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Perception of Health-Impacts of Environmental Noise in an Ambient Noise Context in Owerri -Urban , Imo State, Nigeria.

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ABSTRACT

This paper reports the results of the investigation of health impacts of environmental noise context in Owerri-urban, due to incessant complains of urban dwellers of noise pollution and their effects on the health. This was measured by the use of 210 questionnaires on urban dwellers along the major routes, in which 30 questionnaires were randomly administered between sampled routes designated NP1- NP7. The observed results indicate that , automobile has 32.3%, church 3.3%, construction work 19.5%, market 5.7%, industrial activities 9.0%, hawking 10%, and school 6.6%, with automobile recording the highest response as the main source of environmental noise pollution and church having the least response. For the perceived health problems caused by environmental noise, the results further shown that Cardiovascular and Physiological effects constituted 20.5%, Hearing Impairment 25.2%, Sleeplessness 21.9%, mental health 11.4%, annoyance 6.6% and human performance 14.2%, with hearing impairment ranking the highest and the lowest being annoyance. Environmental noise was at the peak between the hours of 8- 11 am constituting 49.1%. The hours between 3-7 pm constitutes 39.5%, while <10pm has 11.4% indicating noise pollution is less in the evening time of the day where people are indoor for rest. These then calls for best management practice like enforcement of pollution law, maintenance of vehicles and creation of awareness on health implications of environmental noise.

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1. INTRODUCTION

Noise can be defined as an unwanted or undesired sound whereas environmental noise is any unwanted or harmful outdoor sound created by human activities that is detrimental to the quality of life of individuals [1] . According to Encyclopedia Britannica: In acoustic, noise is define as any undesired sound. In chambers 21st Century Dictionary the definition of noise has undergone a change. Noise pollution stands carved out as phrase separately from noise. The two are defined as under. Noise + a sound, a harsh disagreeable sound, or such sound; a din pollution – an excessive or annoying degree of noise in a particular area [16;24]. Community noise (also called environmental noise, residential noise or domestic noise) is defined as noise emitted from all sources except noise at the industrial workplace. Main sources of community noise include road, rail and air traffic, industries, construction and public work, and the neighbourhood [3]. Noise pollution is by now recognized worldwide as a major problem for the quality of life in any urban area [5]. In most developed countries, standards for air pollution and noise exposures are an important part of environmental policy to improve local environmental quality [6]. Often these standards are based on expert judgments and do not take into account people's preferences. Numerous noise surveys

treating the problem of noise pollution in many cities throughout the world have been conducted [36; 37; 39].

In some surveys, noise impact was treated as a stress indicator, and in consequence the role of noise as a risk factor for human health was discussed. Noise effect includes various impacts on mental and physical health and disturbance of daily activities which may affect sleep, conversation, lead to perception of annoyance, cause hearing loss, instigate cardiovascular problems as well as affect human judgment and performance [1; 34]. The perception of sounds in day-to-day life is of major importance for human well-being in urban areas.

The paper focus on the effects of human activities as the sources of noise generation and the environmental implications of the perceived noise in Owerri Urban.

2. MATERIALS AND METHODS

2.1. The Study Area

Owerri Municipal of Imo State is within rainforest zone of Nigeria that lies between longitude $7^0.00$' and $7^{0.}05$' E and latitude $5^0.27$' and $5^0.31$'. The area covers the total landmass of 24.88 km. It has mean annual rainfall of 213.2 mm, and mean annual temperature ranging between 26 – 28 ^{0}C, with humidity that varied between 50.5 -70.5 %. Owerri Municipal Council is characterized by influx of people and high volume of vehicular flows in and out of the area due to its nodal functions it plays. It has a big central market called Ekeonunwa within the centre with petty trading like hawkers, and shops selling musical equipments, records and grounding machines and churches and mosque. The population of Owerri Municipal is 165,470 people.

2.2. Method of Data Collection by Questionnaire:

A structured questionnaire was used on respondents in order to know peoples' perception about noise pollution in the area. And 210 designed questionnaires were randomly administered on respondents along the six selected roads. And 30 set of questionnaires each were sampled on the seven routes [Douglas Road, Okigwe Road, Port Harcourt Road, Orlu Road, Onishia Road, Wethra Road, and Orji Road. And for temporal variation of environmental noise pollution, vehicular flow were monitored based on time grouping as 8 -11am, 3 -7pm and <10 pm. Personal observations on the type of activities performed in the locations and relevant information were sourced for.

