

Perceived Health Effects of Environmental Noise Pollution on the Inhabitants of Ado-Ekiti Metropolis. Ekiti State, Nigeria

Awosusi¹ A.O & Akindutire² I.O

- 1, Awosusi, Ajoke Olukemi Ph.D. Human Kinetics and Health Education Department, Faculty of Education, Ekiti State University Ado-Ekiti. jawosusi@yahoo.com
- 2, Akindutire Isaac Olusola Ph.D. Professor in Human Kinetics and Health Education Department, , Faculty of Education. Ekiti State University Ado-Ekiti. ioakindutire@yahoo.com

Abstract

This study investigated the level of awareness of health problems associated with noise pollution and also examined the relationship between location and the perceived health effects among inhabitants of Ado Ekiti metropolis. The study was a descriptive research design of the survey type. The sample consisted of 250 participants, selected using stratified and simple random sampling techniques. Structured questionnaire was used to elicit information from participants. The reliability of the questionnaire was determined using split half reliability method with a co-efficient of 0.79. The hypotheses were tested at 0.05 level of significance using one way Analysis of Variance (ANOVA). The results revealed that participants were aware of the health effects of noise pollution. Also, a significant relationship was established between location and the perceived health effects of noise pollution. Based on the findings, it was recommended that Government should review the existing noise pollution regulations as well as ensure compliance on the activities put in place to control noise pollution in the Ado-Ekiti metropolis.

Keywords: Noise pollution, environment, traffic noise, health effects, Nigeria

Introduction

Noise pollution is one of the major environmental pollutants that has direct effects on human performance (Debasish & Debasish, 2012). The survival and healthy existence of man depend largely on the enabling environment where he resides, as disruption in the conducive environment may lead to dysfunction in his health status (Otukong, 2002). Urbanization, civilization or industrialization is majorly characterized with noise pollution. Noise is derived from the Latin word “nausea” implying ‘unwanted sound’ or ‘sound that is loud, unpleasant or unexpected (Singh & Davar, 2004). Sound is usually measured in decibel. Decibel is a standard of measurement of sound of which whisper measures 20db while a noise in a quiet office measures 40db, the normal conversation measures 60db and a level of sound above 80db is referred to as noise (Miglani, 2010). Noise is considered as pollution because of the noxious and unwanted sound that it emits into the environment. Oyedepo (2012) discovered that noise pollution in Nigeria cities is relatively high when compared to recommended levels by World Health Organization.

Sources of Noise

Noise pollution can emanate from traffic, construction sites, factories, neighbours. Excessive noise from neighbours can be frustrating and disturbing resulting into stress and annoyance. Nigerian cities are environmentally noise polluted and the road traffic, industrial machineries and generators are the major sources of it (Oyedepo, 2012). Noise from transport is an increasingly prominent feature of the urban environment (Clark & Stansfeld, 2007). Noisy neighbours can make someone’s life a miserable or prevent on from enjoying the comfort of his home. On many occasion, the person making the noise may be unaware that he is making noise because a joyous music to one may be a source of disgusting sound to another. For instance, closely knitted residential apartment with industry will experience noise pollution. Also, dwellers may be exposed to noise from boilers, generators, air conditioner and amplified music. Football or noisy activities from neighbours such as social parties can equally amount to noise pollution. Other forms of noise can come from barking dogs, or banging of doors.

Traffic noise

Traffic noise has become a serious problem nowadays because of inadequate urban planning of the city in the past (Debasish & Debasish, 2012). The most rigorous and pervasive type of noise pollution that has been a predominant source of annoyance is traffic noise (Öhrström & Skånberg, 2004). Noise arising from road traffic can be attributed to the large number of automotive vehicles in comparison with other machines. Traffic noise is harmful to the health of almost one third population in the WHO European Region (WHO, 2012). Sources of traffic noise include sound from automobiles such as trucks, cars, motorcycles. Noise from road traffic can be augmented by the narrow streets and tall buildings which produce canyon in which traffic noise reverberates (Miglani, 2010). Urban dwellers are also exposed to noise from emergency vehicles like ambulance, fire fighters, sirens from security agents and top government officials’ vehicles as well as blaring horns at gridlock. It is believed that sound at the level of 80db and above has become physically irritating, yet this sound is still

considered not to be as loud as traffic noise on a busy street.

