

Examination of Noise Pollution from Generators on the Residents of Obantoko, Ogun State, Nigeria

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Abstract— The health effects of noise among residents of Obantoko, Ogun State, Nigeria was assessed using 43- item questionnaire. A sample size of 262 persons was randomly selected which cut across different age groups and sex. Results showed that Obantoko residents are in constant exposure of generator noise which results in adverse health effect of the habitants which includes hearing impairment, interference with spoken communication, sleep disturbances, cardiovascular disturbances, impaired task performance and negative social behavior and annoyance reactions. The negative health effects of noise noted among residents of Obantoko deserves urgent attention.

Index Terms— Effect; Environment; Exposure; Generator; Health; Noise; Pollution; Resident.

I. INTRODUCTION

RESIDENTIAL noise is the noise emitted from all sources, except noise at the industrial workplace [1]. Noise is a human caused acoustic contaminant, aural litter or audible trash. It is an unusual pollutant unlike other types of pollutant because it is not visible; it is a pollutant we impose directly on our neighbours [2]. The recognition of noise as a serious health hazard as opposed to a nuisance is a recent development and the health effects of the hazardous noise exposure are now considered to be an increasingly important public health problem [2]. As the day rises, the noise level in the different parts of the city increases in and around work places and homes [3]. Man works and lives under various types of noise environment [4]. Our society is beset by noise, which is intrusive, pervasive, and ubiquitous; most important of all, it is unhealthy [5]. The variety of noise polluting devices and activities is large and seems to be growing on a daily basis, although there is no consensus about what items are useful and desirable or noise polluting and unnecessary ([5], [6]). The noise problems of the past are significant when

compared with those experienced by modern city dwellers; noise pollution continues to grow in extent, frequency, and severity as a result of population growth, urbanization, and technological development [7]. The defining characteristic of residential noise is not whether we like it, but that it is a waste product, escaping from one person's property, and contaminating another's property or a public space. Technology plays a very big role in our noisy world [2]. Noise seems to flow from every new technical innovation of the modern society. Much of the noise pollution we experience results from individuals and businesses who believe that it is their right or freedom to make noise. The most common right claimed is a property right. They claim that they should be free to use their property as they see fit without interference from others [2]. In most urban areas of the third or developing countries of the world there are lots of noise pollutants which includes noise from exhaust cars, industrial as well as home generating plants.

II. ELECTRICITY POWER SUPPLY

Electrical energy occupies the top grade in energy hierarchy as it finds innumerable uses in homes, industry, agriculture, and defense and of course in some nations, transportation. Nigeria's electricity power situation is very poor because of erratic power supply [8]. The inefficiency of the Power Holdings Company of Nigeria to render electricity supply has led to the massive use of generators [9]. Mr. Steven Dimitriyev, noted that "Nigeria experienced the worst electricity crisis among its contemporaries, which underscores the nightmarish generation, distribution and supply in the country. According to daily times news, an estimated 60 million residents use generators of varying sizes [10]. More than half of the country's 162 million citizens have no access to electricity, and even those who do cannot guarantee having power every day [11]. The use of electricity generating plant with its attendant noise pollution on the environment and human health has been on the increase because of the poor power supply [12]. The sound emanating from these generators constitutes noise and nuisance mostly at night hours when people have retired to rest after a hectic activity at workplaces. Most workplaces and homes use generating

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plants 24 hours in alternative to power supply [12]. The noise from generating plants in Nigeria couples with its accompanying smoke emission to the sky has greatly contributed to the breaking of the ozone layer in the sky [8]. This has been a very serious concern because generating plants of various designs and sizes are used resulting in high noise levels. This kind of noise bothers people very seriously in their various homes even when their generators are part of the noise constituents.

III. ADVERSE EFFECTS OF NOISE

A comfortable environment is one in which there is little or no annoyance and distraction so that working or leisure tasks can be carried out unhindered either physically or mentally. Unfortunately, residential noise has become a serious problem in many countries, and it is difficult to regulate by physical means alone [13]. It is well known that residential noise may affect sleep, attentiveness, problem solving, memory, conversation, academic work in terms of reading and learning, and cause annoyance as well as affect task performance [9]. Noise has become a very significant stress factor in the environment, to the level that the term noise pollution has been used to signify the hazard of sound which consequences in the modern day development is immeasurable. Noise is intrusive and harmful. William H. Stewart, former US Surgeon General, stated, "Calling noise a nuisance is like calling smog an inconvenience. Noise must be considered a hazard to the health of people everywhere." Exposure to excessive noise is a threat to many aspects of life. Loud sound is dangerous even when it is not painful. Noise as a polluting agent in the environment has been recognized for some time as a serious threat to the quality of life enjoyed by the populace [14]. A link between residential noise and mental health problems is suggested by the demand for tranquillizers and sleeping pills, the incidence of psychiatric symptoms and the number of admissions to mental hospitals. The World Health Organization (WHO) classified the adverse effects of noise pollution on humans into seven categories which are hearing impairment, interference with spoken communication, sleep disturbances, cardiovascular disturbances, disturbance in mental health, impaired task performance and negative social behavior and annoyance reactions.

