

DESIGN AND PLANNING CONTROL TO NOISE POLLUTION IN PORT-HARCOURT CITY

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ABSTRACT

Right from time immemorial everything in life begins with planning, therefore failure to plan planned to fail. In most of the develop cities in the world, urban design and planning were strictly adhered to fascinate it. Hence, in this paper, based on the current experience of high level of noise pollution in Port-Harcourt city, the study intend to reviews the cause, effect and source as were discovered. The design and planning control to noise pollution were also recommended.

Keywords; Noise Pollution, causes, effects, sources and Control to noise pollution, design and planning.

INTRODUCTION

Noise is gradually becoming part of human lives nowadays because of the fast growing industry and technology globally. Crowded city, new pattern of recreation and entertainment, mechanized means of transportation are polluting the Atmosphere with their noise every day. However, it is continually disturbing the peace and tranquillity of human and wild life Spence (2003). According to Arvind Singh (2014), that amongst other pollution causing component to our environment, noise is not an element, compound or substance which can accumulate and harm our generation. It is a special kind of wave action usually transmitted by air in form of pressure waves and received by hearing apparatus present in the human body. The word noise is defined as "wrong sound, in the wrong place at wrong time". Noise therefore is bad, annoying that causes irritation. Generally, noise pollution can be defined as introduction of undesirable sound energy into the environment at levels that is detrimental to human activity. Though, noise may not seem to be harmful as the contamination of air or water, but it is that pollution problem that

affects the entire human health and can contribute to the general deplorable form of the environment. Noise pollution is the most dangerous pollution of man's environment which is harmful to body and mind. Arvind Singh (2014).

According to Onuu (1999) the environmental noises from the road traffic in urban areas were as a result of too many of heavy vehicles which could be attributed to the speed and other variables such as ground cover. It is therefore, important to note that staying longer or exposure to low frequency noise can cause either permanent or temporal damage to hearing. The effect of noise on human emotions ranges from negligible through annoyance and anger to psychologically disruptive. Apart from other environmental problems, Noise pollution has continued to increase and was accompanied by daily complaints and reports from individuals that are exposed to these noise. The increase and growth in noise pollution cannot be sustained because it involved directly adverse health effects. It also adversely affects future generation, and has socio cultural, aesthetics and economic effects (Yilmaz and Ozer 2005).

There are prevalent factors that give rise to noise pollution in cities areas which include loudspeakers, generating set, vehicular traffic, railway and air traffic, neighbourhood electrical appliances and musical system. It will interest you to note that even researchers are victims to the noise generated by neighbourhood appliances (Singh and Daver, 2004).

Several researchers have swung into action in major countries because of the problems of noise pollution and its impact on the environment (Zeid et al, 2000; Zannin et al., 2003; Oyedepo and Saadu, 2009, Ugwuanyi et al., 2005).

So many researchers reported that road traffic is the predominant and most generalized noise source in urban area (Saadu et al.,1998; Bisio,1996; Nelson, 1998; Oyedepo and Saadu,2008). Oyedepo and Saadu(2009) carry out measurement on noise levels in busy roads/ roads junctions, residential ,industrial, commercial and passengers loading parks areas in Illorin city, Nigeria and reported that the industrial areas have the highest noise levels

followed by busy roads/roads junctions, passengers loading parks and commercial areas. This is in contrary to the findings of (Omubo-Pepple, 2010.)that carry out research on the effects of noise on Sources of noise in Terms of Age Groups, Sources of Noise in Terms of Male and Female Respondents. The result shows that Generators, automobiles, and public address systems (loudspeakers) used by religious centres turn out to be the major sources of noise pollution in the city of Port- Harcourt.

It has been generally accepted that noise pollution, particularly road traffic noise is sever in rapidly expanding cities such as those South-Eastern Nigeria (Onuu, 1992) when insufficient control is exercised and cities are poorly planned.

This study reviews the noise pollution level, sources and its effects in Port-Harcourt city and possible design and planning control to reduce its impact to the barest minimum on the society.

Effects of noise pollution on human health

Noise pollution has several ill effects on human beings. The most direct harmful effect of excessive noise is physical damage to the ear and the temporary or permanent hearing loss often called as 'temporary threshold shift' (TTS). Person suffering from the condition is unable to detect weak sounds. However, hearing ability is usually recovered within a month of exposure. Permanent loss usually called 'noise-induced permanent threshold shift' (NIPT's) represents a loss of hearing ability from which there is no recovery. The sound of 100 dB leads to permanent loss of hearing. Noise of about 90 dB causes auditory fatigue. Arvind Singh (2014).

The World Health Organization (WHO) has documented several categories of adverse health effects of noise pollution on humans. Much of the following comes from the WHO Guideline on Community Noise and follows its format, (Berglund and Lindvall, 1995). The guideline provides an excellent, reasonably up-to-date, and comprehensive overview of noise-related issues, as do the other recent reviews on this subject.

