

# Public Awareness of the Impacts of Noise Pollution on Human Health

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**Abstract**— The study investigated the general public awareness of the impacts of noise pollution on human health. The study adopted a survey research design. Questionnaires were used to collect data from adult respondents through emails and their phone numbers. The results were analysed with pie and bar charts indicating the frequencies and percentages. The results of study revealed that negative impacts of noise pollution on health are headache, sleeplessness, psychological disorders, lack of concentration at work and other health impacts such as hearing loss, learning difficulties, stroke, hypertension and reduced quality of life. The study also indicated that the majority of the respondents are knowledgeable about the health effects of noise pollution. The study concludes that noise pollution adversely impact human health. The study recommends aggressive public enlightenment on the danger of noise pollution on human health and the strict implementation and enforcement of noise pollution abatement and control laws.

**Index Terms**— Public, Awareness, Noise, Pollution, Human, Health.

## I. INTRODUCTION

Highlight Noise pollution is an environmental menace in residential, commercial, industrial and agricultural facilities in countries around the globe particularly developing countries. Noise pollution adversely impacts human health and the environment. Jariwala, Syed, Pandya and Gajera (2017) stated that noise pollution is a major problem in cities around the world and defined noise as unwanted sound. Environmental noise according Jariwala et al (2017) consists of all the unwanted sounds in our communities and a form of air pollution, which is a threat to health and well-being.

Jariwala, et al (2017) opined that noise adversely affects future generations by degrading residential, social, and learning environments with corresponding economic losses.

Dorlikar, Awadhoot, Haque, Ratkanthiwar, Sarkar, Kolhe, Asrar and Khobragade (2015).avered that noise pollution as the third most hazardous pollution after air and water pollution. Dorlikar,et. al (2015) stated that the health effects of noise pollution are: “hearing impairment, interference with spoken communication, sleep disturbances, cardiovascular disturbances and disturbances in mental health, impaired task performance and negative social behaviour and annoyance reactions.” According to Basner, M., Babisch, W., Davis, A., Brink, M., Clark, C., Janssen, S., Stansfeld, S. (2014) “noise is pervasive in everyday life and can cause both auditory and non-auditory health effects”Hunashala and Patil (2012) stated that noise pollution is an alarming environmental problem in Kolhapur. Literature search revealed that several

studies have conducted on the impact of noise pollution on human health but only a few studies have focused on general public awareness of noise pollution on human health. This study was undertaken to fill this gap and add to the knowledge base on the impacts of noise pollution on human health in Nigeria.

## II. LITERATURE REVIEW

Hunashala and Patil (2012) assessed day time urban noise quality in fives zones such as educational, commercial and residential, industrial and residential, recreational and silence zone in Kolhapur and observed Leq of 72.25 dBAin industrial-residential zone, 64.47 dBA in commercial-residential zone, 63.71 dBA in educational zone, 53.26 dBA in recreational zone and 42.84 dBA in silence zone. Their study further showed that observed Leqfor educational zone was higher than the statutory limits and Leq was below the statutory limit for other zones.

Dorlikar, Awadhoot, Haque, Ratkanthiwar, Sarkar, Kolhe, Asrar and Khobragade (2015)assessed public perspectives of noise pollution in Nagpur city using a sample of 100 respondents through direct interview and found that most residents were not fully aware of the seriousness of noise as a form of pollution. Their study also revealed that traffic noise and construction activities were the major sources of noise pollution in Nagpur city and that majority of the residents were slow to speak on noise from religious practices.

Basner, Babisch,Davis, Brink, Clark, Janssen and Stansfeld(2014)examined auditory and non-auditory effects of noise on health and found hearing loss in occupational environments and through personal music players , sleep disturbance, daytime sleepiness, hypertension and cardiovascular disease, impairment of cognitive performance of school children, impacts patient outcomes and staff performance as noise-induced problems.