Electricity generating plant

The need for electricity in homes, workplaces and industries is high. Yet, the erratic supply of low voltage electricity by Power Holding Company in Nigeria makes it imperative for individuals, companies and factories to generate the needed electricity through generating plants without considering the attendant effects. Olokooba, Ibrahim & Abdurraheem-Mustapha (2010) observed that not only the smoke emission from generating plant that deplete the ozone layer is considered as harmful that the noise from generators is equally hazardous. Also, noise coming from the use of electricity generators could be compounded by noise from recording houses and those using music to promote sales of their wares (Anomohanran & Osemeikhian, 2005)

Religious homes

Loud congregational worship is another source of noise. Singh & Davar, (2004) identified the use of public address system used by temples and mosques as a major source of noise. Also, noise from churches most especially the use public address system during night vigils and the early morning call for prayers by Muslim could be considered as noise pollution. Nigeria is a multi religious society and is therefore prone to religious activities. These activities manifest in congregational worship in various forms. Congregational worships are held in Mosques, Churches and other non-conventional areas. Noise from the loudspeakers, automobiles and religious functions act as significant sources of noise pollution (Singh, 1984). Most night vigils organized by Pentecostal Christians are characterized by thunderous voices of worshippers and loud noise from heavy public address system while the early morning worship organised by Muslims using blaring sound may affect the sleep pattern of those living in the environment.

Health effect of noise pollution

Noise exposure is increasingly being seen as an important environmental public health issue (Clark and Stanfeld, 2007). Persistent exposure to noise is injurious to health (Boateng and Amedofu, 2004; Oyedepo, 2012; WHO, 2012). The damage caused by noise pollution is related to the intensity of the sound or the amount of energy it has (Bashorun & Olamiju, 2013). The daily activities coupled with continuous exposure to loud sound can have adverse effect on physiological and psychological health (Field, 1993).

Sleep disturbance

Constant exposure to excessive noise may have serious detrimental effect on human's health and behaviour. For instance, sound sleep is one of the major prerequisites for good physiological and mental functioning in healthy individuals. Yet, a noisy environment may contribute significantly to the increasing complaint of primary sleep disturbance in the society. Environmental noise can cause tinnitus, hearing loss, sleep disturbance and other harmful effects on health (Mead, 2007). Exposure to noise disturbs sleep proportional to the amount of noise experienced in terms of an increased rate of changes in sleep stages and in number of awakenings (Olokooba, et al. 2010). Sleep disturbances such as difficulty to fall asleep, alterations of sleep pattern or depth and awakenings may necessitate the need for using sleeping pills or ear plugs (Olaosun, Ogundiran & Tobih, 2009). The problem or the solution proffered can both have significant detrimental effect on health. Though evidence for sleep disturbance by noise can either be objective or subjective because what sound as noise to someone may be a source of pleasure to another.

Annoyance

Annoyance arising from environmental noise may be associated with the disturbance that goes with noise. In Nigeria, the persistent noise from the generating set of a neighbour could result into annoyance and such could result into conflicts thus hindering the healthy relationship in the environment. Noise can cause annoyance and aggression (Mead, 2007 and Abel, 1990). Though, the evidence regarding the impact of long-term noise versus recent changes in ongoing noise is equivocal on its impact on annoyance (Field, 1993). Studies on traffic and aircraft noise have shown that noise level have been associated with annoyance in a close-response relationship (Schulz, 1978) and fear of the noise source and sensitivity to noise were both found to strongly affect the annoyance from noise (Miedema & Vos, 1999). The degree of interference that noise causes in everyday activities precedes or leads to annoyance (Stansford & Matheson, 2003).

