IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)
e-ISSN: 2319-2402,p- ISSN: 2319-2399.Volume 14, Issue 7 Ser. II (July 2020), PP 58-71
www.iosrjournals.org

Effects of Social, Demographical and Behavioral Factors on the Noise Level Evaluation in Urban Open Spaces of Ibadan Metropolis, Oyo State, Nigeria

P. A. Ogar[1], C. N. Uyo[2], K. M. Iwuji[2], A. E. Ukpe[2], A. I. Dike[2], C. R. Asoegwu[2], M. O. Nwauhiara[2]

[1]*Institute of Ecology and Environmental Studies, Obafemi Awolowo University, Ile-Ife*
[2]*Department of Environmental Management, Federal University of Technology, Owerri (FUTO)*
Corresponding Author: Chijioke Ndukwe Uyo

Abstract
Noise is identified as a disturbance that could induce different behavioural responses. Noise pollution is a major problem in Ibadan Municipality, affecting human behavior, well-being, productivity and health. The study therefore assessed the sources and effects of noise in urban open spaces of Ibadan metropolis, Oyo state Nigeria. The survey was carried out to identify settings of noise and noise levels, to which people are regularly exposed and compare measured levels with the National permissible levels of NESREA. This was done with a view to proffer best strategies to control noise pollution in the study area. The study involved the use of primary and secondary sources of data. Digital noise meters, digital cameras, Global Positioning System GPS were materials used to measure sound levels at high noise locations. Well structured questionnaires were also used to elicit responses from 150 respondents carrying out various businesses in the study location. The data was analysed using statistical packages for social sciences (SPSS version 20) and result of descriptive statistic was presented with the help of graphs, charts, percentages and cross-classifications on sources of noise, effects of noise, reactions to noise and suggestions to control noise. The results from respondents clearly identified Gbagi, Wema park, Iwo road, Agodi Gate, Bodija, Sango-Ojurin, Mokola, Dugbe, Molete and Challenge as high noise locations. Noise levels recorded ranges from 79.9 to 114.7 dB(A) for Maximum values and 59.3 -99.3 for Minimum values. The measured maximum levels were all above the NESREA permissible levels of 75 for commercial areas for eight hour daily exposure levels. Analysis on acute effects showed that noise affects communication, 67(44.7%), causes headaches and fatigues, 82(54.7%), 82(54.7%) agree that noise causes annoyance and disruption of behaviour, affects hearing, 69(46.0%), reduces productivity, 54(36.0%) and causes lack of concentration, 69(46.0%). The responses on chronic effects of noise showed that noise elevates stress levels, 83(55.3%), elevates heart rates 96(64.0%), causes repeated sicknesses, 81(54.%), causes increase in blood pressure 96(64.0%) and causes hearing loss 81(54.0%). The study concluded that noise has acute and chronic effects that adversely affect general health and well-being of citizens carrying out activities in high noise locations. Local control of noise has not been successful in Ibadan, as most people spend a significant portion of their time in high noise locations without recourse to its impacts on their health and wellbeing. The study therefore recommended vigorous education and awareness campaigns on noise, implementable legislations, noise monitoring, enforcement of standards and improved technologies on noise as some of the measures to control noise pollution in Ibadan Metropolis.

Keywords: ***Noise Pollution, Monitoring, Noise Meter, Global Positioning System, Ibadan Metropolis***

Date of Submission: 13-07-2020 Date of Acceptance: 28-07-2020

I. Introduction

Noise, commonly defined as unwanted sound, is an environmental phenomenon to which humans are exposed before birth and throughout life. Noise can also be considered an environmental pollutant, a waste product generated in conjunction with various human activities (Stansfeld et al., 2000). Noise is any sound – independent of loudness – that may produce an undesired physiological or psychological effect in an individual and that may interfere with the social ends of an individual or group. These ends include all human activities – communication, work, rest, recreation and sleep (Mitzelfelt, 1996).

An important difference between sound or noise and other classic environmental pollutants is the fact that sound is not harmful to the environment *per se* but is being stored as sometimes harmful impressions in individual people (Geary, 1996). Noise cannot be diluted, cleansed, collected or reused, but a precautionary principle can be applied, so that no human being should involuntarily be exposed to noise that could be harmful

to their hearing, health and wellbeing (Miedema, 1998). Human activities such as urban development, the construction and exploitation of natural resources, and transportation have increased around the globe in the last century, changing the acoustic environment both on land and underwater (Jasny 1999; McDonald et al. 2006; Watts et al. 2007; Barber et al. 2009). Human activities introduce anthropogenic noise sources into the environment across many elements of the modern terrestrial landscape, including roads, airports, military bases, and cities (Murphy, 2014).

Noise pollution is therefore the addition of unwanted noise into the atmosphere (Stansfeld et.al. 2000). Noises can be of different levels depending on duration; long lasting and short-term, depending on intensity; very loud, medium and soft sounds, depending on the distance from the source (WSP, 2015). Anthropogenic noise is a global phenomenon, with the potential to affect humans, wildlife and infrastructure across all continents, countries, towns and cities (Francis, et.al. 2009).

Numerous international reports e.g. Principle 10 of the Rio Declaration on Environment and Development (UNEP, 1992) has expressed the importance of public participation to move towards sustainable development. Furthermore, as is the case with many issues affecting the sustainability of the environment in Nigeria, noise pollution cannot be tackled by policymakers alone. To manage noise pollution in cities one also needs to consider the behavior of the citizens themselves. The first step towards changing such behavior is to raise awareness. But often participation is only proposed at the decision making level.

Ibadan being the largest city in West Africa and host to many government ministries, departments and agencies, institutions of learning, various businesses, thriving infrastructures, multinational companies and large markets has attracted people from various parts of the country and abroad thereby increasing human activities that results in noise pollution. Exposure to noise for a long duration according to occupational safety and health act (OSHA, 2016) may result to physical, physiological and even psychological problems. These problems may include permanent or temporary hearing loss, interference with speech clarity and intelligibility, reduced productivity, increase blood pressure and even lack of concentration (OSHA, 2016).

This study aims to investigate how a participatory and people-centric approach to noise monitoring can be used to create awareness on the dangers of high noise areas in Ibadan Municipality thus assessing the sources, effects and control of human-induced noise in Ibadan Municipality.

