

## **NOISE LEVELS AT MAJOR MARKETS IN ABA, NIGERIA AND ITS EFFECTS ON HUMANS.**

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**ABSTRACT:** *The study determined the prevailing noise levels at major markets in Aba, Abia State Nigeria and its impact on individuals and traders during the month of May, 2017. The designs of the study were field studies and descriptive social surveys through measurement of the noise levels at radial distances in the markets using mini sound level meter (NEDA model) and administration of questionnaires. The results showed that noise levels values at open shade apartments were higher than lock-up shops and exceeded the threshold of OSHA and WHO regulation 1910.95 measurement for hearing conservation (HC) and noise control (NC) or permissible exposure level (PEL), and requires the use of hearing protection instrument by market operators. The result further revealed that Ariaria International Market had the highest noise limit (90.0dBmin, and 92.3dBmax respectively) which exceed the limit of OSHA and WHO regulation indicating high noise pollution level in the studied area. Major effects on the individuals includes annoyance, speech interference and hearing loss. Generally, individuals and traders within the markets complained of high noise levels and are at high risk of excess noise exposure particularly those in the open shades in the market. Proper regulation should be put in place by both state and local government environmental protection agencies to reduce noise pollution in the markets and improve the health of the market operators.*

**KEYWORDS:** *Noise, Ariaria, Measurement, Markets, Levels, Aba, Questionnaire*

### **I. INTRODUCTION**

Noise pollution is considered as one of the key problems of urban communities such as Aba that has numerous industrial and human activities that affect the urban environment and may result in a great deal of costs on the society [1]. Noise pollution or noise disturbance is the disturbing or excessive noise that may harm the activity or balance of human or animal life. The source of most outdoor noise worldwide is mainly caused by machines and transportation systems, motor vehicles engines, aircraft, and trains [2]. Outdoor noise is summarized by the word environmental noise [3]. Poor urban planning may give rise to noise pollution, since side-by-side industrial and residential buildings can result in noise pollution in the residential areas [4]. Outdoor noise can be caused by machines, construction activities, and music performances, especially in some workplaces. Noise-induced

hearing loss can be caused by outside (e.g. trains) or inside (e.g. music) noise. High noise levels can contribute to cardiovascular effects in humans and an increased incidence of coronary artery disease [5]. Unwanted sound (noise) can damage psychological health. Sound becomes unwanted when it either interferes with normal activities such as sleeping, conversation, or disrupts or diminishes one's quality of life [6]. Noise pollution can cause hypertension, high stress levels, tinnitus, hearing loss, sleep disturbances, and other harmful effects [7]. High noise levels can result in cardiovascular effects and exposure to moderately high levels during a single eight-hour period causes a statistical rise in blood pressure of five to ten points and an increase in stress [5], and vasoconstriction leading to the increased blood pressure noted above, as well as to increased incidence of coronary artery disease [8]. Road traffic, jet planes, garbage trucks, construction equipment, manufacturing processes and lawn mowers are some of the sources of the unwanted

sounds that are routinely transmitted into the air [9]. All these problems are direct consequence of rapid growth of population, self centred human mentality, fast life style, number of instruments in daily life, excessive exploitation of natural resources, rapid rate of urbanization and industrialization [10]. In the present scenario, noise, is becoming an increasingly source of discomfort and danger in the vicinity of the society. The noise generally consists of three inter-related elements – the source, receiver and transmission path [11].

In Aba markets, noise levels increase with increasing density of traffic and communication between sellers of goods and services related with the human population and traffic composition, the road, slope width and surface structure distance to cross road [12]. The urban environmental quality of developing countries and cities like Aba has been deteriorated by an unlimited increase of vehicles, infrastructures population and buying and selling in the market places and adding a new threat to the health and environment of inhabitants of the city of Aba, [13].

The permissible noise tolerance levels are displayed in (Table 2)