3. RESULTS AND ANALYSIS

3.1. Sources of Environmental Noise Pollution:

Results of sources of environmental noise pollution is shown in Table 1, and activities such as music stores, automobile, churches, construction works, market squares, industrial activities, hawking and schools were considered in appraisal as appears below.

Table 1. Distribution of Respondents according to Sources of Noise in the selected Roads in Owerri Urban

Sources	Douglas Road NP 1	Okigwe Road NP2	PH Road NP3	Orlu Road NP4	Onishia Road NP5	Wethra Road NP6	Orji Road NP 7	Mean	%
Music Store	6	5	-	3	1	7	6	4	13.3
Automobile	7	8	10	8	15	9	11	9.7	32.3
Church	1	2	1	1	-	-	2	1	3.3
Construction	2	3	12	10	5	1	8	5.9	19.5
Market	6	2	-	1	2	1	-	1.7	5.7
Industrial	1	3	2	-	7	5	1	2.7	9.0
Hawking	5	2	-	6	-	6	2	3	10
School	2	5	5	1	-	1	-	2	6.6
TOTAL	30	30	30	30	30	30	30		100

Source: Fieldwork, 2011

From Table 1, the results of the sources of noise pollution indicates that music stores records the mean value of 4 that constitutes 13.3 % of the respondents, automobile has the mean value of 9.7 (32.3%), church 1(3.3%), construction work 5.9 (19.5%), market 1.7 (5.7%), industrial activities 2.7 (9.0, hawking 3 (10%), and school 2 (6.6%) (Fig.1). The overall result shows that church has the lowest percentage response as source of noise pollution, while automobile records the highest response as the main source of

environmental noise pollution in urban areas. The result is consistent with the finding of Spence [28], who reported that in the city, the main sources of traffic noise are the motors and exhaust system of autos, smaller trucks, buses, and motorcycles. The noise from the construction of highways, city streets, and buildings is a major contributor to the urban scene. Construction noise sources which ranks the second include pneumatic hammers, air compressors, bulldozers, loaders, dump trucks (and their back-up signals), and pavement breakers are issues in Owerri due to what is called "rescued agenda" of the Government is also consistent with the finding of Spence [28].

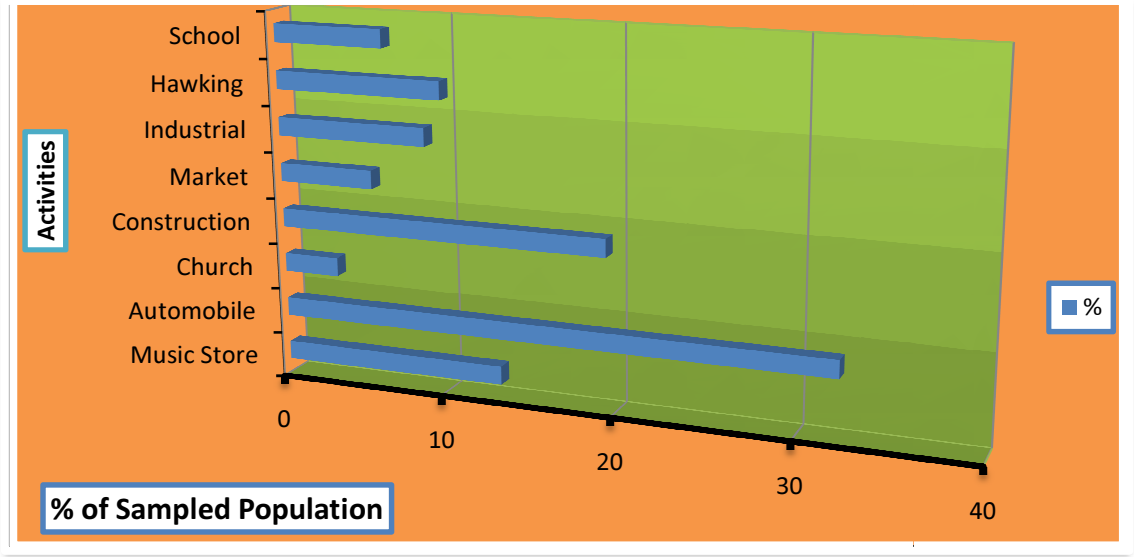

Fig.1: Sources of Environmental Noise Pollution in Owerri Urban.