Hearing loss

High level noise will result into hearing loss (Donatelle, 2002). Evidences abound that constant noise exposure can damage sensitive structures in the ear. Noise-induced hearing loss, the second to age induced hearing loss results from damage of the hair cells of the cochlea in the inner ear arising from continuous exposure to recreational and occupational noise (Rabinowitz, 2000). Blasts and other intense or explosive sounds can rupture the eardrum or cause immediate damage to the structures of the middle and inner ear, while, hearing loss due to prolonged noise exposure is generally associated with destruction of the hair cells of the inner ear (Olaosun et al. 2009). The observed increase in noise level in metropolitan cities above specified standard limits is responsible for rising incidence of deafness among the inhabitants (Bhargawa, 2001). Though, exposure to loud, distracting and possibly hazardous noise may be a common experience for everyone but to allow such exposure to have

detrimental effect on one's hearing is a personal choice (Boateng & Amedofu, 2004).

Lack of Concentration

Concentration on task and reading achievement are affected in noisy homes or work places. Studies have revealed that chronic exposure to noise affects cognitive function and comprehension (Stansford & Matheson, 2003). Noise exposed children have been discovered to have difficulties in concentrating in comparison to students from quieter schools (Kryter, 1985). The study of the effect of noise on cognition revealed an impaired cognitive development in children whose homes or schools are located near sources of noise such as highways and airports (Evans & Lepore, 1993). These findings thus substantiate that noise could increase errors and decrease motivation thereby hinder task performance at school and at work.

Cardio vascular diseases

Workers that are exposed to high noise levels have a higher incidence of circulatory problems, cardiac diseases, hypertension, neuro sensory and motor impairment (Singh, 1984). High noise level was discovered to cause stress and high blood pressure which is the leading cause of health problems (Rosen & Olin, 1965 and Mead (2007). The body's fight or flight response leading to autonomic nervous and endocrine effects seen with chronic daily level of noise can lead to elevated blood pressure and heart rate (Goines & Hagler, 2007). Studies have revealed a significant relationship between daily traffic noise and night time aircraft noise and an increase in blood pressure (Jarup et al., 2008) and association between road traffic noise and self-reported doctor diagnosed hypertension (Bluhm, Berglind, Nordling & Rosenlund, 2007)

Stress

The non-auditory effects of noise on humans are viewed as being generally stress-related, following observations that noise exposures engender physiological reactions typical to those of stress (Ouis 2001). Noise seems to have a negative effect on performance. It appears that the longer the exposure, the greater the effect. Children from noisy areas have been found to have heightened sympathetic arousal indicated by increased levels of stress-related hormones (Goines and Hagler, 2007). Likewise, those working in noisy office environments have also been found to be less cognitively motivated, and to have higher stress levels (Scott, 2012). Noise does not have to be loud to be harmful. A neighbour's blaring television or generator sound from public address system of a religious house may cause stress to the body's system (Bronzaft, 2000). Exposure to moderately high levels of noise causes a statistical rise in stress (Rosen & Olin, 1965).

Accidents

Noise masks important signal sound like warning shout or siren which may indicate impending danger (Wilkins & Acton, 1982). A study of medical and accident records of workers in several industries found that a significantly higher number of reported accidents occurred in noisier plant areas (Olaosun et al., 2009). Likewise, an association was seen between accident risk and worker's hearing sensitivity for a hearing loss of 20 dB was found to correspond to a rise of accident risk (Picard et al, 2008). Headache can be triggered or made more severe if an individual is exposed to high noise. Noise has been discovered to trigger headache in susceptible individuals in various studies (Nicholson & Smitheman, 2006). Likewise, Martin, Reece & Forsyth (2006) found an association between noise and headache. The best way to prevent to prevent headache is to avoid noise that triggers it. Regrettably, many people seem not to know the effect of noise pollution on their health. For instance, Miglani (2010) discovered that people generally lack consciousness of the ill effects which noise create and what the society including themselves stand to benefit from the prevention of generating and emitting of noise.