Wang, Qin, Liu, Han and Chen (2013) carried out a cross-sectional study on the effects of occupational noise exposure on hypertension or cardiovascular and hearing lossamong workers from automobile manufacturing company of Chongqing, China from 2011 to 2012

For the past few years, noise pollution has been more and more serious, and it may lead to several diseases. While the humans expose to noise in quantity for a long time, their blood pressure will change, and even cause changes in cardiac function. Their study divided into two groups; noisy with  $\geq 90$  dB(A) and non-noisy with  $\leq 70$  dB (A) and found that there is a positive association between occupational noise and hypertension, occupational noise and impaired hearing, but no conclusion can be drawn between occupational noise and Electocardiogram (ECG). They also stated that long term noise exposure can increase blood

pressure and change cardiac function.

Oviasogie and Ikudayisi (2019) investigated the effect of noise exposure on residents' wellbeing in Benin city, Nigeria adopting a cross-sectional survey of urban residents and ordinal regression analysis to determine factors that influenced neighbourhood wellbeing and found hindrances to communication, interference with sleep, stress, annoyance, as the major effects of urban neighbourhood noise pollution. Their study concluded that most residents perceived neighbourhood noise as harm to health and might stimulate aggression and other anti-social behaviour.

Science Communication Unit (2015) reviewed several articles on the Noise impacts on health and found that stress and sleep disturbance due to environmental noise lead to cardiovascular disease and that night-time noise impact more on cardiovascular health than day-time noise. Noise exposure at night is a particular problem because it disturbs sleep. They also found that day – time exposure of United Kingdom (UK) population to noise affect blood pressure, heart disease, stroke, dementia and cost to society valued at 1.34. Aircraft noise at night can cause sleep disturbance, damage blood vessels and cause long-term cardiovascular disease in the long run of 75 healthy volunteers aged between 20 and 60 years.

Science Communication Unit (2015) review revealed that vulnerable groups of people with mental illness, shift workers and tinnitus are at increased risk to environmental noise exposure and also children become hyperactive, inattentive and have emotional problems especially if they are exposed to higher levels of the night-time noise. Their review also revealed that World Health Organization (WHO) affirmed that 10% of the world population is exposed to environmental and social noise such as head phones that leads hearing impairment. (Science Communication Unit, 2015) Their review further showed that living in quiet areas improves, noise affects human state of mind and that a mixture of quiet and vibrant areas should be found in cities. Their review further indicated that noise from wind turbines influence people's judgement of noise annoyance and that wind turbine noise can be detected even when it was 23 dBA quieter than motorway noise, and they could hear turbines above any volume of noise from local roads (Science Communication Unit, 2015)

According to the Organisation for Economic Co-operation and Development (OECD) (2001) environmental damage significantly impact on human health as high as 5% for high-income OECD countries, 8% for middle-income OECD countries, 13% for non-OECD countries and is responsible for 2-6% of the total disease burden in OECD countries. Causes of the environment-related disease burden in OECD countries are air pollution and exposure to hazardous chemicals. The transport and energy sectors are key drivers of air pollution, while agriculture, industry, waste disposal and incineration are major sources of chemical pollution (OECD, 2001).

Van den Bosch, Tjeerd, Andringa, Peterson, Ruijssemaars, & Vlaskamp (2017) conducted a study on the relationship between natural and non-natural soundscapes such as beach, Forest, Urban, Music and silence on the mood of people with

severe or profound intellectual and multiple disabilities and confirmed the result of earlier studies that there is a relationship between the auditory environment and the mood of people with severe or profound intellectual disability. Thirteen participants with severe or profound intellectual disability and challenging behaviour were presented with 5 different soundscapes (Beach, Forest, Urban, Music, and Silence) in a dedicated room. Direct support professionals made observations before and after each trial. Results show that there is an increase in the frequency of observations of a relaxed mood across conditions, a greater increase in the frequency of observations of a relaxed mood and a greater decrease in the frequency of observations of an interested mood were associated with the natural conditions (Forest and Beach) rather than the non-natural conditions (Urban and Music).