II. Research Methodology

The Study Area

The study area which was Ibadan consisted of 11 Local Government Areas (LGAs) for governance and administrative purposes. Five of the LGAs are located in the metropolis, while the remaining six are either predominantly peri-urban or rural settlements (Figure 3.1). Ibadan is one of the largest metropolitan cities in West Africa and is primarily an indigenous city with millions of inhabitants, most of which are Yoruba's; other ethnic groups constitute smaller proportions of the population (Yesufu *et al.*, 2013). It has total land area of 3 123 km^2 of which about 15 per cent is urban and the remaining 85 per cent is classified as peri-urban (Adelekan *et al*., 2014). Ibadan North LGA is the largest among the urban LGAs (145.58 km^2) while Ibadan North West is the smallest at 31.38 km^2. The peri-urban LGA of Ido (865.49 km^2) covers the largest land area (Adelekan *et al*., 2014).

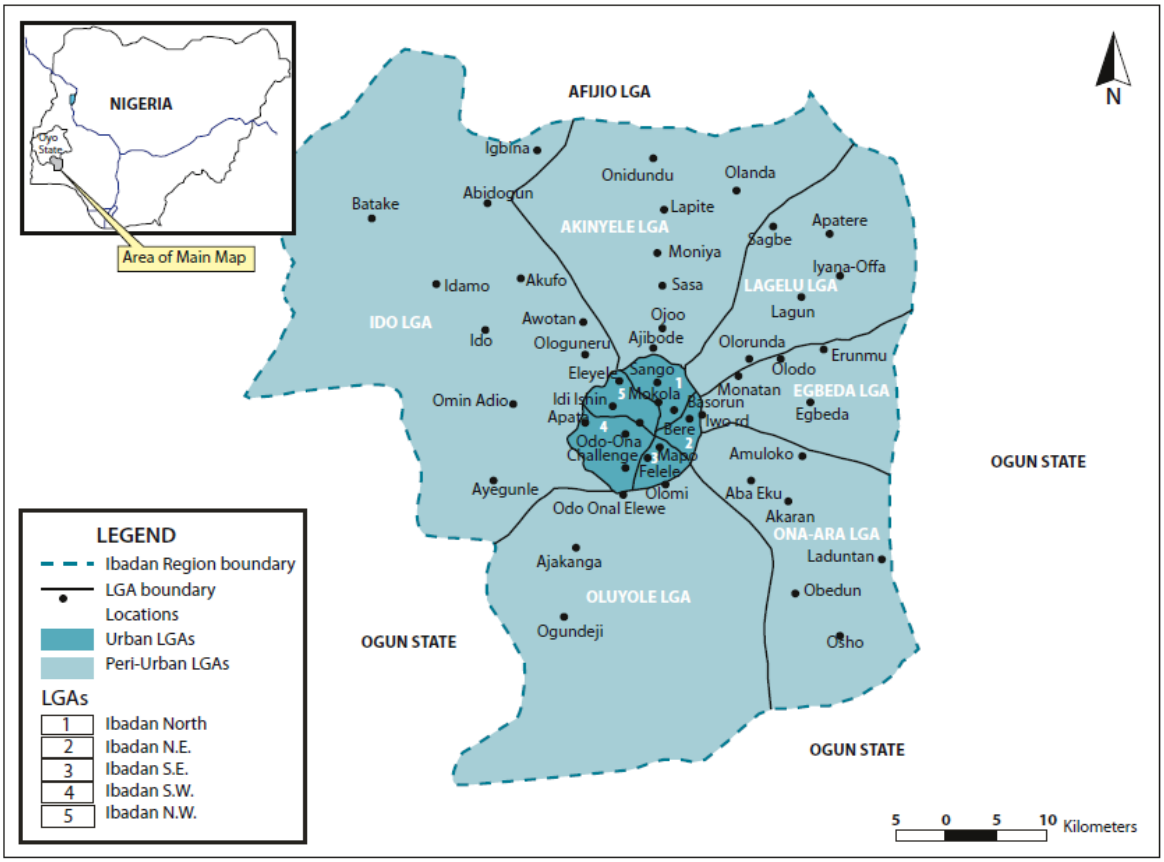

Figure1: Map of the Study Area

Research Design

To investigate sources of noise that create noise pollution, the study identified high noise locations in the entire study area by means of a preliminary reconnaissance survey conducted in and around the Ibadan metropolis. Twenty (20) respondents were randomly selected from the high noise area and standard questionnaires were administered to elicit responses. The questionnaire survey was designed to establish a comparison between the level of exposure and the state of health of the people within the vicinity of the selected study locations. The target population required to conduct the survey were the various business operators. Apart from their level of enlightenment they were also chosen because they formed the larger percentage of the populace in the study area that spent extended periods at work in the locations; thus, making them the most vulnerable. In order to assess the sources, effect and control of noise pollution, digital noise meters, questionnaires, semi-structured interviews and direct observation were all used to gather all the necessary data required for the study. Data collection was carried out for a period of six weeks in the selected high noise areas**.** All instrument used were tested and found to be in perfect working conditions before they were used for data collection.

Sources of Data Collection

The primary data consists of a number of items in a standard questionnaire that was administered to the respondents. The decision to structure the questionnaire was predicated on the need to reduce variability in the meaning conveyed by the question as a way of ensuring comparability of responses. The study also involved empirical measurement of noise levels using digital noise meters in identified high noise locations in the study area, coordinates of these locations were also gotten using global positioning system GPS Garmin 17. Secondary/Ancillary data were collected through texts books, journals, newspapers, magazines and other materials relevant to the research topic. The target population of the study included business operators within and around high noise areas who spends a minimum of five hours a day on such locations. The study sample was deduced from the total population through sample randomization and the distributions are highlighted as follows;

Table 1: Sample Population

ITEMS	POPULATION	%
Gbagi market	20	10
Wema park	20	10
Iwo Road Roundabout	20	10
Agodi Gate market area	20	10
Mokola junction	20	10
Bodija	20	10
Sango – Ojurin market	20	10
Dugbe axis	20	10
Molete junction	20	10
challenge	20	10
TOTAL	200	100%

Source: Fieldwork 2018.

Methods of Data Analysis

The data collected from the field was validated, edited and coded. The validation process enabled the researcher to determine the rate of the questionnaire. In editing, the questionnaire was scrutinized to determine the response rates; data from interviews and open-ended items in the questionnaire constituted the qualitative data in form of words and phrases. However, some data were quantitative and treated along the quantitative data from the structured questionnaire items. Finally, all qualitative data were coded whereby categories of responses were identified, classified and then recorded or tabulated on a prepared sheet in tandem with the objectives of the study. They were subjected to descriptive statistics so as to produce frequencies and percentages which were used as tools of analysis. The data was analysed and presented using charts and tables accompanied by appropriate descriptions and explanations. The Levels of noise measured with the digital noise meter was compared with the National standards for noise control in Nigeria.