It can be safely concluded that the effect of noise pollution can affect both the physical, mental and social health of the individual expose to incessant noise. The fact that people may not know the detrimental effect of noise on their health may worsen the problem of noise generation and exposure. Based on the findings of various researchers on this important issue, this study is therefore aimed at finding out if residents of Ado-Ekiti metropolis are exposed noise pollution. It will identify the sources of noise pollution as well as determine the level of awareness of noise related health problems. Finally, it will examine the relationship educational status knowledge of health effects, location of participants and the perceived health and influence of location on noise pollution.

Methodology

The research design adopted for the study was descriptive research design of the survey type. The population for the study consisted of the male and female inhabitants with ages from 20 years and above living in Ado-Ekiti. The sample of the study is made up of 250 participants that were selected using stratified sampling and simple random techniques. Stratified sampling was used in classifying the street into residential, commercial, industrial, government office area and school area. Simple random sampling was used for both the selection of two streets and respondents from each stratum. A pre tested close-ended questionnaire titled Noise Pollution and Perceived Health Effects on the Inhabitants of Ado-Ekiti Metropolis was used to collect information from respondents. The questionnaire was made up of four parts. Section A sought information on the personal data of the respondents. Section B was used to gather information on sources of noise. Section C was used to gather information on the

knowledge of respondents on health effects of noise pollution. Finally, Section D sought information on the perceived effect of noise pollution on respondents' health. The validity of the questionnaire was established using face and content validity. A reliability coefficient of 0.79 established that the questionnaire is consistent.

A set of two hundred and fifty (250) copies of questionnaire was administered, out of which, two hundred and forty six (246) were retrieved giving 98.4% return rate. The data were analyzed using descriptive and inferential statistics. The descriptive analysis included simple percentages and mean scores was used to answer the research questions while the hypotheses were tested at 0.05 level of significance using One-Way Analysis of Variance (ANOVA). Post Hoc Analysis was further used to identify the specific areas of significance.

Results

Table 1: Frequency counts and Mean scores of sources of noise pollution

S/N	Variable	Yes		No		N		Remark	
		F	%	F	%	F	%		
1	Noise can come from Traffic (blaring vehicle horn or movement)	219	89	27	11	246	100	1.89*	Accepted
2	Neighbours	159	64.6	87	35.4	246	100	1.65*	Accepted
3	Construction or industrial area	183	74.4	63	25.6	246	100	1.74*	Accepted
4	Bars/Disco	127	51.6	119	48.4	246	100	1.52*	Accepted
5	Musical Shops	148	60.2	98	39.8	246	100	1.60*	Accepted
6	Generators	204	82.9	42	17.1	246	100	1.83*	Accepted
7	Religious homes	103	41.9	143	58.1	246	100	1.42	Rejected

*> 1.50

In Table 1, the mean scores of all the items except religious homes exceeded 1.50. This indicates that participants identified them as sources of noise. Noise from Religious houses (1.42) was not accepted as source of noise in Ado-Ekiti.

Table 2: Frequency counts and Mean scores of knowledge of the health effects of noise pollution

S/N	Variable	Yes		No		N		Remark	
		F	%	F	%	F	%		
1	Noise can cause Stress/Anxiety	124	50.4	122	49.6	246	100	1.51*	Accepted
2	Hearing Impairment	156	63.4	89	36.2	246	100	1.64*	Accepted
3	Cardio vascular disease	62	25.2	184	74.8	246	100	1.25	Rejected
4	Annoyance	152	61.8	94	38.2	246	100	1.62*	Accepted
5	Sleep Disturbance	162	65.9	84	34.1	246	100	1.66*	Accepted
6	Headache	66	26.8	180	73.2	246	100	1.27	Rejected
7	Accidents	112	45.5	134	54.5	246	100	1.46	Rejected

*> 1.50

In Table 2, the mean scores of noise pollution could cause sleep disturbance, hearing impairment and stress/ anxiety were above 1.50. While, the responses to the items that noise pollution can cardiovascular diseases headache and accidents were below 1.50.