IV. NATIONS CONCERN

Today all countries of the world are aware of the ill-effects of noise on human health [4]. To save him from the hazard as also for his comfort and convenience, many countries of the world have carried out the exercise of finding out the most suitable ambient noise levels to which a human being can be exposed with the least harm in that particular environment [4]. Consequently, national standards have been adopted by many countries laying down maximum permissible noise level for environment and occupational noise exposure to give

relief to the people working or living in those environments. These standards vary from country to country and have laid in the form of recommendations, guidelines or statutory requirements as per the economic conditions, advancement of technology and burden on industry. Some countries have their specific legislation on noise. For instance, in the United States of America, the Noise Control Code, 1972 (Federal), New York Noise Control Code, 1972 and Chicago Noise Control Regulations, 1971, in Great Britain, the Control of Pollution Act, 1974, in Japan, Noise Control Laws of 1968, are the specific laws to control the growing problem of noise pollution [15]. In Nigeria, as far back as 1990, while forming the Federal Environment Protection Agency (FEPA), the Federal government entrusted it with the responsibility of formulating laws to regulate and control the levels and impact of noise in the country [6]

V. CHARACTERISTICS OF NOISE

Noise may influence health directly and not through annoyance [16]. The response to noise may depend on characteristics of the sound, including intensity, frequency, complexity of sound, duration and the meaning of the noise [16]. One of the primary characteristics affecting the unwantedness of noise is its loudness or perceived intensity [16]. Loudness comprises the intensity of sound, the tonal distribution of sound and its duration [17]. The evidence is mixed on the importance of both the duration and the frequency components of sound and also the number of events involved in determining annoyance [17]. High frequency noise has been found to be more annoying than low frequency noise [18]. Vibrations are perceived as a complement to loud noise in most community surveys of noise and are found to be important factors in determining annoyance, particularly because they are commonly experienced through other senses as well as hearing [32]

VI. NOISE MEASUREMENT

Sound is defined as any pressure variation that the human ear can detect, from barely perceptible sounds to sound levels that can cause hearing damage. The magnitude of the variations of the air pressure from the static or normal air pressure is a measure of the sound level. The number of cyclic pressure variations per second is the frequency of sound. When sounds are unpleasant, unwanted, or disturbingly loud, we tend to classify them as noise [19]. Noise is measured in units called decibels (db). A decibel (db) it is a logarithmic unit that indicates the ratio of a physical quantity relative to a specified reference level. Since it expresses a ratio of two quantities with the same unit, it is a dimensionless unit. A decibel is one tenth of a bel, a seldom-used unit [20]. The range of human hearing is from about 0 dB, the threshold of our hearing, to 140 dB, which is above the threshold of pain [21]. Generators are produced by different manufacturer and are characterized

by diverse features. The noise level produced by a generating plant is dependent on the product for new generators.

VII. GENERATOR AND NOISE

Generators can be the noisiest thing on the planet, but when you are without power, they are worth gold [22]. A home standby generator or whole house generator comes in different sizes, from 7 KW to 20 KW in air-cooled and 22 KW and higher in liquid cooled. Portable generators are other options due to personal considerations and choice [22]. The difference in size and type depend upon ones needs and power demand. Home standby generators have noise level in the range of 62-68 dbs depending upon the kind of generator one has [22]. Portable generators have much higher decibels than the home standby generators.

The noise is caused by the engine and exhaust of the generator [23]. A portable generator can run closer to 90 dbs [22]. To define quiet portable generators as those with a decibel level of 60 is somewhat arbitrary, because decibels are on a logarithmic scale, identifying 60 decibels is usually expressed in terms of comparisons with known sound levels in everyday life. For example, a generator running at 60 decibels would be about the same level of sound as would be heard in normal conversation with another person standing within three feet of the listener, so a generator that emits significantly more noise than 60 and 40 decibels create noise pollution [24]. A generator that would block out your ability to hear someone standing or sitting close by would be too loud [24]. There are cases where the noise levels are slightly higher than the decibel levels advertised by the manufacturer thereby imposing noise pollution to the consumers [25].