Muñzel, Goril, Babisch and Basner (2014) reviewed literature on cardiovascular effects of environmental noise exposure and found that environmental noise affects the auditory system, causes annoyance, disturbs sleep, impairs cognitive performance, increase arterial hypertension, myocardial infarction, stroke, blood pressure, stress hormone levels, oxidative stress.

El-Sharkawy and Alsubaie (2016) assessed the noise levels inside the University of Dammam (UD) campus in three different locations namely: outside walls, the internal streets, and inside several buildings and measured environmental noise pollution levels at three different periods of the academic year 2011-2012, that is, lecture periods, final exams and holiday periods. The study revealed that noise levels outside UD campus walls were higher than those inside the campus walls at the three periods; noise levels were highest at locations with high traffic movement in UD campus; the highest noise levels were recorded during the lecture period, the lowest level was observed during the holiday period. Indoor noise levels of buildings on the campus were nearly the same with outdoor noise levels. Their study concludes that noise levels were higher inside and outside the buildings than their statutory limits.

Halin (2016) investigated the distractive effects of background speech, aircraft noise and road traffic noise on text memory and particularly to examine if displaying the texts in a hard-to-read font can prevent against the detrimental effects of these background sounds and found that a hard-to-read font, can increase concentration temporarily and shield against the detrimental effects of environmental noise and background speech on text memory. The study concludes that a simple alteration of the appearance of a text can help individuals that are reading in noisy environments to overcome auditory distraction.

Shepherd, McBride, Kim, Dirks and Welch (2014) Noise remains a potent degrader of health in many global contexts, capable of inducing severe annoyance and sleep disturbance. An epidemiological study was undertaken to compare noise annoyance and health-related quality of life of individuals residing close to a major international airport or wind turbine complex with those located in demographically matched areas. Results indicate that domains of health-related quality of life may be degraded in those living in areas more likely to induce noise annoyance. Furthermore, the addition of aviation noise to environments already encroached by road

noise may induce further annoyance and degradations in health-related quality of life, indicating that one noise sources may not mask the impact of another.

Jariwala, Syed, Pandya and Gajera (2017). Reviewed literature on Noise pollution and human health and found that noise pollution impairs health, degrades residential, learning environment, social, work environment which leads to economic and intangible losses such as wellbeing. Their review further revealed that noise pollution causes hearing loss, sleep disruption, cardiovascular disease, social handicaps, reduced productivity, negative social behaviour, annoyance reactions, absenteeism and accidents. It destroys owners and occupiers quiet enjoyment of property, leisure time and increases the frequency of antisocial behaviour.

According to Charakida and Deanfield (2013) "Night time aircraft noise can be perceived by the brain as a chronic stress response. Stress release hormones (glycocorticoids and catecholamines) are reproduced, and an increase in blood pressure can also be observed. Stress hormones can act directly on the endothelial surface by binding to their receptors and indirectly by promoting oxidative stress"

Tiesler, Birk, Thiering, Kohlböck, Koletzko, Carl-Peter Bauer, Berdel, Berg, Babisch and Joachim Heinrich, J. (2013) investigated the association between the exposure to road traffic noise and children's behavioural problems and sleep disturbances in Munich, Germany and found that exposure to road traffic noise at home increased hyperactivity, emotional symptoms particularly of children exposed to higher nocturnal noise and sleeping problems.

Foraster, Eze, Schaffner, Vienneau, Héritier, Endes, Rudzik, Thiesse, Pieren, Schindler, Schmidt-Trucksäss, Brink, Cajochen, Wunderli, Rössli, and Probst-Hensch (2017) examined the association between exposure to road, railway and aircraft noise and arterial stiffness in the SAPALDIA study: annual Average Noise Levels and Temporal Noise Characteristics and found that residential outdoor long-term exposure to railway noise (expressed as annual average Lden levels) and to total number of noise events (mainly related to road noise) may be associated with arterial stiffness as measured by baPWV, particularly at night and potentially through sleep impairment. Their study concluded that association between transportation noise and arterial stiffness adds to the evidence about the long-term impact of noise on the cardiovascular system and the development of cardiovascular disease (CVD).