Table 3: Frequency counts and Mean scores of the perceived health effects of noise pollution

S/N	Variable	Yes		No		N		Remark	
		F	%	F	%	F	%		
1	Noise Makes me nervous	68	27.6	178	72.4	246	100	1.28	Rejected
2	Wakes me up	79	32.1	167	61.9	246	100	1.32	Rejected
3	Makes me angry	108	43.9	138	56.1	246	100	1.44	Rejected
4	Affect my hearing	73	29.7	173	70.3	246	100	1.30	Rejected
5	Reduce my concentration	142	57.7	104	42.3	246	100	1.58*	Accepted
6	Leads to headache	132	53.7	114	46.3	246	100	1.54*	Accepted
7	Prevents me from sleeping	147	59.8	99	40.2	246	100	1.60*	Accepted
8	Affects my health	131	53.3	115	46.7	246	100	1.53*	Accepted

*> 1.50

Table 3 shows that the mean score of noise reduces concentration, leads to headache, prevents me from sleeping and affects my health

In Table 3, that the mean score of noise reduces concentration, leads to headache, prevents me from sleeping and affects my health exceeded 1.50 makes the items to be accepted as affecting the health of the respondents.

Table 4: One-Way Analysis of Variance showing the relationship between participants' educational status and knowledge of health effects of noise pollution

	SS	MSS	df	F cal.	Sig.	Remark
Between groups	110.82	27.04	4			
Within Groups	616.14	2.56	241	10.84*	.000	S
Total	726.96		245			

*P<0.05

Table 4 shows that at p<0.05 level of significance, the f calculated (10.84) was significant. This denotes that the formulated null hypothesis that there is no significant relationship between educational status of the participants and knowledge of health effect of noise pollution is rejected. This implies that there is a significant relationship between level of educational status of participants and knowledge of health effects of environmental noise pollution.

Table 5: Scheffe Multiple Comparison of educational status and Knowledge of health effects of noise pollution

Educational Level	No formal education	Primary school leaving Certificate	Secondary school Certificate	Tertiary Education	Adult Education	N	
No formal education						8	10.00
Primary school leaving Certificate						21	10.67
Secondary school Certificate						64	9.94
Tertiary Education			*			106	11.08
Adult Education				*		47	9.43

*The mean difference is significant at P<0.05

Table 5 shows that at p<0.05, a significant relationship was found between participants with secondary education and tertiary education. Similarly, a significant relationship also exists between participants with tertiary education and adult education. The post hoc comparison analysis shows that participants with tertiary education demonstrated higher knowledge of the health effects of environmental noise pollution

Table 6: One way Analysis of Variance comparison of location on sources of noise pollution among respondents

	SS	MSS	Df	F cal.	Sig.	Remark
Between groups	54.334	13.58	4			
Within Groups	796.581	3.31	241	4.110*	.003	S
Total	850.915		245			

*P<0.05

Table 6 shows that the df 4,241, f-calculated (4.110) is significant at P<0.003 level of significance. With p<0.05, denotes that the hypothesis which states that location has no significant influence on sources of noise is significant. Thus, the null hypothesis is rejected which implies that the location of the participants will determine the source of noise pollution.