III. Results And Discussion

Settings of noise and measured noise levels to which people are regularly exposed

One of objectives of the study is to identify settings of noise. This was done with the help of reconnaissance survey of the major locations within the metropolis. Identified high noise areas were used for the survey. The major locations identified as high noise locations were areas of intense human, vehicular, rail and air transport activities. The outcome of the study which included sources of noise, measured noise levels, locations where noise levels were taken and their geo-coordinates is presented in the table below.

Table 2: Noise Sources, Measured Levels, Locations and Coordinates

SOURCE	MAX dB(A)	MIN dB(A)	LOCATION	GEO-LOCATION	NESREA PERMISSIBLE LEVEL dB(A)
Loud speaker	95.8	64.0	Wema park	07^0 23' 48.4" 003^0 57' 05.8' 243m	75
Automobile	82.0 88.8	77.1 71.7	Wema park	07^0 23' 48.8" 003^0 57' 04.2" 238m	75
Motor park	83.2	62.1	Gbagi park	07^0 23' 37.2" 003^0 57' 30.4" 235m	75
Advertisement	114.8	99.2	Gbagi market	007^0 23' 35.4" 003^0 57' 25.0" 232m	75
Automobile	90.4	67.2	Iwo raod under bridge	07^0 24' 13.7" 003^0 56' 40.4" 238m	75
Vehicular movement and human activities	99.8	67.2	Iwo road round about	07^0 24' 13.2" 003^0 56' 42.7" 232m	75
Vehicular movement	79.9	68.1	Eko park Iwo Road	07^0 24' 14.8" 003^0 56' 42.8"	75
Musical instrument	99.4	80.2	Agodi Gate	07^0 23' 50.5" 003^0 55' 18.6" 254m	75
Advertisement	98.6	71.0	Agodi Gate	07^0 23' 51.5" 003^0 55'19.3" 250m	75
Vehicular movement	97.9	59.3	Agodi Gate bus stop	07^0 23' 43.9"	75

				003^0 55' 10.0" 251m	
Vehicular movement	85.6	69.5	Bodija market roadside	07^0 25' 49.8" 003^0 54' 49.0 248m	75
Barber shop	92.1	65.0	Bodija opp market	07^0 25' 52.3" 003^0 54' 48.5" 241m	75
Grinding machine	94.1	83.9	Bodija market	07^0 25' 50.9" 003^0 54' 49.8" 238m	75
Automobile	80.3	66.4	Sango opp. Fatoil filling station	07^0 25' 25.5" 003^0 53' 59.5" 217m	75
Vehicular	80.7	68.5	Sango junction	07^0 25' 23.5" 003^0 53' 58.1" 220m	75
Market noise	81.7	70.4	Elewure junction, Sango	07^0 25' 16.8" 003^0 53' 54.1 223m	75
Vehicular movement	99.6	67.2	Mokola Oja	07^0 24' 11.1" 003^0 52' 27.2" 202m	75
Musical instrument	98.0	76.1	Mokola under bridge	07^0 24' 00.9" 003^0 53' 26.4" 200m	75
Automobile, advertisement	99.5	72.8	Dugbe junction	07^0 23' 07.55" 003^0 52' 52.9" 196m	75
Vehicular movement	89.4	66.8	Molete gasland	07^0 21' 33.3" 003^0 53'21.7" 175m	75
Vehicular movement	96.5	70.9	Molete under bridge	07^0 21' 29.5 003^0 53' 23.2" 176m	75
Vehicular / human noise, musical	95.2	71.8	Challenge MRS	07^0 20' 50.2" 003^0 52' 46.6 201m	75
Vehicular movement	97.8	72.5	Challenge bus stop	07^0 20' 53.3" 003^0 52' 45.9" 171m	75
Vehicular, advertisement, hawkers	89.9	69.2	Challenge roundabout	07^0 20' 51.7" 003^0 52' 47.1" 175m	75

Source: Field work 2018

The result of measured averages of day and night time measurements of the study as presented in table depicts that automobile sounds, advertisements, musical instruments, rail operations, air transport operations, machineries, and other human activities like barbing saloons, grinding machines etc are the major sources of anthropogenic noise in the major city locations like Gbagi, Wema park, Iwo road, Agodi Gate, Bodija, Sango-Ojurin, Mokola, Dugbe, Molete and Challenge. Noise levels recorded range from 79.9 to 114.7 dB(A) for Maximum values and 59.3 -99.3 for Minimum values. The measured maximum levels were all above the NESREA permissible levels of 75 for commercial areas for eight hour daily exposure levels. The study also involved the perception of business operators around and within these locations on the various sources of noise and the result of the study is presented in table.

Table 3: Response of Respondents to Sources of noise

			Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Automobiles	Valid	YES	150	100.0	100.0	100.0
Railway	Valid	YES	56	37.3	37.3	37.3
		NO	94	62.7	62.7	100.0
		Total	150	100.0	100.0	

Airport	Valid	YES	28	18.7	18.7	18.7
		NO	122	81.3	81.3	100.0
		Total	150	100.0	100.0	
Machinery	Valid	YES	124	82.7	82.7	82.7
		NO	26	17.3	17.3	100.0
		Total	150	100.0	100.0	
Generators	Valid	YES	150	100.0	100.0	100.0
Megaphones	Valid	YES	150	100.0	100.0	100.0
Working with Tools	Valid	YES	112	74.7	74.7	74.7
		NO	38	25.3	25.3	100.0
		Total	150	100.0	100.0	
Worship Activities	Valid	YES	84	56.0	56.0	56.0
		NO	66	44.0	44.0	100.0
		Total	150	100.0	100.0	
Advertisements	Valid	YES	150	100.0	100.0	100.0
Musical Instruments	Valid	YES	150	100.0	100.0	100.0

The primary data presented on table 3 shows the responses of respondents to various sources of noise at different locations within the metropolis of Ibadan. The summary of the result shows that 150 respondents which make up 100% of the sample population agreed that sounds from automobiles is a major source of human-induced noise in all the locations of the study, 56 (37.3%) of respondents majorly in areas like Bodija, Sango, and Dugbe agreed that railway operations is a source of anthropogenic noise in such locations while 94(62.7%) of respondents said disagreed. 28(18.7%) of respondents agreed that air operations that include landing and take-off noise from aeroplanes constitutes a source of noise around the Gbagi market area, 122(81.3%) of respondents in other locations disagreed to this notion. Also, 124(82.7%) of respondents agreed that machinery activities and operations constitute a source of noise in the study locations while 26(17.3%) of respondents disagreed. Similarly, 150(100%) of respondents agreed that generators used as source of power to carry out various business operations is a source of anthropogenic noise in the study locations. Likewise, megaphones were identified as a source of noise as agreed by 150(100%) of the respondents. 112(74.7%) of respondents also agreed that working with tools generates noise in the study locations, while 38(25.3%) of respondents disagreed when responding to the question. However, 84(56%) of respondents agreed that various worship activities generate noise, as 66(44%) of respondents disagreed to this question. Advertisements was agreed by 150(100%) of respondents to be a source of noise pollution in the study locations. Also, 150(100%) respondents agreed that musical instruments of various forms are a major source of anthropogenic noise in the study locations.