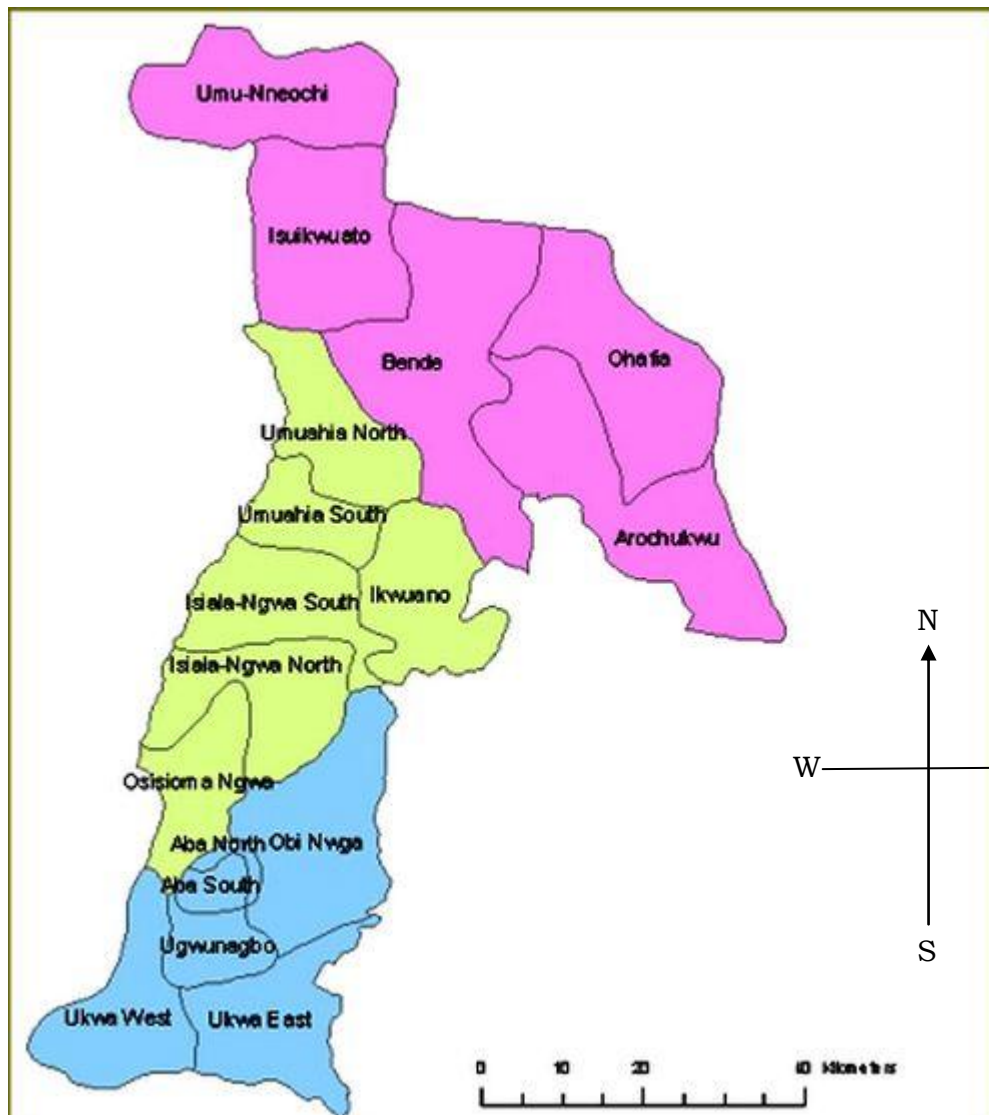
**Noise Levels of Representative Sounds**

REPRESENTATIVE SOUND	DECIBELS	CHARACTERISTICS
Threshold of hearing	0	Audible
Normal breathing	10	Audible
Leaves rustling in the breeze	20	Very quiet
Whispering	30	Very quiet
Library	40	Quite
Quiet restaurant	50	Quite
Conversation	60	Moderately loud
Vacuum cleaner	70	Moderately loud
Food blender	80	Very loud
Heavy traffic	90	Very loud
Train	100	Uncomfortably loud
Machine gun at close range	120	Uncomfortably loud
Jet plane engine at take off	150	Painful

**SOURCE:[22]**

## **II. STUDY AREA**

This study of quantitative assessment of noise pollution was conducted in five major markets in Aba. Abia created in 27th August 1991 which is part of the Niger Delta region and a state in the South Eastern part of Nigeria. The capital is Umuahia and the major commercial city is Aba, formerly a British colonial government outpost in the region. In terms of vegetation, it is low lying tropical rain forest with some oil palm brush. The rest of the state is moderately plain and wooded Savannah. The most important rivers in Abia State are the Imo and Aba Rivers which flow into the Atlantic Ocean through Akwa Ibom to Rivers State. The State lies within latitude  $5^{\circ}25'N$  and  $5^{\circ}41'N$  and Longitude  $7^{\circ}30'E$  and  $7^{\circ}51'E$ . The map of Abia State showing Aba is depicted below in fig 1. Aba is said to be the 'Japan of Africa', there is hardly any fashion accessory that this part of the world is not able to replicate. Are you thinking that your most expensive limited edition shoe that you bought from Paris cannot be seen with anyone in Nigeria? . Aba is a major commercial city in Nigeria that has big markets where you can buy different things at an affordable rate. There are five major markets that you can visit in Aba (Table 1).