Kamp and Davies (2013) reviewed literature on noise and health in vulnerable groups such as children, the elderly, the chronically ill, people with a hearing impairment, sensitive persons, shiftworkers, people with mental illness, (e.g., schizophrenia or autism), people suffering from tinnitus, and fetuses and neonates and found that noise exposure in school is associated with fatigue, headaches, annoyance, lack of concentration, learning difficulties, impaired reading speed and higher cortisol level indicating stress reaction in children. Their review also revealed that road traffic noise is negatively related to physical and the mental dimension of health-related (HR) quality of life.

Khan and Ghouri (2011) examined the impact of environmental pollution on life and found that pollution generally adversely impacts human health, animals and

plants.

Bugliarello, G., Alexandre, A., Barnes, J. and Wakstein, C. (1976) investigated the awareness of noise as a risk by the general public and found that those with hearing loss, workers and the general public are not aware that long term exposure to high noise levels can cause damage to hearing. They also stated that hearing loss is caused by old age and specific exposure to noise. Their study also showed that noise can wake people from sleep and prevent people from sleeping. They also stated that the major causes of sleeplessness are noise from airplanes and airport and automobile traffic.

Bhosale, Late, Nalawade, Chavan and Mule (2010) assessed traffic noise levels in Aurangabad city, India in six locations namely: Nagar Naka, Kranti Chowk, CIDCO bus stand, Railway station area, Dhoot Hospital and Baba petrol pump and found that the minimum noise level was 74 dB and the maximum noise level was 86 dB on working days and 70 dB minimum and 81 dB maximum on holidays. Their study further showed that measured noise levels were above the prescribed noise levels.

### III. METHODS

The study adopted a survey research design. Questionnaire was designed to solicit data from the general public in May, 2020. The questionnaire items include public awareness of health impacts of noise pollution and specific health impacts such as headache, sleeplessness, psychological disorders, lack of concentration at work and other health effects. The questionnaires were distributed to undergraduate and postgraduate students, Lecturers, Bank workers, Engineers, Doctors, Pastors, Administrators and other literate adult members of the general public. The study adopted a purposive and convenient sampling technique. The questionnaire was generated using Google form and the questionnaires were distributed to respondents through emails and WhatsApp contact numbers during Covid-19 lockdown. The response rate was very fast and all responses were plotted in pie and bar charts, which made the analysis very easy and fast. Sixty one responses were properly completed and the results and data analysis were based on the sixty one questionnaires retrieved. The results are presented in pie and bar chart indicating frequencies and percentages.

### IV. RESULTS AND DISCUSSION

The results of the study are presented below which include general public awareness of health impacts of noise pollution and the specific impacts of noise pollution on human health.