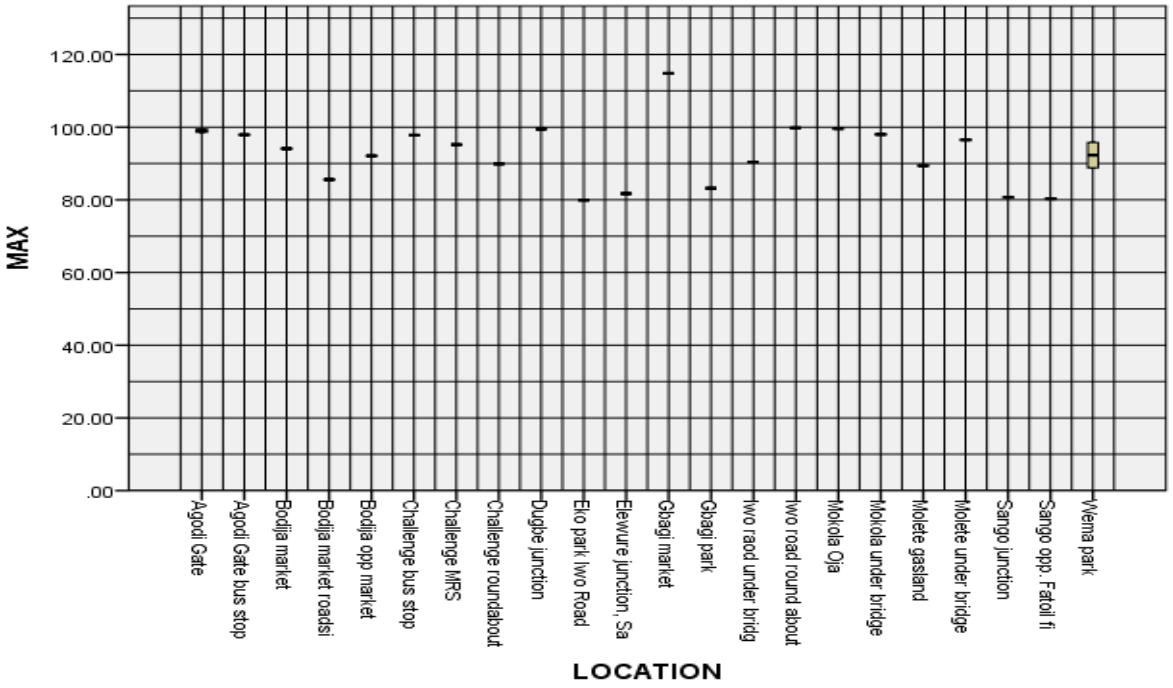

Figure 2: Maximum Noise Levels and Corresponding Locations

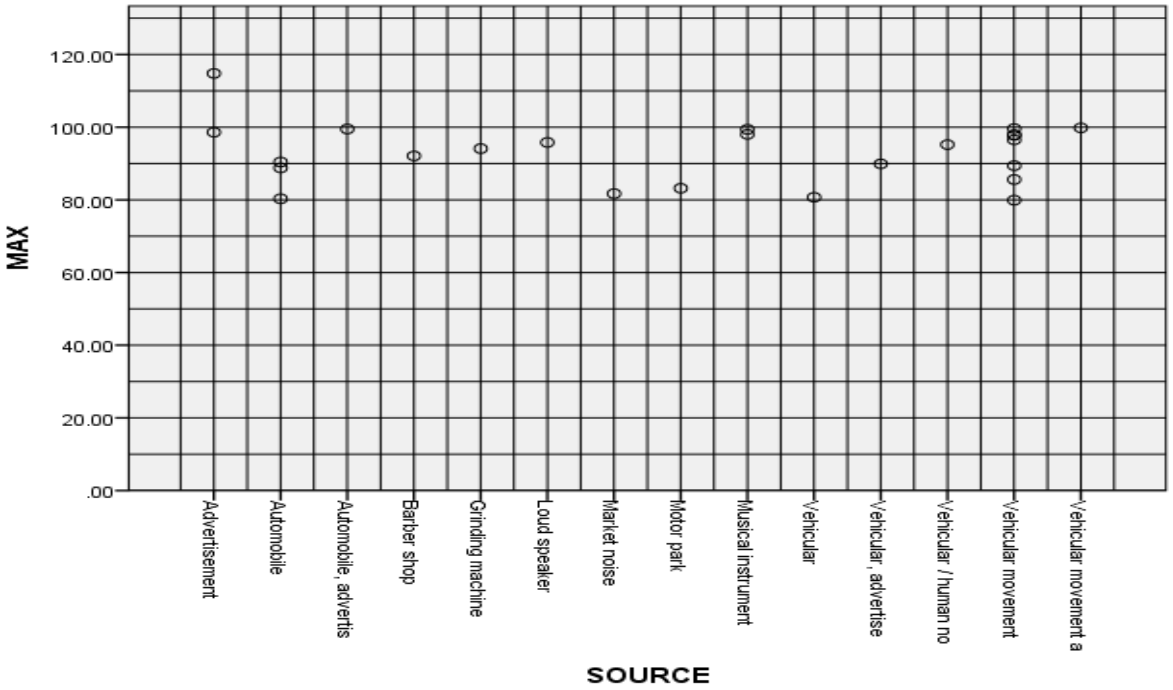

Figure 3: Maximum Noise Levels and Corresponding Sources

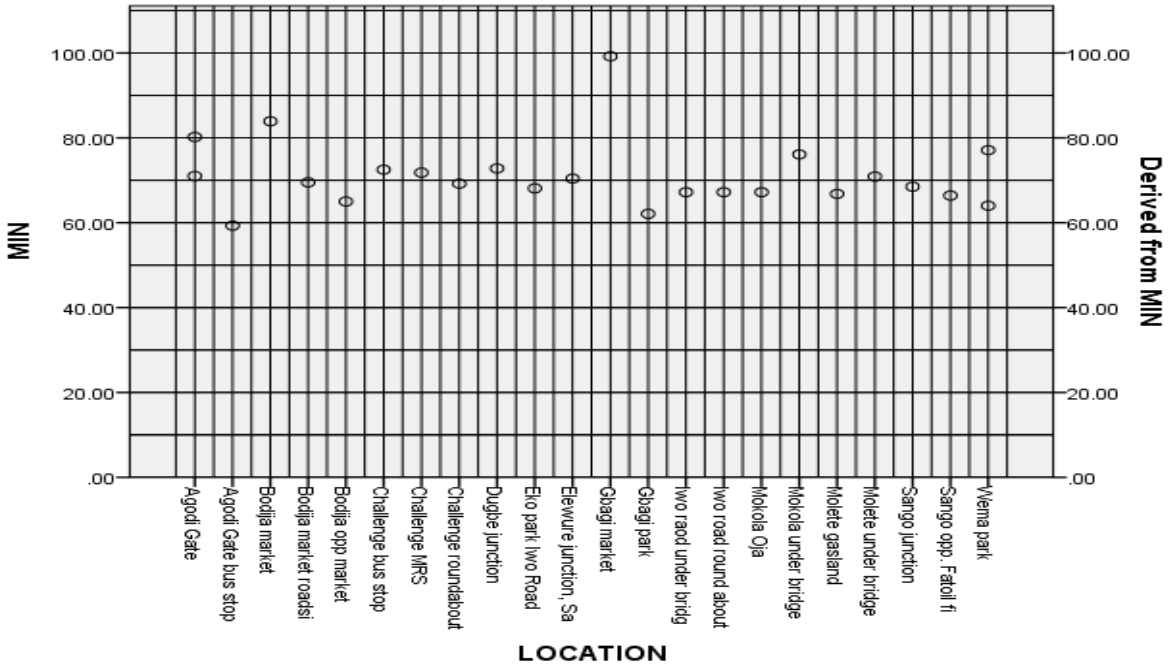

Figure 4: Minimum Noise Levels and Corresponding Locations

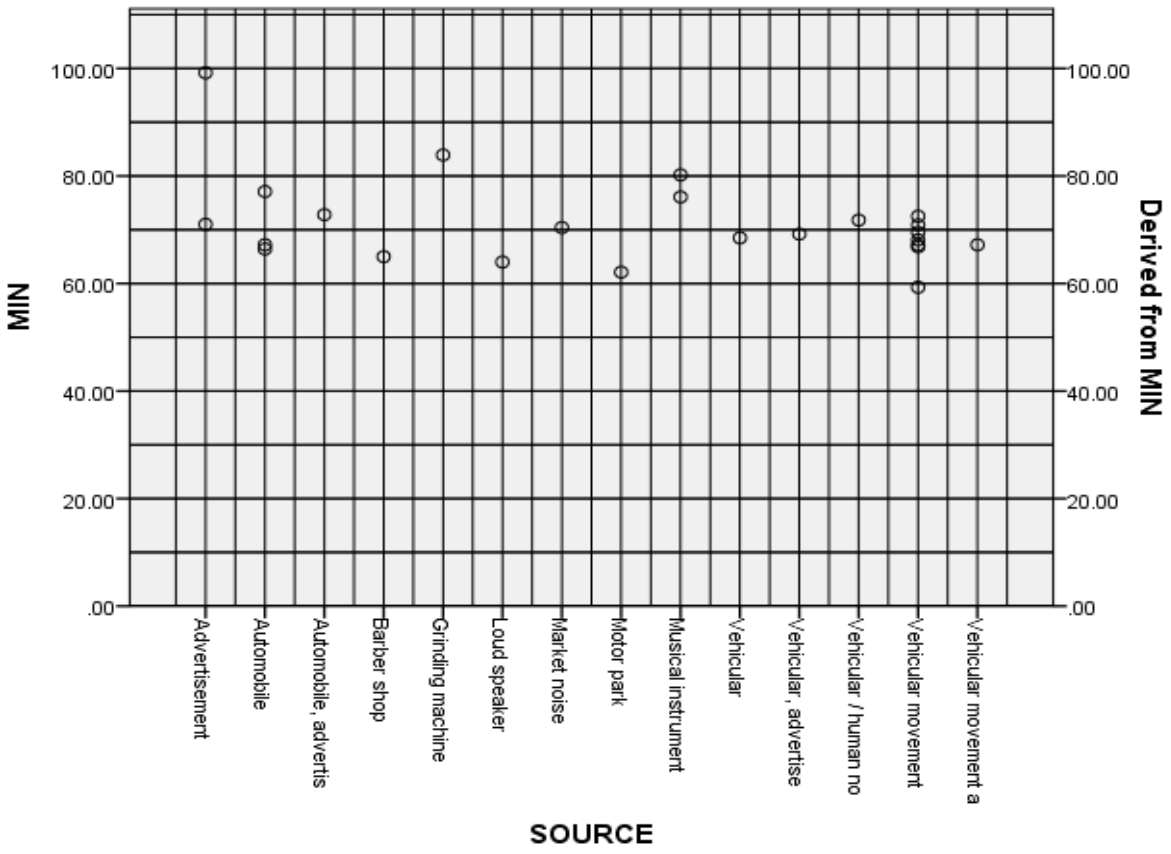

Figure 5: Minimum Noise Levels and Corresponding Sources

Effects of Noise on Respondents

The study sought the perceptions of people on the effects of noise on their wellness and performance as well as their reactions to human-induced noise in the study locations. The effects were classified into acute and chronic based on the severity and duration of occurence.The results of the analysis are as presented in tables below.

Acute Effects of Noise on Respondents

The acute effects of noise pollution are presented in the table below.