VIII. METHODOLOGY

This cross-sectional survey was conducted among the dwellers of Obantoko, Odeda Local Government Area of Ogun state, Nigeria. The data collection tool was a two paged 43-itemed self-administered questionnaires with 15 minutes completion time for the literate inhabitant that needed no assistance in the completion of the questionnaire. The illiterate ones were helped to complete the questionnaire by translating the questions (in Yoruba language) and allow them to tick the space available for their response. The questionnaire assessed a cross-section of different age groups, sex, educational levels, literacy level and occupation of respondents. The analysis has been carried out with the help of percentages and cross-classifications effects of noise, in terms of age as well as sex.

IX. RESULTS AND ANALYSIS

A. Ostensible High Generator Noise

Technically, there is no such thing as a totally silent generator because after all there is an engine that is running and producing electrical power [26]. It is almost impossible for any quality generator not to have sound at all [27]. Generator noise can be a big problem, especially in quiet neighborhoods. According to [24], if you are running a generator and your neighbors are complaining about the noise, you probably have a generator that is too noisy [33]. Table 1 shows that perceived noise level of owners' and neighbors' generators used in Obantoko are high. 42.7% and 28.2% of the participants sometimes and always respectively complain of their own generator being noisy and 32.8% and 28.2% for that of the neighbors'. Portable generators are predominantly in use by Obantoko dwellers. According to the users some of these generators had moderate noise level at purchase but after sometime their noise levels increased probably due to age of use and maintenance culture.

B. Exposure to Generator Noise

Electricity crisis is the most important infrastructure bottleneck in Nigeria today [10]. In most parts of the country, darkness pervades and generators have taken over as the source of power. When the power shuts down – which it does all the time – people sit in the dark or, if they are lucky, fire up generators. According to Chukwuezeonye, generators were meant to be backups for electricity, but now electricity is the backup for generators [10]. Electricity is one of the most important necessities in today's society. Without it, it can severely affect our daily lives. It can mean halting work in commercial and industrial establishments, and it can also mean discomfort. Generators aids continuation of important electrical appliances, such as air-conditioner, heater, computer, refrigerator, and lights, even in the event of a power outage, individuals acquire generating plant to serve these purpose. Indiscriminate use of power plants to generate electricity due to the constant power failures by the Power Holding Company of Nigeria PLC (PHCN) contributes majorly to residential noise of Obantoko metropolis. Table 1 shows the generator ownership and the length exposure among the residents of Obantoko metropolis.

It was discovered that most residence areas in Obantoko municipality has generating plant. There is virtually no courtyard where there is no user of generator. 91.2% of the studied population has generators and 92% percent of their neighbours do also have generators.

The building pattern of Obantoko city is such that the generator noise from adjacent building can be felt so strong as

Table 1: Generator Usage and Noise Production

Generator usage and noise production	Characteristics	Frequency	Percent (%)
Generator ownership	Yes	239	91.2
	No	23	8.8
Neighbours' generator ownership	Yes	241	92.0
	No	21	8.0
Frequency of usage by owners	Never	38	14.5
	Sometimes	126	48.1
	Always	98	37.4
Frequency of usage by neighbours	Never	33	12.6
	Sometimes	120	45.8
	Always	109	41.6
Owners' duration of usage	0-2 hours	22	8.4
	2-4 hours	48	18.3
	4 hours and above	192	73.3
Neighbours' duration of usage	0-2 hours	34	13.0
	2-4 hours	45	17.2
	4 hours and above	183	69.8
Neighbours' noisy generator	Never	76	29.0
	Sometimes	112	42.7
	Always	74	28.2
Owners' noisy generators	Never	65	24.8
	Sometimes	86	32.8
	Always	111	42.4

though it were in the same courtyard. Moving ones generator far from ones home such that the sound will become quieter in some way will mean deliberate setting strident noisy environment for ones neighbors, There are situations where all the occupants; two, three, four or more as the case may be of a building own generators thereby increasing the level of generator noise exposure. Adverse health effects appear to be related to total noise exposure from all sources rather than the noise from any single source [5] obviously, the more generators in operation at one time, the louder the noise level. Table 2 demonstrates the noise level increase for multiple generators (assumes each generator is the same type and produces the same noise level).

Table 2: Noise Level

Number of Generators	Noise Level Increase	Perception
1	-	-
2	+ 3 dB	"just perceptible"
4	+ 6 dB	"clearly noticeable"
10	+ 10 dB	"twice as loud"

Source: www.generatornoise.com

Most generators are noise collaborators which vary by model, size, type, maintenance culture and age. The type of generator a resident uses is determined by the energy requirement of the home. Sometimes an individual obtains generator capable of

industrial use for residential service not minding the noise level. Table 3 shows that 37.4% of the participants who do have generators always put it on and 48.1% sometimes do. Likewise their neighbors; 41.6% always put their generator on and 45.8% sometimes do. From table 3; 13% is experiencing mild exposure 15% moderate exposure and 22.6% intense exposure