3.2. Perceived Health Problems of Environmental Noise Pollution:

Noise health effects are shown in Table 2, and noise can damage physiological and psychological health, cause annoyance and aggression, hypertension, high stress levels, tinnitus, hearing loss, sleep disturbances, and other harmful effects: stress and hypertension are the leading causes to health problems and tinnitus can lead to forgetfulness, severe depression and at times panic attacks, chronic exposure to noise may cause noise induced hearing loss and cause of annoyance [27].

Table 2: Distribution of Respondents according to the Perceived Problems of Noise Pollution

Problems	Sampled Locations							Mean	%
	NP 1	NP2	NP3	NP4	NP5	NP6	NP 7		
Cardiovascular and Physiological effects	4	6	8	8	6	5	6	6.14	20.5
Hearing Impairment	11	12	5	6	5	10	4	7.57	25.2
Sleeplessness	8	5	6	8	3	6	10	6.56	21.9
Mental Health	3	2	2	3	7	3	4	3.42	11.4
Annoyance	1	2	1	1	3	4	2	2	6.6
Human performance	3	3	8	4	6	2	4	4.27	14.2
TOTAL	30	30	30	30	30	30	30		100

Source: Fieldwork,2011

3.3. Cardiovascular and Physiological Effects:

It has been postulated that noise acts as an environmental stressor[2;34].Acute noise exposures activate the autonomic and hormonal systems, leading to temporary changes such as increased blood pressure, increased heart rate and vasoconstriction. After prolonged exposure, susceptible individuals in the general population may develop permanent effects, such as hypertension and ischaemic heart disease associated with exposures to high sound pressure levels[2;8;34]. The result in Table 2 shows that sampled population with the mean value of 6.14 (20.5%) agreed that noise pollution is responsible for Cardiovascular and Physiological problems which ranks second to the highest value.

3.4. Hearing Impairment:

Hearing handicap is the disadvantage imposed by hearing impairment sufficient to affect one's personal efficiency in the activities of daily living. It is usually expressed in terms of understanding conventional speech in common levels of background noise [27; 34]. The result shows that sampled population ascertained that noise population is responsible for hearing impairment with the mean value of 7.57 (25.2%). The result is consistent with the findings of [23; 34; 40;41 who observed that hearing impairment in young adults and children 12 years and older has been assessed by LAeq on a 24 h time basis, for a variety of environmental and leisure-time exposure patterns due to environmental pollution.

3.5. Sleep Disturbance:

Uninterrupted sleep is known to be a prerequisite for good physiological and mental functioning of healthy persons [1; 4; 25] sleep disturbance, on the other hand, is considered to be a major environmental noise effect. field studies have examined the effects of road traffic and railway noise [8; 17;18;19]. The primary sleep disturbance effects are: difficulty in falling asleep (increased sleep latency time); awakenings; and alterations of sleep stages or depth, especially a reduction in the proportion of REM-sleep (REM = rapid eye movement) [25]. The result indicates that sleeplessness due to noise records the mean value of 6.56 (21.9%). The secondary effects include reduced perceived sleep quality; increased fatigue; depressed mood or well-being; and decreased performance [7;33; 34;35].

3.6. Mental Health Effects:

Mental health is defined as the absence of identifiable psychiatric disorders according to current norms [14]. Studies on the adverse effects of environmental noise on mental health cover a variety of symptoms, including anxiety; emotional stress; nervous complaints; nausea; headaches; instability; argumentativeness; sexual impotency; changes in mood; increase in social conflicts, as well as general psychiatric disorders such as neurosis, psychosis and hysteria [2]. However, the studies have been criticized because of problems in selecting variables and in response bias [4; 22]. The result indicated that the mean value of 3.42 (11.4%) agreed to mental effect of noise pollution in urban area.