Table 4: Acute effects of Noise on Respondents

			Frequency	Percent	Valid Percent	Cumulative Percent
Affects Communication	Valid	Disagree	28	18.7	18.7	18.7
		No response	14	9.3	9.3	28.0
		Agree	67	44.7	44.7	72.7
		Strongly Agree	41	27.3	27.3	100.0
		Total	150	100.0	100.0	

			Frequency	Percent	Valid Percent	Cumulative Percent
Headaches and Fatigues	Valid	Disagree	28	18.7	18.7	18.7
		No response	14	9.3	9.3	28.0
		Agree	82	54.7	54.7	82.7
		Strongly Agree	26	17.3	17.3	100.0
		Total	150	100.0	100.0	

			Frequency	Percent	Valid Percent	Cumulative Percent
Annoyance	Valid	Disagree	28	18.7	18.7	18.7
		No response	14	9.3	9.3	28.0
		Agree	82	54.7	54.7	82.7
		Strongly Agree	26	17.3	17.3	100.0
		Total	150	100.0	100.0	

			Frequency	Percent	Valid Percent	Cumulative Percent
Disruption of Behavior	Valid	Disagree	28	18.7	18.7	18.7
		No response	14	9.3	9.3	28.0
		Agree	82	54.7	54.7	82.7
		Strongly Agree	26	17.3	17.3	100.0
		Total	150	100.0	100.0	

			Frequency	Percent	Valid Percent	Cumulative Percent
Affects hearing	Valid	Disagree	28	18.7	18.7	18.7
		No response	14	9.3	9.3	28.0
		Agree	69	46.0	46.0	74.0
		Strongly Agree	39	26.0	26.0	100.0
		Total	150	100.0	100.0	

			Frequency	Percent	Valid Percent	Cumulative Percent

Reduces Productivity	Valid	Disagree	28	18.7	18.7	18.7
		No response	29	19.3	19.3	38.0
		Agree	54	36.0	36.0	74.0
		Strongly Agree	39	26.0	26.0	100.0
		Total	150	100.0	100.0	

			Frequency	Percent	Valid Percent	Cumulative Percent
Lack of Concentration	Valid	Disagree	28	18.7	18.7	18.7
		No response	14	9.3	9.3	28.0
		Agree	69	46.0	46.0	74.0
		Strongly Agree	39	26.0	26.0	100.0
		Total	150	100.0	100.0	

The primary data presented on table 4 shows that 28(18.7%) of respondents disagree that noise affects communication, 67(44.7%) agree that it affects communication, 41 (27.3%) strongly agree, while 14(9.3%) had no response when asked if noise affects their smooth communication.

The results also shows that 28(18.7%) of respondents disagree that noise causes headaches and fatigues, 82(54.7%) agree that it causes headaches and fatigues, 26 (17.5%) strongly agree, while 14(9.3%) had no response when asked if noise causes headaches and fatigues. Similarly, the results shows that 28(18.7%) of respondents disagree that noise causes annoyance, 82(54.7%) agree that it causes annoyance, 26 (17.5%) strongly agree, while 14(9.3%) had no response when asked if noise causes annoyance.

On the other hand, the results shows that 28(18.7%) of respondents disagree that noise causes disruption of behavior, 82(54.7%) agree that it causes disruption of behavior, 26 (17.5%) strongly agree, while 14(9.3%) had no response when asked if noise causes disruption of behavior.

In the same vein, the results shows that 28(18.7%) of respondents disagree that noise affects hearing, 69(46.0%) agree that it affects hearing, 39 (26.0%) strongly agree, while 14(9.3%) had no response when asked if noise affects hearing.

However, the results also shows that 28(18.7%) of respondents disagree that noise reduces productivity, 54(36.0%) agree that it reduces productivity, 39 (26.0%) strongly agree, while 29(19.3%) had no response when asked if noise reduces productivity.

Finally on acute effects of noise, the results shows that 28(18.7%) of respondents disagree that noise causes lack of concentration, 69(46.0%) agree that it causes lack of concentration, 39 (26.0%) strongly agree, while 14(9.3%) had no response when asked if noise causes lack of concentration.

Chronic Effects of Noise on Respondents

The chronic effects of noise pollution are presented in the table below.

Table 5: Chronic Effects of Noise on Respondents

			Frequency	Percent	Valid Percent	Cumulative Percent
Elevates Stress Levels	Valid	Disagree	54	36.0	36.0	36.0
		Agree	83	55.3	55.3	91.3
		Strongly Agree	13	8.7	8.7	100.0
		Total	150	100.0	100.0	

			Frequency	Percent	Valid Percent	Cumulative Percent
Elevates heart rates	Valid	Disagree	54	36.0	36.0	36.0

	Agree	96	64.0	64.0	100.0
	Total	150	100.0	100.0	

			Frequency	Percent	Valid Percent	Cumulative Percent
Repeated Sicknesses	Valid	Disagree	54	36.0	36.0	36.0
		No response	15	10.0	10.0	46.0
		Agree	81	54.0	54.0	100.0
		Total	150	100.0	100.0	

			Frequency	Percent	Valid Percent	Cumulative Percent
Increase in blood pressure	Valid	Disagree	54	36.0	36.0	36.0
		Agree	96	64.0	64.0	100.0
		Total	150	100.0	100.0	

			Frequency	Percent	Valid Percent	Cumulative Percent
Hearing loss	Valid	Disagree	69	46.0	46.0	46.0
		Agree	81	54.0	54.0	100.0
		Total	150	100.0	100.0	

The primary data on chronic effects of noise presented on table 5 shows that 54(36.0%) of respondents disagree that noise elevates stress levels, 83(55.3%) agree that it elevates stress levels, and 13 (8.7%) strongly agree that noise through anthropogenic activities elevates stress levels.

The results also shows that 54(36%) of respondents disagree that noise elevates heart rates, while 96(64.0%) agree that noise elevates heart rates.

Similarly, the results shows that 54(36.0%) of respondents disagree that noise causes repeated sicknesses, 81(54.%) agree that noise causes repeated sicknesses, while 15 (10%) had no response when asked if noise causes repeated sicknesses.

On the other hand, the results shows that 54(36.0%) of respondents disagree that noise causes increase in blood pressure, while 96(64.0%) agree that it causes increase in blood pressure.

In the same vein, the results shows that 69(46.0%) of respondents disagree that noise affects hearing and causes hearing loss, while 81(54.0%) agree that it affects hearing and causes hearing loss.

Best Measures and Strategies to Control Noise Pollution and its Effects

The study sought the opinions of respondents affected by noise pollution on best measures and strategies to control anthropogenic noise and its effects on their health and wellbeing. The results of the findings are as presented in table 6 below.

