

# An Examination of Sources of Noise Pollution in Cities in Nigeria

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**Abstract**— This study examined the sources of noise pollution in Nigeria. The study adopted survey research design. The target population of the study was the adult urban residents. Data were obtained through a structured questionnaire, observation, photographs and from key informants. The purposive and convenient sampling techniques were utilised to select the respondents. The questionnaire was designed using google form and distributed to respondents through respondents' emails and WhatsApp phone numbers. Sixty one questionnaires were retrieved and analysis was based on the responses from the questionnaire. The results were analysed with descriptive statistics. The study revealed that the major source of noise pollution in Nigeria is generator noise. This was closely followed by automobiles, industries, religious centres, musical equipment and sources of noise pollution. The study concludes there are numerous sources of noise pollution in cities in Nigeria that negatively impact humans and the urban environment. The study recommends that noise pollution can be significantly reduced by law, advocacy, prevention by the polluter and through polluters pay principle.

**Index Terms**— Noise, Pollution, Sources, Cities, Nigeria.

## I. INTRODUCTION

Highlight Noise pollution is a major problem in cities in the world particularly cities in developing countries. In Nigeria people are exposed to the noise pollution menace at home, neighbourhoods, schools, offices and industries. According to Yeates (2020) "noise pollution in cities is a rapidly emerging problem for everyone" Jariwala, Syed, Pandya and Gajera (2017) stated that noise pollution is a major problem in cities around the world. The word noise is derived from a Latin word 'Nausea' which means sickness in which one feels to vomit. Dorlikar, Awadhoot, Haque, Ratkanthiwar, Sarkar, Kolhe, Asrar and Khobragade (2015) averred that noise is derived from the Latin roots nausea, meaning sickness, and noxia, meaning harm. Noise is the unpleasant and undesirable sound which leads to discomfort to human beings

(<https://byjus.com/physics/noise-pollution-prevention>)

Jariwala, Syed, Pandya and Gajera (2017) defined noise as an unwanted sound.

Dorlikar, Awadhoot, Haque, Ratkanthiwar, Sarkar, Kolhe, Asrar and Khobragade (2015) defined noise as an unwanted sound. Ganiyu and Adedeji (2011) defined noise as an unwanted and irritating sound. Kumar and Kumar (2018) defined noise pollution as an unwanted sound. Jariwala, *et al* (2017) opined that environmental noise consists of all the unwanted sounds in our communities. Matthews (2018)

defined that "Noise pollution refers to excessive amounts of noise that interfere with the natural biorhythms of everyday life." Thakur (2017) defined noise pollution as the excessive noise that disturbs the activities of animals or humans.

Jariwala, *et al* (2017) stated that environmental noise pollution is a form of air pollution and it is a threat to health and well-being. It is more severe and widespread than ever before, and will continue to increase in magnitude and severity because of population growth, urbanization, factories, machines, industries, highway, rail, and air traffic, which remain major sources of environmental noise. Reddy (2020) opined that noise is closely related to technological advancement and industrial growth.

Matthews (2018) stated that noise pollution can also come from sounds that aren't necessarily overly loud, but which are particularly annoying or troublesome in nature. Ganiyu and Adedeji (2011) averred that loud noise is harmful and impacts negatively on the quality of the built environment. They further stated that noise is a form of environmental pollution and a source of stress. Jariwala, *et al* (2017) stated that environmental noise pollution is a form of air pollution and it is a threat to health and well-being. The intensity of sound is measured in decibels (dB). (<https://byjus.com/physics/noise-pollution-prevention>) Kumar and Kumar (2018) stated that noise pollution needs to be controlled to make the workplace and living environment comfortable.

Dorlikar, Awadhoot, Haque, Ratkanthiwar, Sarkar, Kolhe, Asrar and Khobragade (2015) stated that WHO has documented seven categories of adverse health effects of noise pollution including hearing impairment, interference with spoken communication, sleep disturbances, cardiovascular disturbances, disturbances in mental health, impaired task performance and negative social behaviour and annoyance reactions. Literature review revealed that several studies examined the effects of noise pollution health but few studies have focused on the sources of noise pollution at the country level. It is against this background that this study was undertaken to examine the sources of noise pollution in cities in Nigeria.