Table 3: Levels of Noise Exposure from Generators

Level of exposure	Frequency	Percentage
Moderate exposure	15	5.7
No exposure	8	3.1
Mild exposure	13	5.0
Intense exposure	226	86.2

Noise exposure is the variation in sound level with time (noise characteristics and measurement). Excessive exposure to noise is probably the most common cause of preventable hearing loss on a global basis. In general terms, prolonged exposure to sound in excess of 85db is potentially hazardous although the important factor is the total amount of sound exposure i.e., both the level and length of exposure are important and the two interrelate ([28], [29]). Exposure to noise pollution exceeding 75 dB for more than eight hours daily for a long period of time can cause loss of hearing. The hazard increases with the intensity of the noise and the period of exposure [6]

XI. HEALTH AND PSYCHOLOGICAL EFFECTS OF GENERATOR NOISE

Noise pollution has been used to signify the hazard of sound which consequences in the modern day development is immeasurable [8]. Noise has numerous health effects making noise pollution a public health concern. The effects include loss of hearing, stress, high blood pressure, sleep disorders, distraction affecting productivity, irritability and in general reduction in the quality of life [5]. Sometimes the damage is due to long period of exposure or short but at a very high level noise. Once the damage occurs it is irreversible ([30], [5]). Below are the detailed effects of generator noise on Obantoko denizens presented under the seven categories of advance effect of noise by World Health Organization.

A. Negative Social Behavior and Annoyance Reactions

Annoyance is defined as a feeling of displeasure associated with any agent or condition believed by an individual to adversely affect him or her. Perhaps in better description of this response would be aversion or distress. Annoyance increases significantly when noise is accompanied by vibration or by low frequency components. Our generators produce noise that is accompanied by vibrations. The term annoyance does not begin to cover the wide range of negative reactions associated with noise pollution; these include anger, disappointment, dissatisfaction, withdrawal, helplessness, depression, anxiety, distraction, agitation, or exhaustion. From Table 4, about 39.3 and 22.9% of the participants were sometimes and always annoyed respectively, once the generators were switch on, while 39.3% always avoid the use of balconies, patios and yards.

B. Hearing Impairment

Table 5 shows that a very large proportion of the respondents in each age group are affected by noise emanating from generators. Hard of hearing problem is predominantly between ages 20-39 and it is mostly found in males (Table 6). Noise induced hearing impairment may be accompanied by abnormal loudness perception (loudness recruitment) distortion (paracusis) and tinnitus [5]. It is important to know that ears do not "get used" to loud noise. As the league for the hard of hearing notes - they "get deaf" [5]. Loud sound is dangerous even when it is not painful [31]. The human ear will feel pain at 120-140 decibels. Prolonged exposure to noise above 85 decibels can cause permanent hearing loss.

C. Sleep Disturbances

Uninterrupted sleep is known to be a prerequisite for good physiologic and mental functioning in healthy individuals. Environmental noise is one of the major causes of disturbed sleep. When sleep disruption becomes chronic, the results are mood changes, decrements in performance, and other long-term effects on health and well-being. It is known, for example, that continuous noise in excess of 30 db disturbs sleep. For intermittent noise, the probability of being awakened increases with the number of noise events per night [5]. Most Obantoko dwellers are experiencing primary sleep disturbances which are difficulty falling asleep, frequent awakenings, waking too early, and alterations in sleep stages and depth, especially a reduction in REM sleep. The percentage disturbance rate for each age group and sex is shown in tables 7 and 8. For each of these, the threshold and response relationships may be different. These effects begin to be seen with long-term daily exposure to noise levels above 65 db or with acute exposure to noise levels above 80 to 85 dB [8]. Acute exposure to noise activates nervous and hormonal responses, leading to temporary increases in blood pressure, heart rate, and vasoconstriction [5]

Table 4: Negative Social Behavior and Annoyance Reactions

Negative Social Behavior and Annoyance Reactions	Never n (%)	Sometimes n (%)	Always n (%)
Upset	104(39.7)	99(37.8)	59(22.5)
Annoy	99(37.8)	103(39.3)	60(22.9)
Irritate	113(43.1)	91(34.7)	58(22.1)
Feel comfortable	115(43.9)	96(36.6)	51(29.5)
Closing window and doors	65(24.5)	53(20.2)	144(55)
Tuning up volume of television/radio	130(49.6)	93(35.5)	39(14.9)
avoiding the use of balconies, patios and yards	97(37)	62(23.7)	103(39.3)
engage in physical activities other than mental	144(55)	91(34.7)	27(10.3)
postpone normal activities	154(58.5)	79(30.2)	29(11.1)
Distraction	128(48.9)	93(35.5)	41(15.6)
Fatigue	166(63.4)	79(30.2)	17(6.5)