Table 7: Scheffe Multiple Comparison of location and sources of noise pollution

Location	Residential	Commercial	Industrial	Government Office Area	School Area	N	
Residential						87	11.2529
Commercial						91	11.9560
Industrial						20	11.7500
Government Office Area						15	10.9333
School Area			*			33	10.6364
Total						246	11.4512

*The mean difference is significant at P<0.05

Table 7 shows that $p < 0.05$, a significant difference exists between participants in their location and source of noise pollution. The significant difference exists between respondents in commercial and school area. The post-hoc analysis shows that commercial areas ranked highest in determining the difference

Table 8: One way Analysis of Variance comparison of location on perceived health effects of noise among respondents

	SS	MSS	Df	F cal.	Sig.	Remark
Between groups	120.11	30.03	4			
Within Groups	1045.92	4.34	241	6.92*	.000	S
Total	1166.03		245			

* $P < 0.05$

Table 8 shows $f_{cal} = 6.92$ at $df 4; 241$ and at significance level .000 denotes that relationship between location of participants and the perceived health effect was statistically significant. Since $P < 0.05$, the null hypothesis was rejected. This signifies that there is a significant between location of participants and the perceived health effect of noise pollution.

Table 9: Scheffe Multiple Comparison of location and perceived health effects of noise pollution

Location	Residential	Commercial	Industrial	Government Office Area	School Area	N	
Residential						87	11.85
Commercial	*					91	10.75
Industrial						20	11.70
Government Office Area		*				15	12.60
School Area		*				33	12.61
Total						246	11.58

*The mean difference is significant at $P < 0.05$

Table 9 shows that at $p < 0.05$, a significant relationship exists between participants in commercial and residential areas on perceived health effect of noise pollution. Likewise, between participants in commercial with both government office and school areas respectively. The post-hoc analysis shows that commercial area ranked highest in determining the relationship between location of participants and the perceived health effects

7.0 Discussion

Findings from the study revealed that the participants knew the sources of environmental noise pollution. The fact that majority of the participants attested to urban traffic as a source of noise pollution was in line with Oyedepo (2012) that road traffic, industrial machines and generators are major sources of environmental noise pollution in urban cities. The revelation that generators constituted a major factor in noise pollution corroborated the findings of Olokooba et al (2010) and Anomoharan & Osemeikhan (2005). That participants were not convinced that noise from religious homes was a source of noise contradicted the submission of Singh (1984) and Singh and Danvar (2004). The reluctance to accept noise from churches and mosques may be linked to the fact that most residents in Ado Ekiti belong to one religion or the other. As a result, majority of the participants probably considered noise from religious houses as problem-solving practices rather than constituting health hazards.

The study also revealed that participants demonstrated little knowledge of the health consequences of noise pollution. This discovery is in line with Miglani (2010) that people generally lack consciousness of the ill effects which noise pollution creates. Out of the seven items that were used to measure the knowledge, only sleep disturbance, annoyance and hearing impairment had a mean scores above 1.50, which indicated that respondents knew them as health consequences of noise pollution. The finding is in line with the discoveries of some scholars who confirm that noise causes hearing loss, sleep disturbance and annoyance (Abel, 1990; Mead, 2007 and Stansford & Matheson, 2003). That many of the participants were not aware that environmental noise pollution could cause cardio vascular disease negates the submission of Goines and Hager (2007) who discovered that noise could lead to elevated blood pressure and heart rate. The participants revealed that environmental noise pollution disturbed them from sleeping, woke them up at night and affected their hearing which were in agreement with the findings of Olokooba et al (2010) who discovered that noise disturbs sleep and inability to fall asleep (Olaosun, et al. 2009).

A significant relationship was found to exist between level of educational attainment and knowledge of health effect of environmental noise pollution. Further analysis revealed that respondents with tertiary education demonstrated the highest knowledge of the health effects could be attributed to the possibility of knowledge gained at school or exposure to information. Similarly, significant difference was found between sources of noise

pollution and participants in residential and commercial locations. The findings agreed with that of Debasish & Debasish (2012) that urban dwellers are daily faced with noise pollution; and that of Rosen and Olin (1965) which reported a significant difference in hearing loss between inhabitants exposed to noise and those not exposed to noise.

