results of many previous findings (Ekott and Menkiti, 2015; Essiett *et al.*, 2010). Copies of the questionnaire were distributed in these areas.

Table 2: Average noise levels of selected locations in Nsit Atai Local Government Area (2017)

Location	Average noise level (dBA)
MT	70.93
CH	80.18
AA	92.43
R/S	72.35
J/P	75.68
SH	60.01
WS	81.79

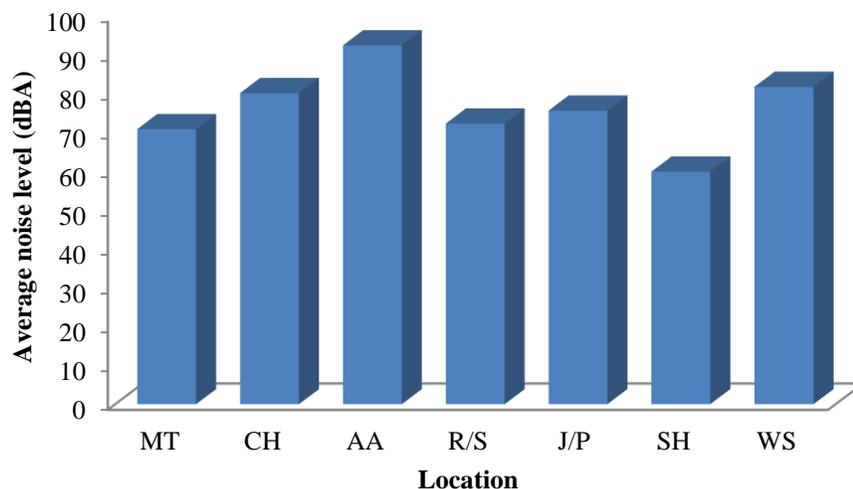


Figure 1: Average noise levels of selected locations in Nsit Atai Local Government Area (2017)

3.2 Social survey

In Nsit Atai, noise of aircrafts bothered only 42% of the respondents, while 60% were exposed to it (Table 3 and Figure 2). This Local Government Area forms part of the Akwa Ibom international airport area. The result may be due to the fact that the airport is located a far distance from the residential areas. This result agrees with the result of a research conducted by Menkiti (2001a) in Port Harcourt. Animal noise was heard by 41%, but only 13% were bothered by it. It is shown that noise of cars bothered the people most. Car noise is the second in the list of sources that the people are exposed to. In this case, car noise bothered 55% of the 75% exposed to it. Churches take the fourth position in both the lists of noise heard and noise bothered by the people in Nsit Atai. Noise of churches bothered 52% of the 65% exposed to it. Children noise was heard by 55% of the respondents and 40% were bothered by it. Compact disk seller noise bothered only 17% of the 53% exposed to it.

The people in Nsit Atai are exposed to the noise of lorries most. Here, lorry noise was heard by 77% of the respondents while 54% were bothered by it. Trader noise bothered 41% of the 57% exposed to it. Tricycle/motor cycle noise was heard by 65% of the respondents and 53% were bothered by the noise source. Tricycles/motor cycles are third in the list of noise sources that bothered the people in the area. It is shown that night club noise did not bother 18 % of the 40% exposed to it. Power generator noise bothered 52% of the 62% that heard the noise. Noise of ships/engine boats bothered 2% of the 3% exposed to it. Whereas 70% of the respondents heard the noise of workshops/factories, only 54% were bothered by it. In Nsit Atai generally, traffic noise bothered the people most, followed by workshop/factory noise.

Table 3: Noise bothers survey in Nsit Atai Local Government Area (2017)

Noise Source	%	
	Heard	Bothered
S <sub>1</sub>	60	42
S <sub>2</sub>	41	13
S <sub>3</sub>	75	55
S <sub>4</sub>	65	52
S <sub>5</sub>	55	40
S <sub>6</sub>	53	17
S <sub>7</sub>	77	54
S <sub>8</sub>	57	41
S <sub>9</sub>	65	53
S <sub>10</sub>	40	22
S <sub>11</sub>	62	52
S <sub>12</sub>	3	2
S <sub>13</sub>	70	54

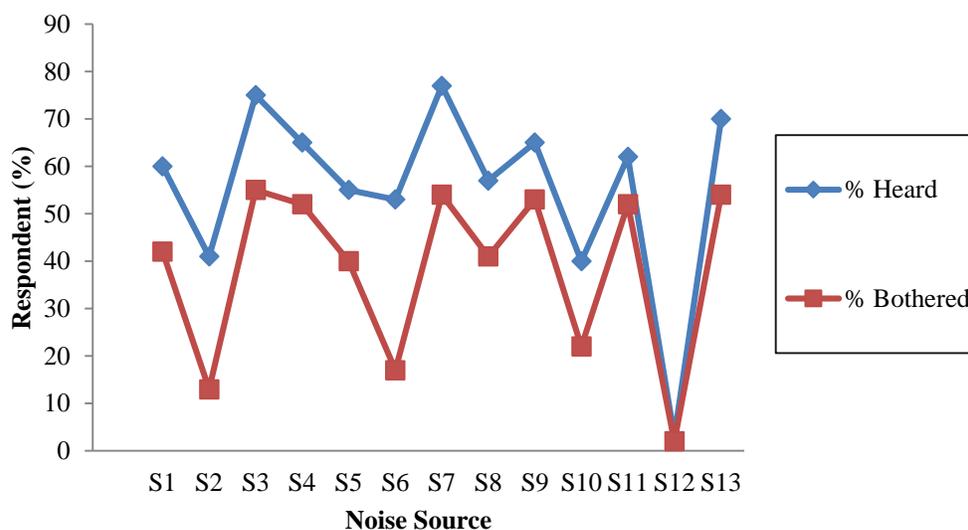


Figure 2: Noise bothers survey in Nsit Atai Local Government Area

## V. Conclusion

From the assessment, noise has negative impacts in the Area. The results of the physical measurements show that all the selected locations had noise levels above the tolerant levels, while the results of the social survey reveal that there are many sources of noise in the area.

## VI. Acknowledgement

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