Table 5: Hearing Problems across Different Age Groups

Health and psychological effects of noise	Characteristics	Age				Total
		0-19	20-39	40-59	60 and above	
Hearing problems						
Hard of hearing	Never	59	53	15	14	141
	Sometimes	32	35	13	10	90
	Always	11	13	5	2	31
	Total	102	101	33	26	262
Any kind of deafness	Never	20	14	6	4	44
	Sometimes	81	87	27	22	217
	Always	1	0	0	0	1
	Total	102	101	33	26	262
Ringing sensation	Never	39	51	12	10	112
	Sometimes	45	29	10	12	96
	Always	18	21	11	4	54
	Total	102	101	33	26	262
Only hear at pitch of callers voice	Never	48	53	16	15	132
	Sometimes	44	34	12	7	97
	Always	10	14	5	4	33
	Total	102	101	33	26	262
Hear only at close range	Never	44	37	12	11	104
	Sometimes	30	41	13	13	97
	Always	28	23	8	2	61
	Total	102	101	33	26	262
strain ear to hear	Never	52	46	14	17	129
	Sometimes	38	33	11	8	90
	Always	12	22	8	1	43
	Total	102	101	33	26	262
Temporal affect on hearing	Never	64	59	22	15	160
	Sometimes	22	18	4	10	54
	Always	16	24	7	1	48
	Total	102	101	33	26	262

Interference with spoken communication is a big challenge generator noise is imposing on Obantoko residents. This challenge cut across all the age groups and sex. As result discussions are made are very close range with undue repetition and shouting. These complain is predominant with the male as 39% complain of discussion at close range, 34% shout during discussion and 22% undue repetition. Noise pollution interferes with the ability to comprehend normal speech and may lead to a number of personal disabilities, handicaps, and behavioral changes. These include problems with concentration, fatigue, uncertainty, lack of self confidence, irritation, misunderstandings, decreased working capacity, disturbed interpersonal relationships, and stress reactions.

A. Cardiovascular disturbances

Apart from various effects on sleep itself, noise during sleep causes increased blood pressure, increased heart rate, increased pulse amplitude, vasoconstriction, changes in respiration, cardiac arrhythmias, and increased body movement. 7.3% of the participant suffer high blood pressure, whereas 23.7 and 11.5% sometimes and always respectively experiences increased heart beat. A growing body of evidence confirms that noise pollution has both temporary and permanent effects on humans’ way of the endocrine and autonomic nervous systems [8]. Noise can trigger both

endocrine and autonomic nervous system responses that affect the cardiovascular system and thus may be a risk factor for cardiovascular disease. Studies of individuals exposed to occupational or environmental noise show that exposure of sufficient intensity and duration increases heart rate and peripheral resistance, increases blood pressure, increases blood viscosity and levels of blood lipids, causes shifts in electrolytes, and increases levels of epinephrine, norepinephrine and cortisol [5]. These responses suggest that one can never completely "get used to" night-time noise. Temporary noise exposure produces readily reversible physiologic changes. However, noise exposure of sufficient intensity, duration, and unpredictability provokes changes that may not be so readily reversible. Even though the increased risk for noise-induced cardiovascular disease may be small, it assumes public health importance because both the number of people at risk and the noise to which they are exposed continue to increase [5]

A. Impaired task performance

Decreased alertness leading to accidents, injuries, and death has also been attributed to lack of sleep and disrupted circadian rhythms. The effects of noise pollution on cognitive task performance have been well-studied. Noise pollution impairs task performance at school and at work, increases errors, and decreases motivation. Reading attention, problem

solving, and memory are most strongly affected by noise. Deficits in performance can lead to errors and accidents, both of which have health and economic consequences. Cognitive and language development and reading achievement are diminished in noisy homes, even though the children's schools may be no noisier than average. Noise affects learning, reading, problem solving, motivation, school performance,

and social and emotional development. There is concern that high and continuous environmental noise may contribute to feelings of helplessness in children. It appears that the longer the exposure, the greater the effect [5] From table 13, difficulty in concentration is prominent with 40% of the participants having this problem, difficulty in attentive reading 51% and reduced efficiency 35%.