8.0. Conclusion

Findings have shown that the knowledge of the health effects of noise pollution seems not to be adequate. This could translate into arbitrary emission and uncontrolled exposure to noise by the inhabitants of the study area. As the population of the city increases, the volume of noise pollutant will increase, especially with lack of health education on the health consequences of noise pollution. The danger of noise pollution is that the health will be affected thereby leading to decrease in productivity. The sources of noise pollution discovered in this study could be controlled if all the stake holders will arise to their responsibilities.

9.0. Recommendations

Based on the findings in this study, it is being recommended that:

- Government should, as a matter of urgency, review the existing noise pollution regulatory laws and ensure compliance with the activities put in place to control noise in living areas
- The government should construct separate motor ways outside the city to cater for traffic as well as heavy duty vehicles.
- Health educators should organize sensitization programmes to educate the populace on the health effects of noise pollution.
- Factories owners should be mandated to use sound proof devices.

References

- Abel, S.M. (1990). The extra-auditory effects of noise and annoyance: an overview of research. *Journal of Otolaryngology*, 19(1), 1-13.
- Anomohanran, O. & Osemeikhian, J.E.A. (2005). Comparative Noise pollution Study of Some Major Towns in Delta State, Nigeria. *Global Journal of Pure and Applied Sciences*, 11(2), 285-290.
- Basorun, J. O. & Olamiju, I.O. (2013). Environmental Pollution and Refinery Operations in an Oil Producing Region of Nigeria: A Focus on Warri Petrochemical Company. *Journal of Environmental Science Toxicology and Food Technology*, 2(6), 18-23.
- Bhargava, G. (2001). Development of India's Urban, Rural and Regional Planning in 21st Century. (115-116), New Delhi: Gian Publishing House.
- Bluhm, L. G., Berglund, N., Nordling, E. & Rosenlund, M. (2007). Road Traffic Noise and Hypertension. *Occupational and Environmental Medicine*. 64(2), 122-126.
- Boateng, C.A. & Amedofu, G.K. (2004). Industrial noise pollution and its effects on the hearing capabilities of workers: A study from saw mills, printing press and corn mills. *African Journal of Health Sciences*, 11(12), 55-60.
- Bronzaft, A.L (2000). Noise: Combating an ubiquitous and hazardous pollutant. *Noise and Health*, 2(6), 1-8.
- Clark, C. & Stansfeld, S.A. (2007). The Effect of Transportation Noise on Health and Cognitive Development: A Review of Recent Evidence. *International Journal of Comparative Psychology*, 20, 145-158.
- Evans G.W, Lepore S.J. (1993): Non-auditory effects of noise on children; a critical review. *Children's Environments*, 10, 42-72.
- Debasish, P. & Debasish, B. (2012). Effect of Road Traffic Noise Pollution on Human Work Efficiency in Government Offices, Private Organizations, and Commercial Business Centres in Agartala City Using Fuzzy Expert System: A Case Study. *Advances in Fuzzy Systems* <http://dx.doi.org/10.1155/2012/828593>
- Donatelle, R.J. (2002). Access to Health. 7thed. New York. Benjamin Cummings Publishers.
- Goines, L, Hagler, L. (2007). Noise Pollution: A Modern Plague. *Southern Medical Journal*, 100(3), 287-293.
- Jarup, L., Babisch, W., Houthuijs, D., Pershagen, G., Katsouyanni, K., Cadum, E., Dudley, M., Savigny, P., Seiffert, I., Swart, W., Breugelmans, O., Bluhm, G., Selander, J., Haralabidis, A., Dimakopoulou, K., Sourtzi, P., Velonakis, M. & Vigna-Taglianti, F. (2008). Hypertension and Exposure to Noise Near Airports: the HYENA Study. *Environmental Health Perspectives*, 116(3), 329-333.
- Kryter, K.D. (1985). *The Effects of Noise on Man*. 2nd Edition. Orlando, FL: Academic Press.
- Martin, P.R., Reece, J. & Forsyth, M. (2006): Noise as a trigger for Headache: Relationship between exposure and Sensitivity. *Headache*, 46(6), 962-972.
- Mead, M.N. (2007). Noise Pollution: The sound behind Heart Effects. *Environmental Health Perspectives*. *Environews*, 115(11), 536-537.
- Miedema, H.M.E. & Vos, H. (1999). Demographic and attitudinal factors that modify annoyance from