Table 6: Best Measures and Strategies to Control Noise Pollution and its Effects

			Frequency	Percent	Valid Percent	Cumulative Percent
Education and Awareness	Valid	Agree	69	46.0	46.0	46.0
		Strongly Agree	81	54.0	54.0	100.0
		Total	150	100.0	100.0	

			Frequency	Percent	Valid Percent	Cumulative Percent
Government Efforts	Valid	Agree	83	55.3	55.3	55.3
		Strongly Agree	67	44.7	44.7	100.0
		Total	150	100.0	100.0	

			Frequency	Percent	Valid Percent	Cumulative Percent
	Valid	Disagree	14	9.3	9.3	9.3
		No response	28	18.7	18.7	28.0

Empowering Agencies	Agree	54	36.0	36.0	64.0
	Strongly Agree	54	36.0	36.0	100.0
	Total	150	100.0	100.0	

			Frequency	Percent	Valid Percent	Cumulative Percent
Ear muffs	Valid	Strongly Disagree	12	8.0	8.0	8.0
		Disagree	29	19.3	19.3	27.3
		No response	27	18.0	18.0	45.3
		Agree	28	18.7	18.7	64.0
		Strongly Agree	54	36.0	36.0	100.0
		Total	150	100.0	100.0	

			Frequency	Percent	Valid Percent	Cumulative Percent
Sound Insulation	Valid	Strongly Disagree	12	8.0	8.0	8.0
		Disagree	42	28.0	28.0	36.0
		No response	14	9.3	9.3	45.3
		Agree	28	18.7	18.7	64.0
		Strongly Agree	54	36.0	36.0	100.0
		Total	150	100.0	100.0	

			Frequency	Percent	Valid Percent	Cumulative Percent
Maintenance of Machinery	Valid	Strongly Disagree	12	8.0	8.0	8.0
		Disagree	42	28.0	28.0	36.0
		No response	14	9.3	9.3	45.3
		Agree	28	18.7	18.7	64.0
		Strongly Agree	54	36.0	36.0	100.0
		Total	150	100.0	100.0	

			Frequency	Percent	Valid Percent	Cumulative Percent
Trees as Sound Barriers	Valid	Strongly Disagree	12	8.0	8.0	8.0
		Disagree	27	18.0	18.0	26.0
		No response	14	9.3	9.3	35.3
		Agree	43	28.7	28.7	64.0
		Strongly Agree	54	36.0	36.0	100.0
		Total	150	100.0	100.0	

			Frequency	Percent	Valid Percent	Cumulative Percent
Auto Silencers	Valid	Strongly Disagree	12	8.0	8.0	8.0
		Disagree	42	28.0	28.0	36.0
		No response	14	9.3	9.3	45.3
		Agree	42	28.0	28.0	73.3
		Strongly Agree	40	26.7	26.7	100.0
		Total	150	100.0	100.0	

The primary data presented on table 6 shows responses on best measures and strategies to control noise pollution from anthropogenic sources and its effects on the health and wellbeing of people carrying out their businesses in high noise locations in Ibadan Metropolis. The result of the analysis showed that 69(46.0%) of

respondents agree that education and awareness on noise pollution can help control noise pollution and its effects on the lives of the people, 81(54.0%) also strongly agree to the assertion on education and awareness as a strategy to control noise pollution.

The results also shows that 83(55.3%) of respondents agreed and 67(44.7%) of respondents strongly agreed that government efforts through development of noise standards and control, guidelines, policies, laws and regulations, popularization of these legal instruments and diligent implementation will go a long to controlling noise pollution in public high noise areas and its effects on the health and wellbeing of the citizens of Ibadan Metropolis. Similarly, the results shows that 14(9.3%) of respondents disagree that empowering government agencies can help control noise pollution, 54(36.0%) agree that it causes will help control noise pollution, 54 (36.0%) strongly agree, while 28(18.7%) had no response when asked if empowering government agencies can help control noise pollution in Ibadan.

On the other hand, the results shows that 12(8.0%) of respondents disagree that use of ear muffs by citizens can help control noise pollution, 29(19.3%) disagree to the use of ear muffs, 28 (18.7%) agree, while 54(36) strongly agreed, while 27 (18.0%) had no response when asked if use of ear muffs in high noise areas can help control noise pollution induced by humans in and its attendant consequences on the health of the people of Ibadan Metropolis.

In the same vein, the results shows that 12(8.0%) of respondents strongly disagree that noise effects can be controlled by use of sound insulation, 42(28.0%) disagree, 28(18.7%) agree and 54 (36.0%) strongly agree, while 14(9.3%) had no response when asked if sound insulation can help control the effects of noise on hearing and other consequences in Ibadan.

However, the results also shows that 12(8.0%) of respondents strongly disagree that noise effects can be controlled through regular maintenance of machineries, 42(28.0%) disagree, 28(18.7%) agree and 54 (36.0%) strongly agree, while 14(9.3%) had no response when asked if effects of noise can be controlled through regular maintenance of machineries.

The need for ecological approach to noise control was also assessed, when respondents were asked if planting trees to serve as sound barriers can serve as strategy to control noise pollution in Ibadan metropolis, the responses were as follows; 12(8.0%) of respondents strongly disagree that noise effects can be controlled through trees as sound barriers, 27(18.0%) disagree, 43(28.7%) agree and 54 (36.0%) strongly agree, while 14(9.3%) had no response when asked if trees serves as sound barriers to control the effects of noise and its attendant consequences on the health and wellbeing of the people of Ibadan Metropolis.

Finally, on use of auto silencers which they people believed an advancement in technology, acute effects of noise, the results also shows that 12(8.0%) of respondents strongly disagree that noise effects can be controlled through use of auto silencer, 42(28.0%) disagree, 42(28.0%) agree and 40 (28.0%) strongly agree, while 14(9.3%) had no response when asked if effects of noise can be controlled through the use of auto silencers in affected locations.

IV. Conclusion And Recommendations

Conclusion

Social, Demographic and behavioral factors influences the noise level of Urban Open spaces of Ibadan metropolis. This is evident in the results obtained from the study. Automobile sounds, Advertisement, Musical instruments, Rail Operations, Air transport Operations, Machineries and other human activities such as Barbing and Grinding activities were the major sources of noise within Ibadan Metropolis. This is as a result of the social activities within the area, the demography of the area and the behavioral pattern of individuals within the area. Result from the study shows that Automobiles, Advertisement, Generators and Musical Instrument are the primary sources of noise within the metropolis other sources include Loudspeakers Railways, Airports, Motor Parks etc. The result from the measurement of noise level at various points of source within the metropolis indicated that the derived Maximum decibel levels of noise were above the NESREA permissible level of 75decibel. The study was able to establish by questionnaire the Acute and Chronic effects of exposure to these levels of noise. It was established that exposure to noise within Ibadan Metropolis has acute effects which include Headache and fatigue, affects communication, causes annoyance, disruption of behavior, affects hearing, reduces productivity, causes lack of concentration etc. While continuous exposure to these levels of noise will lead to chronic effects such as increase in blood pressure, elevation of stress level, elevation of heartbeat rate, repeated sickness and hearing loss. If the social, demographic and behavioral factors within Ibadan Metropolis remain the same, it implies that the noise level within the area will continue to be above the maximum permissible level standard by NESREA. Therefore, people within Ibadan Metropolis run the risk of the acute and chronic effects of the exposure. Given the possibility for every citizen to measure their personal noise exposure in their daily environment could influence their perceptions and potentially support the raising of awareness of environmental issues, thereby changing and introducing new behavior to their life and the environment. This is important because citizens are often indirectly and sometimes directly; collectively and

sometimes individually responsible for part of the noise pollution they experience. Changing their behavior could thus solve a part of the problem.