Interferes with speech communications and reduces the working efficiency

Noise pollution interferes with speech communications and reduces the working efficiency. Communication problems can lead to lack of self-confidence, irritation, fatigue and trouble concentrating. Noise is directly correlated with a decrease in helping behaviours and increase in aggressiveness.(Evans and Lepore, 1993).

Mental Disorders

Noise causes mental disorders like insomnia, anxiety, depression and behavioural and emotional stress. Lack of concentration and mental fatigue are significant health effects of noise. It has been observed that the performance of school children is poor in comprehension tasks when schools are situated in busy areas of a city or suffer from noise pollution. There has been report of low weight children born to mothers living near airports. Arvind Singh (2014).

Human Error and Decreases Motivation

Noise pollution increases human error and decreases motivation. Difficulty in paying attention, dulling of problem solving skills and negative impact on memory are the problems caused by noise pollution.

Other disorders caused by noise pollution include hypertension, increase in sweating, dizziness, headache, nausea, vomiting, giddiness and fatigue. Furthermore, undesirable changes in respiration, circulation of blood in skin, dilation of pupil of eyes, constriction of blood vessels, changes in muscle tension, fright and increase in heart beat and alterations in gastrointestinal motility and glandular reactions are the other physiological disorders caused by noise pollution in human beings. Noise pollution may even cause damage to brain and liver(Konenci, 1975 and Mathews and Cannon, 1975).

Increases the Risk of Peptic Ulcer in Human Beings

Noise pollution also increases the risk of peptic ulcer in human beings. Continuous exposure to noise may lead to abortion in the pregnant women. Noise also causes an increase in cholesterol

level, which blocks the coronary arteries thus making the person prone to heart attack and strokes. At higher impulsive noise pollution the pulse rate and blood pressure changes, stored glucose from the liver is released into the blood stream and there is an increased production of hormone adrenalin. The brain begins to exhibit distorted electroencephalographic brain wave records. Arvind Singh (2014).

Sources of noise pollution:

Industrial revolution has fully contributed to noise pollution in the urban areas. Poor urban planning may give rise to noise pollution, since side-by-side industrial and residential buildings can result in noise pollution in the residential area. There are several other sources of noise pollution that contribute to both indoor and outdoor noise pollution. Noise pollution is caused by vehicles, loudspeakers, electric generators, television, transistor, telephone, bands, sirens, vacuum cleaner, washing machines, food mixers, pressure cookers, fans, air conditioners, coolers, crackers and different types of machines. Mining operations, use of bulldozers, dynamites to break rocks and drillers are other important source of noise pollution. There are three kinds of noise

- (i) intermittent noise or non-uniform noise
- (ii) continuous or uniform noise; these are particularly from road noise, especially at some distance from the road, which can be described as a steady state noise that does not fluctuate much, but rail and air craft noise are acoustically characterized by high noise levels of relative short duration. The speed and exhaust systems determine the noise released by road traffic.
- (iii) Instantaneous or impulsive noise which include the noise caused by explosions, gun shots, thunder.

Generators is seem to be another major source of noise, this is because they contributed to a great extent the noise pollution within the Port Harcourt city reason been that worship centre, industries, small scale businesses, and even residential areas solely depend on generators for the supply of power.

Noise from industrial installations, construction sites, and fixed recreation facilities radiate from a point source and the shape of exposure area is generally circular (Narendra and Davar,

2004). Another major source of noise pollution is the public address systems used by religious and social organizations. The public address system more a time tune the pitch and the sound keep echoing in the air thereby disturbed the peace of the people.

Omubo-Pepple et al (2010) carry out a concise study in the city of Port-Harcourt, Rivers State Headquarter, to established the main sources of noise pollution in the city, and from his study the result are as shown in Table 1 and 2

Table 1; Sources of noise in terms of age group
Age Group

Sources of Noise	Up to 18yrs (%)	19to 35yrs (%)	36 to 50yrs (%)	51 and above (%)	Average (%)
Religious activities	61	51	54	55	55
Social activities	53	58	71	63	61
Loudspeakers	81	74	88	84	82
Road traffic	67	63	72	78	70
Neighbourhood	44	49	45	57	49
Air traffic	32	37	33	30	33
Generator	84	80	86	88	85

Omuubo-Pepple et al (2010)

Table 2: Sources of Noise in Terms of Male and Female respondents

Sources of noise	Male (%)	Female (%)
Religious activities	51	61
Social activities	53	58
Loudspeakers	81	74
Road traffic	67	63
Neighbourhood	44	49
Air traffic	32	37
Generator	84	80

Omuubo-Pepple et al (2010)

From his study as shown in table 1 a very large proportion of the respondents in each age group are affected by noise coming from generators. Almost the same result obtained from road traffic noise and loudspeakers. Not all that small proportions (49% across various age groups) of respondents acknowledge the effects of noise generated from neighbourhoods. Almost equal proportions of respondents (55%) across various age groups

agree with the facts that noises generated from religious activities affect them. Table 2 shows that women are mostly affected by noise pollution generated from religious activities and social activities, while in the other sources like the road traffic, air traffic and generators not much difference in percentage of male and female population.