- transportation noise. *Journal of the Acoustical Society of America*, 105(6), 3336–3344.
- Miglani, D.G (2010). Noise Pollution: Sources, Effects and control
http://depssa.ignou.ac.in/wiki/index.php/Noise_Pollution
- Nicholson, R.A. & Smitherman, T.A. (2006). Noise as a Trigger for Headaches. *Headache*, 46(10), 1592-1594.
- Öhrström, E & Skånberg, A. (2004). Sleep disturbances from road traffic and ventilation noise-laboratory and field experiments. *Journal of Sound and Vibration*, 271(1&2), 279–296.
- Olaosun, A.O., Ogundiran, O. & Tobih, J.E. (2009). Health Hazards of Noise: A Review Article. *Research Journal of Medical Sciences*, 3(3), 115-122.
- Olokooba, S.M., Ibrahim, I. & Abdulraheem-Mustapha, M.A. (2010). Noise Pollution: A Major Catalyst to Climate Change and Human Health Catastrophe. unilorin.edu.ng/.../work%20shop%20NOISE%20POLLUT.ION.pdf
- Ouis, D. (2001). Annoyance from Road Traffic Noise: A Review. *Journal of Environmental Psychology*, 21(1), 101-120.
- Otukong, I.T.O. (2002). Environmental Pollution and Emerging Health Hazard: the Nigerian Scenario. *Journal of General Practice*, 7(1), 3-4.
- Oyedepo, S.O. (2012): Noise Pollution in Urban Areas: The Neglected Dimensions. *Environmental Research Journal*, 6(4), 259-271.
- Picard, M., Girard, S.A., Simard, M., Larocque, R., Leroux, T. & Turcotte, F. (2008). Association of work-related accidents with noise exposure in the workplace and noise-induced hearing loss based on the experience of some 240,000 person-years of observation. *Accident Analysis and Prevention*, 40(5), 1644-1652.
- Rabinowitz, P. (2000). Noise-Induced Hearing Loss. *American Family Physician*. 61:2749-2760.
- Rosen, S. & Olin, P. (1965): Hearing Loss and Coronary Heart Disease. *Archives of Otolaryngology*. 82: 236-245.
- Schulz, T.J. (1978): Synthesis of Social Survey on Noise annoyance. *Journal of Acoustic Society of America*. 64(2); 377-405
- Singh, N. & Davar, S.C. (2004). Noise Pollution- Sources, Effects and Control. *Journal of Human Ecology*. 16(3), 181-187.
- Singh, P. (1984): Noise pollution. *Every Man's Science*, 25(1&2), 231-235.
- Stansford, S.A. & Matheson, M.P. (2003). Noise Pollution: Non-auditory effects on health. *British Medical Bulletin*, 68(1), 243-257.
- WHO (2012). Noise. <http://www.euro.who.int/en/what-we-do/health-topics/environment-and-health/noise>.
- Wilkins, P.A. & Acton, W.I. (1982). Noise and Accidents- A Review. *Annals of Occupational Hygiene*. 25(3), 249-260.

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:
<http://www.iiste.org>

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: <http://www.iiste.org/journals/> All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: <http://www.iiste.org/book/>

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digital Library, NewJour, Google Scholar