Table 6: Hearing Problems across Different Sex

Health and psychological effects of noise	Characteristics	Sex		
		Male	Female	Total
Hearing problems				
Hard of hearing	Never	67	74	141
	Sometimes	46	44	90
	Always	23	8	31
	Total	136	126	262
Any kind of deafness	Never	27	17	44
	Sometimes	108	109	217
	Always	1	0	1
	Total	136	126	262
Ringing sensation	Never	53	59	112
	Sometimes	51	45	96
	Always	32	22	54
	Total	136	126	262
Only hear at pitch of callers voice	Never	66	66	132
	Sometimes	48	49	97
	Always	22	11	33
	Total	136	126	262
Hear only at close range	Never	50	54	104
	Sometimes	47	50	97
	Always	39	22	61
	Total	136	126	262
strain ear to hear	Never	61	68	129
	Sometimes	46	44	90
	Always	29	14	43
	Total	136	126	262
Temporal affect on hearing	Never	87	73	160
	Sometimes	27	27	54
	Always	22	26	48
	Total	136	126	262

Table 7: Sleep Disturbance across Different Age Groups

Health and psychological effects of noise (Sleep disturbance)	Characteristics	Age				Total
		0-19	20-39	40-59	60 and above	
Alter bed time	Never	55	52	12	14	133
	Sometimes	31	32	16	10	89
	Always	16	17	5	2	40
	Total	102	101	33	26	262
Disturb sleep	Never	55	43	19	14	131
	Sometimes	28	38	6	10	82
	Always	19	20	8	2	49
	Total	102	101	33	26	262
Insomnia	Never	69	73	23	17	182
	Sometimes	26	19	5	7	57
	Always	7	9	5	2	23
	Total	102	101	33	26	262

Table 8: Sleep Disturbance across Different Sex

Health and psychological effects of noise	Characteristics	Sex		
		Male	Female	Total
Sleep disturbance				
Alter bed time	Never	78	55	133
	Sometimes	39	50	89
	Always	19	21	40
	Total	136	126	262
Disturb sleep	Never	71	60	131
	Sometimes	39	43	82
	Always	26	23	49
	Total	136	126	262
Insomnia	Never	91	91	182
	Sometimes	34	23	57
	Always	11	12	23
	Total	136	126	262

Table 9: Inference with Communication across Different Age Groups

Health and psychological effects of noise	Characteristics	Age				Total
		0-19	20-39	40-59	60 and above	
Inference with communication						
Discussion only at close range due to generator noise	Never	44	37	12	11	104
	Sometimes	30	41	13	13	97
	Always	28	23	8	2	61
	Total	102	101	33	26	262
Shouting during conversation as a result of generator noise	Never	51	47	12	14	124
	Sometimes	30	31	12	8	81
	Always	21	23	9	4	57
	Total	102	101	33	26	262
Difficulty to hear conversation when generator is on	Never	52	46	14	17	129
	Sometimes	38	33	11	8	90
	Always	12	22	8	1	43
	Total	102	101	33	26	262
Unnecessary repetition during conversation	Never	48	53	16	15	132
	Sometimes	44	34	12	7	97
	Always	10	14	5	4	33
	Total	102	101	33	26	262
Increase of television/radio volume in order to hear	Never	56	49	12	13	130
	Sometimes	34	38	12	9	93
	Always	12	14	9	4	39
	Total	102	101	33	26	262

Table 10: Inference with Communication across Different Sex

Health and psychological effects of noise	Characteristics	Sex		
		Male	Female	Total
Inference with communication				
Discussion only at close range due to generator noise	Never	50	54	104
	Sometimes	47	50	97
	Always	39	22	61
	Total	136	126	262
Shouting during conversation as a result of generator noise	Never	58	66	124
	Sometimes	44	37	81
	Always	34	23	57
	Total	136	126	262
Difficulty to hear conversation when generator is on	Never	61	68	129
	Sometimes	46	44	90
	Always	29	14	43
	Total	136	126	262
Unnecessary repetition during conversation	Never	66	66	132
	Sometimes	48	49	97
	Always	22	11	33
	Total	136	126	262
Increase of television/radio volume in other to hear	Never	64	66	130
	Sometimes	50	43	93
	Always	22	17	39
	Total	136	126	262

Table 11: Cardiovascular Disturbances across Different Age Group

Health and psychological effects of noise	Characteristics	Age				Total
		0-19	20-39	40-59	60 and above	
Cardiovascular disturbances						
Feel the generator vibration	Never	63	70	24	13	170
	Sometimes	27	17	5	13	62
	Always	12	14	4	0	30
	Total	102	101	33	26	262
High blood pressure	Yes	6	10	3	0	19
	No	96	91	30	26	243
	Total	102	101	33	26	262
Increase heart rate	Never	5	10	3	1	19
	Sometimes	97	90	30	25	242
	Always	0	1	0	0	1
	Total	102	101	33	26	262

Table 12: Cardiovascular Disturbances across Different Sex

Health and psychological effects of noise	Characteristics	Sex		
		Male	Female	Total
Cardiovascular disturbances				
Feel the generator vibration	Yes	10	9	19
	No	126	117	243
	Total	136	126	262
High blood pressure	Never	87	83	170
	Sometimes	33	29	62
	Always	16	14	30
	Total	136	126	262
Increase heart rate	Never	12	7	19
	Sometimes	124	118	242
	Always	0	1	1
	Total	136	126	262