3.7. The Effects of Noise on Annoyance:

Noise annoyance is a global phenomenon, the physiological features like breathing amplitude, blood pressure, heart-beat rate, pulse rate, blood cholesterol are effected [10].

A definition of annoyance is "a feeling of displeasure associated with any agent or condition, known or believed by an individual or group to adversely affect them" [29;30]. However, apart from "annoyance", people may feel a variety of negative emotions when exposed to community noise, and may report anger, disappointment, dissatisfaction, withdrawal, helplessness, depression, anxiety, distraction, agitation, or exhaustion[28]. A number of studies have shown that equal levels of traffic and industrial noises result in different magnitudes of annoyance[19; 21; 31]. Data from 42 surveys showed that at the group level about 70% of the variance in annoyance is explained by noise exposure characteristics, whereas at the individual level it is typically about 20% [28]. The result indicates that sampled population with the mean of 2 (6.6%) agreed that noise pollution is the cause of annoyance in urban area which is the second to the least factors. Conversely, for road traffic noise, the introduction of noise protection barriers in residential areas resulted in smaller reductions in annoyance than expected for a stationary situation [32].

3.8. The Effects of Noise on Performance

It has been documented in both laboratory subjects and in workers exposed to occupational noise, that noise adversely affects cognitive task performance [9; 12; 13; 20]. Some of the effects are related to loss in auditory comprehension and language acquisition, but others are not [11]. Experimental noise exposure consistently produces negative after-effects on performance [26]. The result shows that sampled population with the mean value of 4.27 (14.2%) agreed that noise pollution affect performance in urban area (Fig.2).

Table 3: Distribution of Respondents according to temporal Variation of Noise Generation in the Selected roads

Time	Sampled Locations							Mean	%
	NP 1	NP2	NP3	NP4	NP5	NP6	NP 7		
8 -11am	15	18	13	14	14	15	14	14.7	49.1
3 -7pm	12	11	14	13	9	12	12	11.8	39.5
<10 pm	3	1	3	3	7	3	4	3.4	11.4
TOTAL	30	30	30	30	30	30	30		100

Source : Fieldwork, 2011

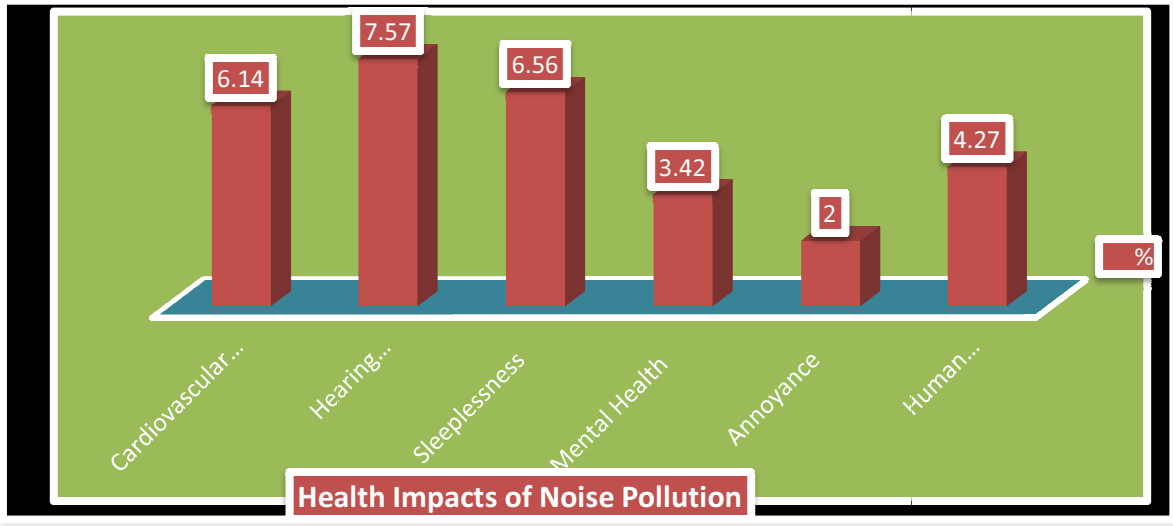

Fig. 2. Health Impacts of Environmental Noise Pollution in Owerri Urban

From Table 4, the result shows that environmental noise is at the peak between the hours of 8- 11 am reflecting the mean value of 14.7 (49.1%), the periods the workers, students, pupils and business/market men and women moved to the point of action during the day, hence influx of vehicles that generate noise. The hours between 3-7 pm are the periods that people left their duty posts to their homes for resting which constitutes the mean value of 11.8 (39.5%), while <10pm has mean value of 3.4 (11.4%), indicating noise pollution is less in the evening time of the day where people are indoor for rest (Fig.3).