## II. LITERATURE REVIEW

Yeates (2020) stated the following as noise pollution sources: mowing machines, loud music, overpopulation, traffic congestion and noise from international airport. Yeates (2020) listed the most noise polluted cities in world as Karachi, Pakistan with 15 million residents and noise levels of 90 decibels; Mumbai, India with noise levels of over 100

decibels referred to as the noisiest city in the world; New York City, New York, with population congestion of over 8 million and around 70 decibels; San Francisco, California due to loud noise from San Francisco International Airport, San Francisco; Shanghai, China with 85 decibels or higher due to traffic; Guangzhou, China with over population of 13 million had the highest noise pollution index in the world; Los Angeles, California, noise from constant traffic congestion and LAX International Airport; New Delhi, India, with high population and traffic, Madrid, Spain with loud noise from loud nightlife and Tokyo, Japan with noise levels of 90 decibels in some locations. Other cities with very high noise levels according to Yeates (2020) are Cairo, Egypt, Istanbul, Turkey; Barcelona, Spain; Mexico City, Mexico; Paris, France; and Buenos Aires, Argentina.

Reddy (2020) stated that the five major sources of noise are noise generated from wars between Countries, neighbourhood noise, traffic noise, occupational noise and noise from religious and cultural Functions. According to Reddy (2020) neighbourhood noise sources include disturbance at home, public places of entertainment, television and radio sets, parties, children playing, domestic animals, cars, motorcycles, football matches, athletics meetings, carnivals, trade fairs, open air pop concerts, loud speakers and amplifier music. Other sources of noise include indoor places of entertainment such as dance halls and discotheques that cause noise nuisance to nearby residents especially late in the evening. Reddy (2020) also stated that neighbourhood noise also include demolition, building construction and road construction works. The occupational noise is largely produced by industrial machines and processes and the noise sources at home include washing machines, spin dryers, food blenders and vacuum cleaners. (Reddy, 2020). Industries, religious and cultural functions such as weddings, burials and festivals are noise sources. (Reddy, 2020)

Reddy (2020) found that noise in Indian cities is increasing and above human tolerance and are above WHO (World Health Organisation) and BIS (Bureau of Indian Standards). In large cities noise levels range from 90 to 100 dbA while cities like Calcutta and Bombay, the noise levels are higher.

Noise pollution sources in household are food mixer, grinder, vacuum cleaner, washing machine and dryer, cooler, air conditioners, loud speakers of sound systems, TVs, ipods, ear phones and barking of dogs (Eschooltoday, nd) Social events such as places of worship, discos and gigs, parties and other social events also create a lot of noise for the people living in that area. In many market areas, people selling with loud speakers and shouting to attract customers to buy their goods (Eschooltoday, nd) Noise pollution caused by Commercial and industrial activities include Printing presses, manufacturing industries, construction sites, contribute to noise pollutions in large cities. People working in industries and work with lawn mowers, tractors and noisy equipment are required to wear ear plugs and noise-proof gadgets. Noise pollution sources in the transportation sector are aeroplanes flying over houses close to busy airports, over ground and underground trains and vehicular traffic (Eschooltoday, nd).

Matthews, K. (2018) stated that noise pollution comes from ineffective city planning, construction activities, social events such as concerts, industries, hum of electronic devices and florescent lights, vehicles passing on the street and voices from other offices. Matthews, K. (2018) further stated that excessive noise pollution can be detrimental to physical, mental, and emotional health.

Kumar and Kumar (2018) analysed noise pollution mathematically and revealed that two noise sources of exactly the same level can have a combined noise level that is 3 dB higher than the individual values. The greater the difference between the two individual noise sources, the lower is the combined noise level. The average noise level of various equipment used inside the washery generally ranges from 85 to 110 dB.

Dayal (2017) examined the environmental concern of shale gas production and found that at all the stage of the production from Shale exploration to exploitation environment is negatively impacted such as air pollution, water pollution, soil pollution and noise pollution.

Lercher (2019) stated that everyday people are exposed to different sound sources such as aircraft noise, noise from industries, railway noise and road traffic noise from various background soundscapes due to building layouts, residential pattern, meteorology and lifestyle. Lercher (2019) suggested that in noise regulation, planning and control all noise sources should be combined as a single sound environment and not separating it into pieces and describe it by a one-number indicator. Noise sources create other environmental factors such as vibration and air pollution (Lercher, 2019).