Table 13: Impaired Task Performance

Impaired task performance	Never n (%)	Sometimes n (%)	Always n (%)
Attentive reading difficulty	131(50)	80(30.5)	51(19.5)
Difficult to concentrate	125(47.7)	97(37)	40(15.3)
Affect efficiency	124(47.3)	103(39.3)	35(13.4)
Fatigue	166(63.4)	79(30.2)	17(6.5)
Feel dizzy	176(67.9)	51(19.5)	33(12.6)
Affect at work/school	156(59.5)	71(27.1)	35(13.4)
Impair your performance	148(56.5)	93(35.5)	21(8)

XII. CONCLUSION

Challenges of man are many but can be alienated. Most of these challenges are avoidable some are necessary evil. The need of electricity is a necessity to all both the rich and the poor. Handling the effect of generator noise simply means termination of the source. This can only be done if the major source of power supply of made better or probably constant. Generating plants are one of the major sources of noise pollution in Obantoko. Virtually every building has generator that are frequently used. A problem known is a problem half solved but our reaction as individual and a nation are reluctantly, slowly, and often inadequately. Generator noise has no positive side, it has no rhythm, pattern nor sequence; all it carries are important public health problem that can lead to hearing loss, sleep disruption, cardiovascular disease, social handicaps, reduce productivity, impaired teaching and learning, absenteeism, increased drug use, and accidents. It can impair the ability to enjoy one’s property and leisure time and increases the frequency of antisocial behavior.

Constant electricity supply can be a permanent solution to the generator and its noise but since it is on the way soon to be establish more damages can be avoided by individual generator noise control measure. It is therefore recommended that generator owner should building acoustic barrier and insulation made of rigid materials with significant mass and stiffness such as sheet steel, sand-filled block walls or solid concrete walls. These reduce the transmission of sound.

REFERENCES

[1] Muhammad J. A. Muhammad A. A, and Amna B. (2008) Effect of noise pollution on hearing of Public transport drivers in lahore city Pak J Med Sci Vol. 24 No. 1: 142-146

[2] The Quiet Zone (2006) A publication of The Noise Pollution Clearinghouse Montpelier, VT 05601 toll free (888) 200-8332 PP 1-12
<http://www.nonoise.org/library/qz8/quietzone 8.pdf>

[3] Vijayalakshmi K.S. (2003) “Noise Pollution” in Martin J. Bunch, V. Madha Suresh and T. VasanthaKumaran, eds., Proceedings of the Third International Conference on Environment and Health, Chennai, India, 15-17. Chennai: Department of Geography, University of Madras and Faculty of Environmental Studies, York University. Pages 597 – 603.

[4] Pakistanian Environment Protection Agency (Pak-EPA) Islamabad (2006), Position paper for environmental

Quality standards of Noise in Pakistan. P 1-15
<http://www.environment.gov.pk/propdf/noisepapergen.pdf>

[5] Goines, L, Hagler, L. (2007). Noise Pollution: A Modern Plague. Southern Medical Journal. 100(3):287-293

[6] Omubo-Pepple, V.B., M.A. Briggs-Kamara, and I. Tamunobereton-ari. 2010. “Noise Pollution in Port Harcourt Metropolis: Sources, Effects, and Control”. Pacific Journal of Science and Technology. 11(2):592-600.

[7] Berglund, B. and Lindvall, T. (1995). “Community Noise”. Archives of the Center for Sensory Research. 2:1-195.

[8] Olokooba S. M., Ibrahim I. and Abdulaheem-Mustapha M. A. (2010), “Noise Pollution: A Catalyst to Climate Change and Human Health Catastrophe”, Nigerian Journal of Food, Health and Drug Law, A Publication of the Faculty of Law, Kogi State University, Anyigba, Vol. 3 No 1 (23-38)

[9] Oseji J. O., (2011) Investigation of Environmental Noise Within Campus 2, Delta State University, Abraka, Nigeria Ijrras 6 (2) available at www.arpapress.com/Volumes/Vol6Issue2/IJRRAS_6_2_14.pdf

[10] Energy Commission of Nigeria (ECN, 2009): 60 Nigerians Now Own Power Generators. Adopted from Vanguard Newspaper, 26th January, 2009. Available at www.energy.gov.ng.