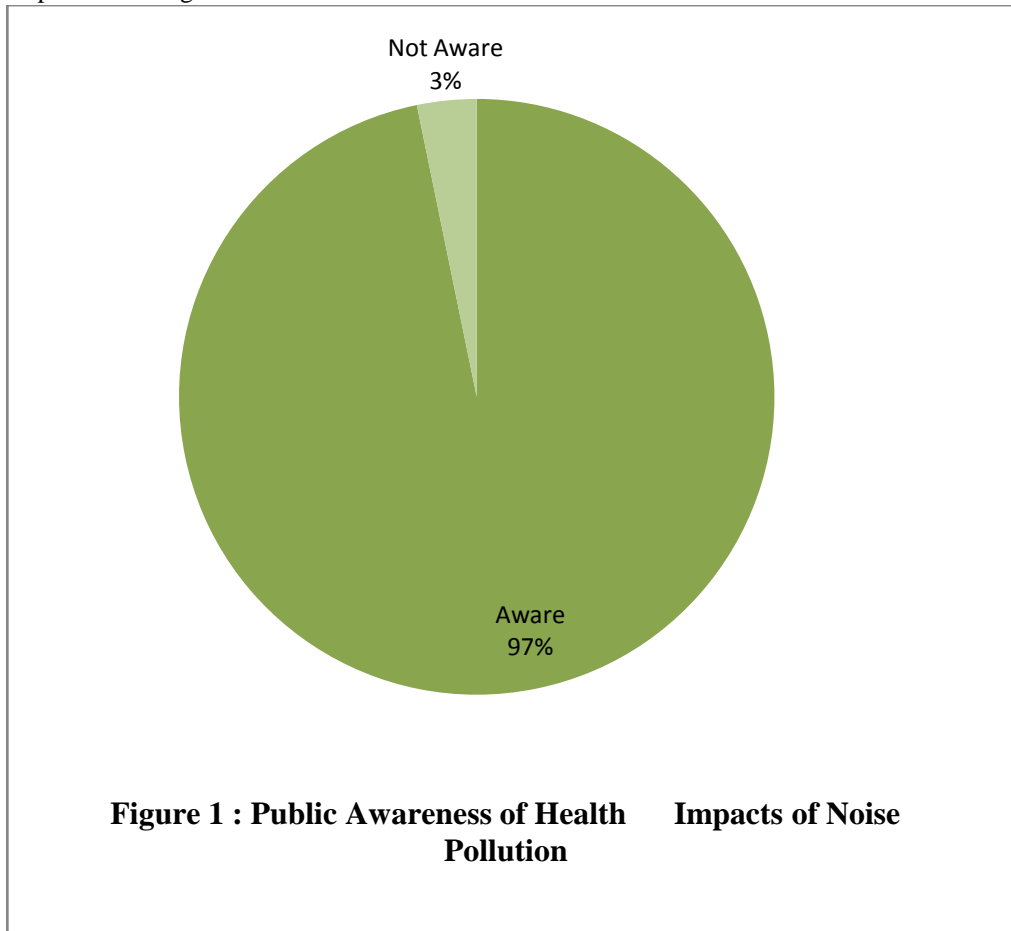
#### A. Public Awareness of Health Impacts of Noise Pollution

The result of general public awareness of the health impact of noise pollution is presented in figure 1. The result shows that majority (59) of the respondents representing 97% are aware of the impacts of noise pollution on health, while only 2 persons representing 3% are not aware. The study concludes that the level of awareness of the impact of noise pollution on health is considerably high in Nigeria. This may be as a result of the level of the education of the respondents. The result of this study is similar to the result of the study conducted by Bugliarello et al., (1976) on the awareness of

## Public Awareness of the Impacts of Noise Pollution on Human Health

noise as a risk by the general public and found that those with hearing loss, workers and the general public are not aware that long term exposure to high noise levels can cause