**FIG, 1THE MAP OF ABIA STATE SHOWING ABA**

**Table 1: The five Major Markets in Aba**

S/N	NAMES OF MAJOR MARKETS MONITORED IN ABA.
1.	Ariaria International Market
2.	Aba Shopping Centre (Ekeoha Market)
3.	Cemetery Market (Eziukwu Market)
4.	New Market (Ahia Ohuru Market)
5.	(Alaoji)Asannentu Motor Spareparts Market

### **Ariaria International Market**

The **Ariaria International Market** is an open-air market located in Aba, a city in Abia State SouthEastern Nigeria[14]. with coordinates  $5^{\circ}7'5''N$   $7^{\circ}19'57''W$ Coordinates  $5^{\circ}7'5''N$   $7^{\circ}19'57''W$  The market is one of the largest markets in West Africa and nicknamed "China of Africa" because of its versatility in the making of wears and leather works[15].

Ariaria International Market was established in 1976 following a fire outbreak that destroyed the old Ekeoha Market in Aba. The market was originally sited in a swampy area. The market is known for its shoe making and leather works thus making it one of the largest leather shoe-making markets in West Africa with an estimated

two million traders[16].The market cuts across three local government areas, the Aba North, Aba South and Osisioma[17]. The market is divided into many segments according to products or market items. Things are very affordable in this market. It is a crowded market where activities can only be brought to a halt by 6pm daily.



**Figure 2: Araria international market**

#### **New (Ahiaohuu) Market**

The New Market may not be as large as Ariaria international Market but it is a respected market in the eastern part of the country. Food stuffs are very affordable here(Fig.3). It is here that the second grade cloth business booms. It is a market that has different items for a shopper.

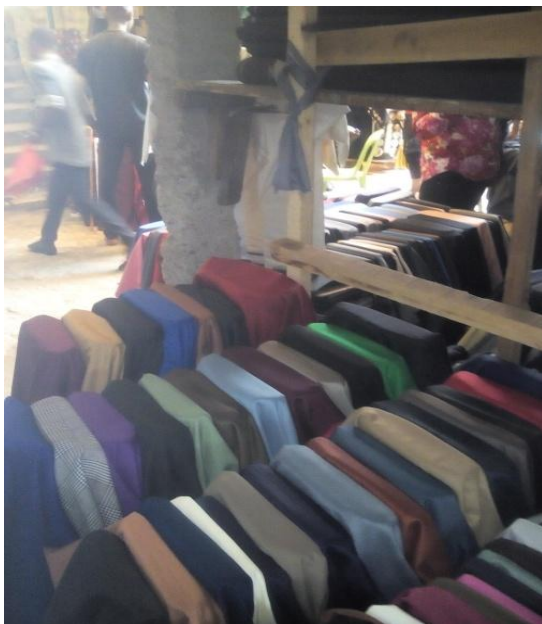




**Fig. 3: Showing fairly used cloths and food stuff at New (Ahiaohuu) Market**

#### **Ekeoha(Shopping) Market**

Ekeoha Market is also called 'Shopping Center.' This is clothing market and it is one of the biggest clothing markets in the Nigeria including Africa. Shopping Center is where you are going to buy any type of fabric. There is no textile industry that is not a friend to this market because of the hundreds of millions naira it turns out monthly.



**Fig. 4: showing Fabric and Textile Materials at Shopping (Ekeoha) Market**

#### **Cemetery Market**

You may end up getting lost in this market where you are going to see a lot of distributors, dealers and importers of different products ranging from tin items, food items, deodorants, wine and lots more. You are going to get things affordable here too.