Table 3: effect of noise on different age

Source of noise	Age group				
	Up to 18yrs (%)	19 to 35yrs (%)	36 to 50yrs (%)	51 and above (%)	Average (%)
Effect on hearing	68	54	80	94	74
Annoyance	75	79	86	74	79
Mental stress	26	39	43	31	35
Sleep disturbance	67	90	97	93	87
Speech interference	98	95	96	83	93
Lack of concentration	41	53	57	56	52
Cardiovascular disturbance	24	37	33	31	31

Omuubo-Pepple et al (2010)

Table 4: effect of noise in terms of male and female respondents

Effect of noise	Male (%)	Female (%)
Effect on hearing	73	61
Annoyance	91	83
Mental stress	31	26
Sleep disturbance	95	80
Speech interference	92	75
Lack of concentration	67	84
Cardiovascular disturbance	26	22

Omuubo-Pepple et al (2010)

Table 5: Reactions to noise by different age group

Reactions	Age group (%)				
	Up to 18yrs	19 to 35yrs	36 to 50yrs	51 and above	Average
Quarrel with people	31	11	19	17	20
Complain to police	18	17	15	22	18
Request to stop or reduce	69	60	61	67	64
Ignore	76	80	64	82	76
Retaliate	63	55	49	41	52

Omuubo-Pepple et al (2010)

From table 3, he reported that noise interferes with many aspects across the age groups. A majority of the respondents exposed to noise report occurrence of sleep disturbance, annoyance, and hearing problems. Generally the growing age group bears more effect of noise.

From table 4, he observed that perception of noise on male and female varies. A good percentage of male population feels the adverse effect of noise pollution more than their female counterpart. The reasons for this differences may be female are more tolerating , patient and accommodating, and also because more men are exposed to noise pollution like industrial noise.

Also, from table 5, he found that people within the ages of 19 to 35yrs do not bother on quarrelling, complaining to the police or even requesting the source of noise to be reduced or stopped. Small proportions seek redress through legal means, while those up to 18yrs quarrel and retaliation seems popular among them.

Planning Control to Noise Pollution:

There are several methods that can be utilized for controlling the level of noise.

The design and technology of machines/equipment could be altered resulting in low noise emission.

Noise barriers may help to control noise. Environmental noise can be reduced by the use of natural shielding of rolling terrain, shielding walls, thick growth of trees or shielding by existing high buildings.

Protect receptors of sound by a shield (e.g. buildings may be insulated against noise and also body and window planes may be made sound proof). Apart from technology, we may undertake various steps to modify or regulate the behaviour of users of machines and equipment. Educating the public may be a good option because it is a social problem; about the adverse effects of noise pollution appear to be a key factor in laying inadequate stress on controlling or reducing its levels.

Zoning of facilities: The society should be planned in such a way that noisy facilities are isolated from the less noisy. Grouping all noisy activities in a particular zone may constitute a source of noise to the quiet areas, so it should be planned in such that activity facilities that may not require high degree of quietness be placed as a buffer between the noisy and the solitude areas. Also in reducing sound levels, planners have to work hand in hand with the design engineers to examine the trade-offs of roadway and architectural designs. These methods include the design of interior walls, party walls, and floor and ceiling of assemblies' halls. Omubo-Pepple,(2010).

CONCLUSION AND RECOMMENDATION

In general it was said that problems identify is a problem half solved. This research has been able to identify the sources and causes of noise pollution in the city of Port-Harcourt. Generators, automobiles, and public address systems (loudspeakers) turn out to be the major sources of noise pollution in the city of Port-Harcourt. Loudspeakers and generators are frequently used for religious and social functions. Noise causes and leads to mental

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disorders like insomnia, anxiety, depression and behavioural and emotional stress. Lack of concentration and mental fatigue are significant health effects of noise. It has been observed that the performance of school children is poor in comprehension tasks when schools are situated in busy areas of a city or suffer from noise pollution. There has been report of low weight children born to mothers living near airports.

Noise pollution increases human error and decreases motivation. Difficulty in paying attention, dulling of problem solving skills and negative impact on memory are the problems caused by noise pollution.

RECOMMENDATION

We therefore recommend that Establishing lower speed limits for highways that pass through residential areas, limiting traffic volume, and providing alternative routes for truck traffic, in Port-Harcourt city will help in mitigating the noise pollution. Constructing vertical barriers alongside the highway can also block the path of traffic noise.

Use of acoustic absorbers in structural designs of buildings especially in all worship centres can mitigate noise pollution. Redesign buildings that are not acoustically proven to make them noise proof. Wood panelling and wood fibre wallboards have a very high coefficient of noise absorption. Special porous materials are also manufactured for panelling auditorium and theatre halls to reduce the intensity of noise. Possibly the use of loudspeakers should be minimum, preferably the use of monitor speakers in churches and event centres will as well mitigate noise pollution. Finally, Local control of noise has not been successful in most places. We therefore recommend improved methods of local control that should include public education, enlightened legislation, and active enforcement of noise ordinances and laws. However, all these depend on the government and NGO's whose assistance in this process is important.

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