Recommendations

The following recommendations will to help address the problems of noise pollution in Ibadan metropolis;

- Educational sensitization and awareness on noise pollution and its adverse effect on human health should be pursued vigorously;
- Earmuffs should be worn by those working in an environment where the noise levels are above the maximum permissible limit.
- There should be maintenance and servicing of machineries used for work in order to reduced noise level from the sound.
- Government should develop implementable legislations on noise standards and control and should ensure diligent implementation of such legislations;
- Relevant agencies of government should be empowered to carry out compliance monitoring and enforcement of noise standards and control legislations;
- Ecological approach to noise management is advised to provide trees that will serve as sound barriers at high noise locations;
- Improved technologies on noise pollution control should be adopted.

References

[1]. Adams, Mags, Trevor Cox, Gemma Moore, Ben Croxford, Mohamed Refaee, and Steve Sharples. 2006. "Sustainable soundscapes: Noise policy and the urban experience." *Urban Studies* 43 (13): 2385-98.

[2]. Barber JR, Crooks KR, Fristrup KM (2009) The costs of chronic noise exposure for terrestrial organisms. Trends Ecol Evol 25:180–189

[3]. Birgitta, Berglund and Lindvall, Homas: A Draft Document of Community Noise. *WHO Environmental Health Criteria 12*, World Health Organization, Geneva (1995).

[4]. BRONZAFT AL. (2002) Assert your right to peace and quiet! (http://www.lhh.org/hrq/25- 1/gull.htm). *Hearing Rehabil Q*: **25**(1). 16. Noise and hearing loss (http://text.nlm.nih.gov/nih/cdc/www/76txt.html). *NIH Consens StatementOnline* 1990: **8**(1): 1–24 (accessed 10 March 2001)

[5]. European Commission 1996. Green Paper on Future Noise Policy (COM(96) 540).

[6]. Bond, Michael: Plagued by noise. New Scientist, November 16: 14-15 (1996).

[7]. European Commission 2002, Directive 2002/49/EC: Assessment and management of environmental noise.

[8]. Francis, Clinton D., Catherine P. Ortega, and Alexander Cruz. 2009. "Noise pollution changes avian communities and species interactions." *Current Biology* 19 (16): 1415-9.

[9]. Geary, James (1996): Saving the sounds of silence. *New Scientist*, **13** April: 45.

[10]. Jasny M (1999) Sounding the depths: supertankers, sonar, and the rise of undersea noise. Natural Resources Defense Council, New York Kiernan, Vincent (2007): Noise pollution robs kids of languages skills. *New Scientist.* May10: 5.

[11]. Kapoor, B.S. and Singh, K. (1995): 'Noise'- the insidious killer. *The Tribune*, Nov. 25.
McDonald MA, Hildebrand JA, Wiggins SM (2006) Increases in deep ocean ambient noise in theNortheast Pacifi c west of San Nicholas Island, California. J Acoust Soc Am 120:711–718

[12]. Miedema HM, Vos H. Exposure–response relationships for transportation noise. *J Acoust Soc Am* 1998: **104**(6): 3432–3445.

[13]. MITZELFELT R. *Albuquerque's environmental story. Environmental topic: noise* (http://www.cabq.gov/aes/s5noise.html). Albuquerque, NM: City of Albuquerque, 1996 (accessed 10 March 2001).

[14]. Musser, J, O'Reilly, T. and the O'Reilly Radar Team 2007.Web 2.0: Principles and Best Practices. O'Reilly Media. Retrieved 2009/03/13. http://radar.oreilly.com/research/web2-report.html

[15]. Murli Krishana, R.V. and Murthy, K.P. Vithal(1983): Noise pollution due to traffic in Vishakhapatanam. *Indian Journal of Ecology*, **10(2):** 188-193.

[16]. Murphy, Enda, Eoin A. King. 2014. *"Environmental noise pollution: Noise mapping, public health, and policy."* Amsterdam: Elsevier.

[17]. OSHA. 2016. *"OSHA (2016)Technical Manual (OTM) | Section III: Chapter 5 – Noise". www.osha.gov.*

[18]. Paulos, E. et al. 2008. Citizen Science: Enabling Participatory Urbanism. Book Chapter, Handbook of Research on Urban Informatics: The Practice and Promise of the Real-Time City, Marcus Foth (Ed.), Idea Group, 414- 436.

[19]. Steels, L. and Tiselli, E. 2008. Social Tagging in Community Memories. Proceedings of the AAAI Spring Symposium on Social Information Processing, AAAI.

[20]. Stansfeld S, Haines M, Brown B 2000. Noise and health in the urban environment. *Rev Environ Health* 2000: **15**(1–2):43–82.

[21]. Stansfeld, Stephen A. and Mark P. Matheson. 2003. "Noise pollution: Non-auditory effects on health." *British Medical Bulletin* 68 (1): 243-57.

[22]. Staples, Susan L. 1996. "Human response to environmental noise: Psychological research and public policy." *American Psychologist* 51 (2): 143-50.

[23]. WSP, The World Soundscape Project. 2015.World Soundscape Project. Accessed November 12, http://www.sfu.ca/~truax/wsp.html.

[24]. UNEP, United Nations Environment Programme. 1992. Rio Declaration on Environment and Development, United Nations Conference on Environment and Development (Rio de Janeiro, Brasil, 3-14 June 1992).

[25]. Watts RD, Compton RW, McCammon JH, Rich CL, Right SM, Owens T, Ouren DDS (2007) Roadless space of the conterminous United States. Science 316:736–738

[26]. Yesufu L.A., Ana G.R.E.E., Umar O.K., (2013), Knowledge and Perception of Noise Induced Health Hazards Associated with Generator use in Selected Commercial Areas in Ibadan, Nigeria. *International Journal of Collaboration Research on Internal Medicine and Public Health Hazards*, 5(9), 581 – 595.

[27]. Yong, E. 2008. City songbirds change their tune. New Scientist, 197, 2649, 33-35.