**Fig.5: Showing Household goods at Cemetery (Eziukwu) Market**

#### **Alaoji (Asannetu) Spare Parts Market**

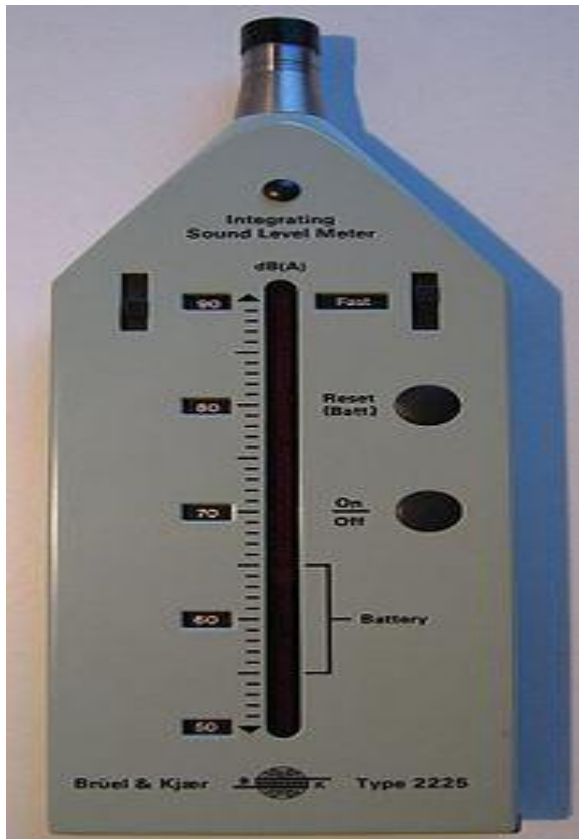
This is the vehicle owners market because you can buy your spare parts here. If you are not able to get your car fixed here, then you should be heading to Lagos to get that vehicle parts. It is located at the outskirts of the town



**Fig.6: Showing Motor Spare parts at Alaoji(Asannetu) Market**

### III. METHODOLOGY

The methodology involved field measurements of noise levels at various locations in the markets using calibrated sound level meter to measure noise levels by taking readings 3 meters high above the ground in accordance with NSW (2000) noise measurement procedure. The measuring range is 40 – 130dBA, accuracy is  $\pm 1.5\text{dB}$ ; resolution is 0.1dB, the frequency range is 31.5Hz – 4KHz and digital display is 3 digits. The unit of sound intensity measurement is described in decibel (dB) and each decibel rise depicts ten-fold increase in sound intensity. Noise is defined as, "the unwanted, unpleasant or disagreeable sound that causes discomfort to all living beings". Sound intensity is measured in decibels (dB), that is the tenth part of the longest unit Bel. One dB is the faintest sound that a human ear can hear. The noise meter is calibrated to assure that their within calibration tolerance. Loudness of sound corresponds to the degree of the sensation depending on the intensity of sound and sensitivity of ear [18].



**Fig.7:** A sound level meter, a basic tool in measuring sound

Six (6) sets of reading were taken at each location (making up 30sets of readings). Based on these, the noise level were determined individually for each monitoring location.

The exercise was carried out in compliance with statutory requirements. Results were compared with noise standards and control regulations. – 2009. S.I No. 35, WHO standard and OSHA Occupational Noise Regulations – 1910.95. A total of 50 questionnaires were also administered to elicit information from the traders in both lock up stores and open shades on the effects of noise on them through stratified random sampling techniques. The simple arithmetic methods and percentage were used to analyze data and presentation of the results.

### IV. RESULTS



**Table 2: Measured Noise Levels(dB) at Lock-Up & Open Shades in 5 Major Markets Aba, Abia State.**

S/N	NAME OF MARKET	Minimum NOISE LEVEL (dB)	Maximum NOISE LEVEL IN (dB)	WHO and OSHA Noise Regulation – 1910.95
1	ARIARIA MARKET			
	Location 1	71.8	82.8	82.8
	Location 2	68.2	73.0	92.3
	Location 3	77.1	92.3	88.3
	Location 4	90.0	88.3	
	Location 5	65.7	69.9	
	Location 6	63.9	70.4	
2	SHOPPING CENTRE (EKE OHA) MARKET			
		77.8	84.9	84.9
		61.4	75.4	86.1
		69.5	70.3	84.0
		67.0	86.1	
		78.2	84.0	
		57.3		
3.	CEMETERY (EZIUKWU)			
		67.1	72.9	80.0
		65.0	68.8	89.8
		73.0	77.3	
		77.2	80.0	
		72.3	78.2	
		53.7	89.8	
4.	NEWMARKET (AHIAOHURU)			
		70.5	72.1	
		73.2	89.7	
		55.9	73.8	
		79.5	80.2	
		73.2	72.8	
		51.5	71.1	
5.	ASANNENTU(ALAOJI) MOTOR SPAREPARTS			
		73.8	Nil	
		62.5		
		66.5		
		71.8		
		67.5		
		55.5		

### RESULT OF QUESTIONNIRE ADMINISTRATION

A total of 50 questionnaires administered to the traders (respondents) were all returned, and the data analyzed(Table 3).