Hornberg and Pauli (2011) examined substandard housing as a social dimension of environmental health and found that there is a relationship between dwelling unit and neighbourhood conditions environmental health inequalities. They recommended that local initiatives and national programs should promote good-quality housing and improve health opportunities for the population regardless of social status, gender, age and ethnicity.

Murphy and King (2014) focused on technical and practical approaches for noise abatement and recommended source-based abatement measures, receiver-based measures, long term and short term measures for noise reduction.

Thakur (2017) averred that noise pollution sources are motor vehicle engines, trains, aircraft, transportation system and have negative impact on psychological and mental wellbeing of the people. Other noise pollution sources include poor Urban Planning, social events such as pub party, and traditional marriage parties, machines such as and heavy industrial machine and equipments such as generators, grinding mills and compressors (Thakur, 2017)

Ganiyu and Adedeji (2011) investigated major sources of noise pollution and its impact on the built environment of Oba – Ile housing estate in Akure, Ondo State, Nigeria and found that the major sources of external noise are vehicular traffic, pedestrian traffic and religious buildings and the major sources of internal noise are generating sets, telephone/mobile phones, radio and television sets and impacts negatively on residents and the built environment.

Their study recommends good design and building orientation, adequate set back and reduction of noise from sources as some of the ways to minimize the problems of noise pollution in built environment

Some major causes of noise pollution are vehicle engines and horns, aircraft, railways, industrial machines, loudspeakers used for religious functions or political purposes, crackers, television, transistors, radio, musical instruments, generators, mills, huge exhaust fans, events such as weddings and public gatherings, Construction sites such as Mining and construction of buildings and unnecessary usage of

fireworks(<https://byjus.com/physics/noise-pollution-prevention>). Noise pollution adversely impact human health which includes hypertension, hearing loss, sleeping disorder, cardiovascular

issues(<https://byjus.com/physics/noise-pollution-prevention>)

Pritam, Pandey and Singh (2014) assessed outdoor and indoor noise pollution hourly in eleven locations in commercial areas of Gorakhpur City and found that the outdoor noise levels are as a result of traffic volume and congestion, users' generators and crowd on roads and indoor noise levels increased only in the afternoon from 3:00 pm to 4:00 p.m. when large number of customers flows into the shops after work and school. Their study further revealed that during the day the outdoor and indoor noise levels are greater than the maximum permissible limit of 65 dB.

Kim(2015) assessed noise pollution sources, effects and control in indoor and outdoor living environments and found that sources of noise pollution include noise due to human behavior, motor engines, building facilities, construction noise, working environment, and social gatherings. Among these sources of noise, traffic was found to be the most significant in the living environment.

Ahmed and Rahman (2015) examined the actual condition of auditory and non-auditory health effect of noise among street people in Dhaka city found that both auditory and non-auditory effects of noise are at alarming condition in all zones of the city. The study found that noise levels in Dhaka are higher than WHO standards and noise levels were higher in the city centre than in the periphery. Ahmed, T. and Rahman, T. (2015) also affirmed that sources of noise pollution are divided into two categories namely: the indoor and the outdoor sources. The indoor noise sources are Television, radio, cassette recorder, i-pod, CD or DVD players, ring-tones or alarm-tones of mobile phones, computer games, guitar, drums, other musical instruments with the help of an amplifier, electrical appliances, drill machine and lawn-mower. The outdoor sources include buses, trucks, taxis, other three wheeler-vehicles, automobiles, motorbikes, trains, airplanes and jetfighters

Passchier-Vermeer and Passchier (2000) investigated noise pollution and public health and found that noise exposure can induce hearing impairment, hypertension and ischemic heart disease, annoyance, sleep disturbance, and

decreased school performance. They concluded that noise exposure constitutes a health risk. Hammer, Swinburn and Neitzel (2014) examined environmental noise pollution in the United States and found that 104 million of individual suffer from adverse health outcomes due to noise exposure, including heart disease and hearing loss.