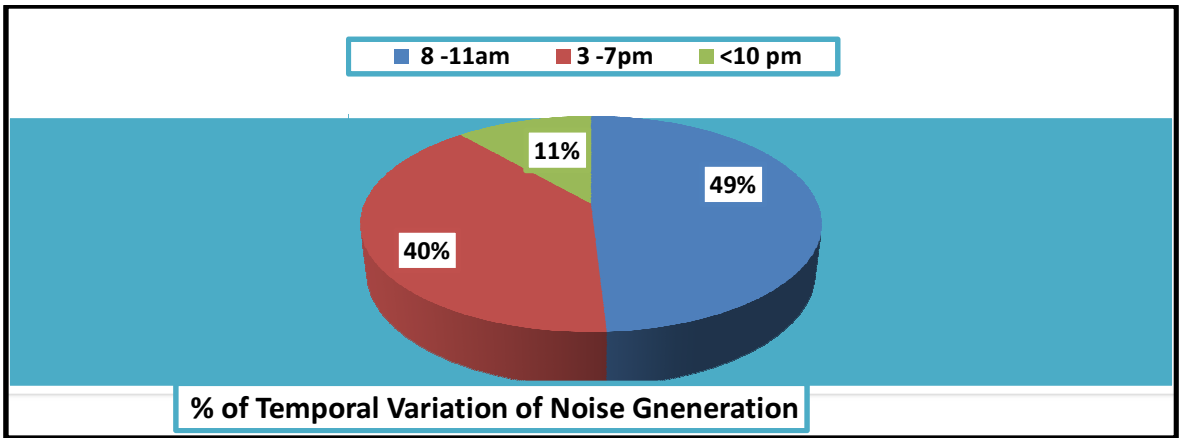

Fig. 3. Temporal Variation of Environmental Noise Generation in Owerri Urban

4. SUMMARY AND CONCLUSION

In developing countries, occupational noise and urban, environmental noise are increasing risk factors for hearing impairment. Exposure to excessive noise is also of concern because it is associated with distressing conditions such as tinnitus[38].

In this study , the health impact of environmental noise has been established based on the administration of questionnaires . It is observed that church has the lowest percentage response as source of noise pollution, while automobile records the highest response as the main source of environmental noise pollution in urban areas, and this has led to the greater number of peoples suffering from hearing impairment in the area. From the temporal variation of environmental noise, its peak was discovered between the hours of 8- 11am and lowest during the hour of < 10 pm. This variation was found to be influenced by vehicular flow and the movement of people in and out of their destinations. It is now concluded that exposure to excessive noise is the major avoidable cause of hearing impairment and this is caused by high volume of

vehicular flow that lead to blowing of horn by heavy duty trucks, passengers cars, and tricycles.

Based on the results, recommended Noise Management Measures:

[i] **Legal measures:** Enforcement of regulations to maintain Low Noise Minimum requirements for acoustical in urban area by approved Government Agencies. If governments implement only weak noise policies and regulations, they will not be able to prevent a continuous increase in noise pollution and associated adverse health effects. Failure to enforce strong regulations is ineffective in combating noise as well.

[ii] **Engineering Measures:** Vehicles that apply the road must be maintained and checked by vehicle inspection office (VIO) for compliance**.**

[iii] ***Education and Public Awareness***. Noise abatement policies can only be established if basic knowledge and background material is available, and the people and authorities are aware that noise is an environmental hazard that needs to be controlled. Limits on the noise emission of vehicles have been introduced in many countries [39]. Such limits, together with the relevant measuring methods, should also be introduced in other regions of the world.

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