**TABLE 3: NUMBER OF ADMINISTERD QUESTIONNAIRES**

S/N	NAME OF MARKETS	NUMBER DISTRIBUTED	NUMBER RETURNED	%OF NUMBER RETURNED
1.	ARIARIA	10	10	20
2.	ABA SHOPPING CENTRE (EKEOHA	10	10	20
3.	CEMETERY (EZIUKWU) MARKET	10	10	20
4.	MEW (AHIAOHURU) MARKET	10	10	20
5.	ASANNENTU MOTOR SPAREPARTS	10	10	20
	TOTAL	50	50	100

**Table 4: SHOWING THE VARIOUS SOURCES OF NOISE AND THEIR PERCENTAGES .**

S/N	TYPES OF NOISE	NUMBER OF RESPONDENTS	PERCENTAGE(%)
1	HUMAN	18	36
2	VEHICLES	9	18
3	MUSICAL INSTRUMENT	5	10
4	MACHINES	4	8
5	SIRENS	0	0
	Total	36	72
	Combination of More than one noise	14	28
	Grand Total	50	100

**Table 5: COMPLAINTS FROM NOISE BY RESPONDENTS**

S/N	Types of Complain	Number of respondents	Percentage of respondents
1	Discomfort	14	28
2	Temporary hearing loss	9	18
3	Shout during conversation	21	42
			10
			2
	Total	44	100

**Table 5: EFFECTS OF NOISE ON RESPONDENTS**

S/N	Effects of noise	Number of respondents	Percentage %
1	Annoyance	12	24.00
2	Speech interference	13	26.00
3	Affect the ear	12	24.00
4	Affect performance	7	14.00
			12.00
	Total	44	100%

## V. DISCUSSION

From OSHA and WHO regulation 1910.95 the measurement for Hearing Conservation (HC) and Noise Control (NC) or Permissible Exposure Level (PEL) is set at threshold of 80dB(min) and 90dB(max) and beyond these audible levels (say <95dBA), hearing protection instrument should be used. Ariaria international market had highest noise level of 92.3dB emanating from machine operations in the open shade followed by Cemetery (Eziukwu) with noise level of 89.8dB and New Market (Ahiaohuru) which had 89.7dB in open shades. Generally the noise levels in all open shades exceeded the OSHA and WHO compliance for Hearing Conservation (HC) in comparison with lock up shops. Analysis from the noise source revealed that noise from individuals constituted 36% as a result of human traffic, while vehicular movement was 18% which shows a high traffic level. Percentage for other sources include musical instrument 10% and machine noise 8%. The study further revealed the type of complains with 28% not comfortable with the noise, 42% would shout

during conversation for another person or customer to hear from them while 18% have temporary hearing loss. On the effect of noise, the highest impact was on speech interference being 26%, followed by annoyance and the affect on ear which were 24% and 14% respectively. The individuals and traders should be monitored very well for their health due to the impact of noise pollution [19]. The OSHA noise exposure standards defined two actions at which ear protection must be provided and used. These are based on the measurement for Hearing Conservation (HC) measured with a noise dosimeter or sound level meter with its threshold set at 80dB and measurement of Noise Control (NC) or Permissible Exposure Level (PEL) with a threshold of 90dB [20].

The measured noise level at Ariaria International Market is classified as very high on a rating scale [21]. This indicated that the individuals and traders are exposed to high noise pollution and may be at risk of accelerated presbycusis process or noise induced hearing impairment with age [22].

The overall result data analysis revealed that noise levels at Motor spareparts Market were less than the other four markets. The noise level in Ariaria International Market precisely at the free-zone area (open shade) may cause hearing impairment to individuals and traders especially those that stay near grinding machines and their operators.

Control measures for Noise Pollution in Aba Markets:

1. **Source Control:** This includes source modification such as acoustic treatment to machine surface, design changes, limiting operational timings, etc
2. **Transmission Path Intervention:** This includes containing the source inside a sound insulating enclosure, constructing a noise barrier or provision of sound absorbing materials along the path.
3. **Receptor Control:** This includes protection of the receiver by altering the work schedule or provision of personal protection devices such as ear plugs for operating noisy machinery. The measure may include dissipation and deflection methods.
4. **Oiling:** Proper oiling will reduce noise from the machine.

#### Preventive measures:



1. Prescribing noise limits for vehicular traffic
2. Ban on honking (usage of horns) in certain areas
3. Creation of silence zones near the markets
4. Redesigning buildings to make them noise proof
5. Reduction of traffic density in certain areas of the market
6. Giving preference to mass public transport system.

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