damage to hearing. This study was conducted over forty years ago

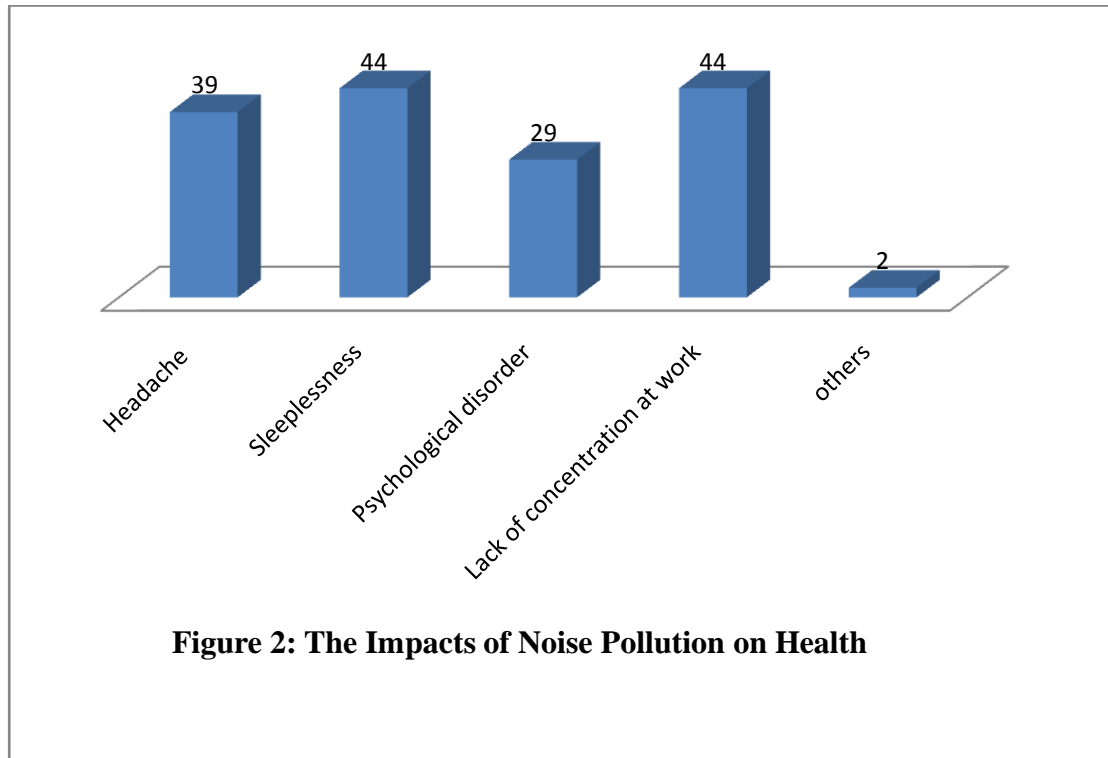


### B. Impacts of Noise Pollution on Health

The results presented in Figure 2 revealed that noise pollution impacts negatively on health. The study showed that thirty nine respondents representing 63.9% of the sixty one respondents indicated that headache was noise pollution induced. This result confirmed the result of Kamp and Davies (2013) that noise exposure in school is associated with fatigue and headache. The results further showed that forty four (72.1%) respondents representing 72.1% of the sixty one respondents affirm that noise pollution is a major cause of sleeplessness. Several studies (Bugliarello *et al.*, 1976; Tiesler *et al.*, 2013; Mu'nzelet *al.*, 2014; Foraster, *et al.*, 2017; Jariwala, *et al.*, 2017; Oviasogie and Ikudayisi, 2019) also confirmed that noise pollution is a major cause of sleep disturbance.

The study also revealed that twenty nine respondents representing 47.5% of the sixty one respondents agreed that psychological disorders are caused by noise pollution.

Several studies (Charakida and Deanfield, 2013; Kamp and Davies, 2013; Tiesler *et al.*, 2013; Mu'nzelet *al.*, 2014; Shepherd *et al.*, 2014; Jariwala *et al.*, 2017; Van den Bosch *et al.*, 2017; Oviasogie and Ikudayisi, 2019) also confirmed psychological disorders such as hyperactivity in children, annoyance reaction, learning difficulties, stress reaction, mood changes, cognitive performance, negative social behaviour and emotional symptoms are caused by noise pollution. The results further indicated that forty four (72.1%) respondents representing 72.1% of the sixty one respondents affirm that noise pollution is a main cause of lack of concentration. This result is similar to the results of the study conducted by (Kamp and Davies, 2013; Jariwala *et al.*, 2017) that noise pollution is a significant cause of lack of concentration in children and reduced productivity. The study showed that only two respondents stated that noise has negative impacts on other health issues which can be inferred from literature such as hearing loss, hypertension, stroke, cardiovascular disease, distractions, reduced health related quality of life.



**Figure 2: The Impacts of Noise Pollution on Health**

## V. CONCLUSION

The research investigated the general public awareness of the impacts of noise pollution on human health. The study revealed that noise pollution adversely impact on human health. The negative impacts on health are headache, sleeplessness, psychological disorders, lack of concentration at work and others such as hearing loss, learning difficulties, stroke, hypertension and reduced quality of life. The study indicated that the majority of the respondents are knowledgeable about the health effects of noise pollution. The study recommends increased enlightenment of the public on the danger of noise pollution on their health and the strict implementation and enforcement of noise pollution control laws.

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