### III. RESEARCH METHODS

The study was conducted in Nigeria, the most populated country in West Africa and in Africa with a population of over 200 million. The study adopted a survey research design. The data for the study were collected through a structured questionnaire, observation, photographs and key informant sources. The questionnaire was generated using google form and the questionnaires were distributed to respondents through emails and WhatsApp contact numbers in May, 2020 during Covid-19 lockdown. Photographs were taken in June, 2020 after the Covid -19 lockdown. The questionnaire items include sources of noise pollution such as generators, industries, automobiles, Religious centres, musical equipment and other sources of noise pollution. The study target was on the urban population. The questionnaires were distributed mostly to respondents in Lagos, Abuja, Port Harcourt and Yenegoa. The study adopted a purposive and convenient sampling technique. Sixty one questionnaires were retrieved and data analysis was based on the sixty one responses. The response rate was very fast and all the responses were plotted in a bar chart, 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 study utilised both primary and secondary data sources. The data was analysed with descriptive statistics such as bar chart. The results are presented with photographs and bar chart indicating the frequencies and percentages.

### IV. RESULTS AND DISCUSSION

The results of the study are presented in Figure 1. The sources presented in figure 1 include generator, automobiles, industries, religious centres, musical equipments and other sources. The study showed that the major source of noise pollution in Nigeria cities is generator from household. Fifty five respondents representing 90.2% percent of the sixty one respondents agreed that generators are the major sources of noise pollution in Nigeria. This finding supports the finding of some studies (Wokekoro and Owei, 2006; Ganiyu and Adedeji 2011; Wokekoro and Owei, 2014; Pritam, Pandey and Singh, 2014). Generator noise in Nigeria is as a result of incessant power cuts by Power distributing companies across the nation. A good example is the Port Harcourt Electricity Distribution (PHED) Company that delights in cutting power supply and cables even when the people have paid electricity bills. People are thrown into darkness for days, weeks and sometimes months. The people are ignorant of their rights, helpless and frustrated so they resort to the use private power generators to provide their power supply needs. It has been observed that when Electricity Distribution Companies transformers are faulty, residents are requested to contribute money by these companies to effect the repairs, without

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contribution of the said amounts, residents are kept in darkness for weeks and months until the monies are paid. The regulating body, Nigerian Electricity Regulatory Commission (NERC) is not doing anything to stop the trend and the Ministry of Environment is also doing nothing to curb the noise pollution menace. It has also been observed that in multiple occupation residential properties, occupants of each flat operate a separate generator (see Plate 2) and the noise becomes unbearable in the night leading to sleeplessness and difficulty in communication. This is also applicable to multiple occupation commercial properties, where each occupant operates a separate generator thereby increasing the noise pollution problem. The use of electricity generators significantly increases the cost of running a business and decrease profit. Generators are found in virtually all premises in Churches, commercial properties (see Plate 1), industrial establishments, educational institutions such as primary, secondary and tertiary. It is virtually impossible do business in Nigeria without a private electricity generator since electricity from the public sector is very unreliable. Generators also produce grime, cause vibration and pollute the air. A key informant revealed that the noise pollution problem is exacerbated by owners of petroleum products filling stations and generator merchants who bribe staff of electricity distribution companies to cut power in order to sell their products.



Plate 1: Private Electricity Generator in Front a shop.



Plate 2: Private Electricity Generator at the Balcony of an apartment in a Multiple Occupation Residential Property

The study also revealed that the second major source of noise pollution is automobiles. Thirty three respondents representing 54.1% of the 61 respondents indicated that automobiles are critical source of noise pollution. This is a prevalent problem in affluent cities like Port Harcourt, Lagos and Abuja. Traffic congestion is a major problem in Lagos, Nigeria. The result of this study supports several studies (Ganiyu and Adedeji, 2011; Pritam, Pandey and Singh, 2014; Wokekoro and Owei, 2014; Kim, 2015; Thakur, 2017; Matthews, K. (2018); Lercher, (2019; Reddy, 2020; Yeates (2020)). Automobiles are causes of air pollution, global warming and climate change through the emission of greenhouse gases such as carbon monoxide (CO) and carbon dioxide (CO<sub>2</sub>).