[11] Businessday News Online (2012) Teenagers invent 'urine-powered' generator Written by Agency Reports Sunday, 11 November 2012 07:59
<http://www.businessdayonline.com/NG/index.php/power/47372-teenagers-invent-urine-powered-generator>

[12] Akinbulire T.O., Oluseyi P.O., Awosope C.O.A and Okoro O.I: Data-Based Analysis of Power System Crisis in Nigeria, p 1-2 accessed on 1/11/2012, COA Awosope;

[13] Haruna A. (2011) Grinding machine noise spectra in Kaduna metropolis, Nigeria Journal of environmental Issues and Agriculture in Developing Countries, 3(1) PP 157-164

[14] Abumere, O.E, Ebeniro, J.O and Ogbodo, S.N. (1999): “Investigation of Environmental Noise within Port-Harcourt city Metropolis” Nig. Journ. of Physics Vol.11 Pp(129 – 132).

[15] Agarwal, S. K. 2002. Pollution Management. Noise Pollution. 5:(136-138).

[16] Stephen A. S. and Mark P. M. (2003) Noise pollution: non-auditory effects on health British Medical Bulletin

- 2003; 68: 243–257 British Medical Bulletin, Vol. 68 © The British Council DOI: 10.1093/bmb/ldg033
- [17] Fields J. M. (1984). The effect of numbers of noise events on people's reactions to noise. An analysis of existing survey data. *J Acoust Soc Am*; 75: 447–67
- [18] Bjork E. A. (1986) Laboratory annoyance and skin conductance responses to some natural sounds. *J Sound Vib* 109: 339–45
- [19] <http://www.drnoise.com> available at http://www.drnoise.com/PDF_files/Detailed%20Introduction%20to%20Acoustics.pdf
- [20] Einstein College of Engineering-Tirunelveli Department of Electronics and Communication Engineering Ec 55 /Transmission Lines and Waveguides Semester: V Notes of Lesson <http://www.einsteincollege.ac.in/Assets/Department/Lecturer%20notes/ECE/UG/Transmission%20lines%20and%20Waveguides.pdf>
- [21] <http://www.level.org.nz/passive-design/controlling-noise/noise-basic-concepts/>
- [22] Robert F., (2012) Generators and Decibel Levels <http://ezinearticles.com/?Generators-and-Decibel-Levels&id=6808158>
- [23] Foster G. D. (2010 a) Soundproofing Materials Needed For an Outdoor Generator Enclosure <http://www.generatornoise.com/2003Acoustics.com>
- [24] Zach P., (2010) How Do You Know If a Quiet Portable Generator is Quiet Enough <http://ezinearticles.com/?How-Do-You-Know-If-a-Quiet-Portable-Generator-is-Quiet-Enough?&id=3831498>.
- [25] Campinglife (2004) Camping Generator Comparison <http://www.campinglife.com/feature-stories/quiet-thunder/>
- [26] Jason S., (2006) Reducing Noise with Buying a Silent Generator <http://ezinearticles.com/?Reducing-Noise-with-Buying-a-Silent-Generator&id=292890>
- [27] Jessica R., (2010) What You Need to Know About Silent Generators <http://ezinearticles.com/?What-You-Need-to-Know-About-Silent-Generators&id=4511680>
- [28] Robinson, D.W. (1987). Noise Exposure and Hearing: A New Look At The Experimental Data. Health and Safety Executive Research report, 1/1987. H.M.S.O.
- [29] Dobie, R.A. (1993) Medical-Legal Evaluation of Hearing Loss. New York, Van Nostrand Reinhold.
- [30] NIDC Fact Sheet. Noise-Induced Hearing Loss. U.S. Department of Health and Human Services, National Institute of Health, National Institute of Deafness and other Communication Disorders.
- [31] Marek Roland-Mieszkowski (1994), Common Misconceptions About Hearing Digital Recordings - Advanced R & D 5959 Spring Garden Rd., Suite 1103, Halifax, Nova Scotia, B3H-1Y5, Canada. Tel./Fax. (902) 429-9622 www.digital-recordings.com
- [32] Fields J. M. (1992) Effects of Personal and Situational Variables on Noise Annoyance with Special Reference to Implications for En Route Noise. Report No: FAA-AEE-92-03. Washington, DC: Federal Aviation Administration and NASA,
- [33] Foster G. D. (2010 b) My Generator is Too Loud! I Need a Silent Generator <http://EzineArticles.com/4530759>
- [34] <http://www.generatornoise.com>
- [35] Stanley, A.M. (2010): Air Pollutants Concentration and Noise Levels from Electric Power Generators. Seminar Presented at the Seminar Series of Faculty of Environmental Design, Ahmadu Bello University, Zaria.
- [36] Stanley, A.M., Mbamali, I., Zubairu, I.K., Bustani, S.A, Andrew, S.S and Joshua, I.A. (2010): Electric Power Generator Noise Level Characterization and Impact on Selected Commercial Areas of Zaria and Kaduna Nigeria. International Postgraduate Conference 5 on Infrastructure and Environment, The Hong Kong Polytechnic University, Hong Kong.