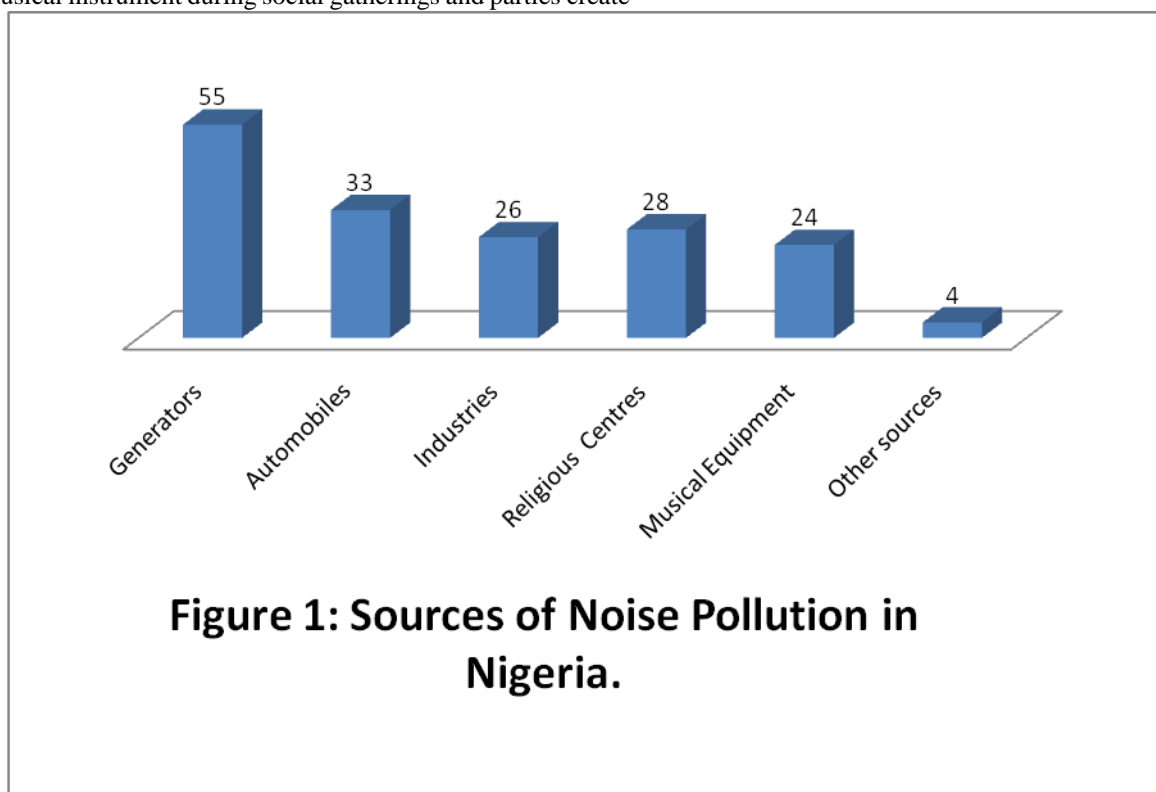
The results show that the third major source of noise pollution in Nigeria is from religious centres. Twenty eight respondents representing 45.9% of the sixty one respondents affirm that religious centres are noise pollution sources. The noise pollution from religious activities includes loud speakers, micro phones, musical instruments and generators. The noise is short lived and it is referred to as a joyful noise. This result is similar to the findings of the studies of (Reddy, 2020; Ganiyu and Adedeji (2011).

The study further revealed that industries are sources of noise pollution. Twenty six respondents representing 42.6% affirm that industries are also major sources of noise pollution. Industries include oil and gas, chemical, textile, food processing, Leather, plastic, glass and others. The results support the findings of several studies (Thakur, 2017; Matthews, 2018; Lercher, (2019; Reddy, 2020). The noise is generated from industrial machines and power plants.

The results also indicated that another source of noise pollution is musical instruments. Twentyfour respondents representing 39.3% of the sixty one indicated musical instruments such as loud speakers, microphones, drum,

musical stores and electronic devices as noise pollution sources. This finding confirms the findings of several studies (Ganiyu and Adedeji, 2011; Kim, 2015; Matthews, K.(2018); Lercher, (2019); Reddy, 2020; Yeates (2020) that the use of musical instrument during social gatherings and parties create

noise pollution. Other sources of noise pollution were deduced from literature including night clubs, washing and spinning machine, dish washers, car horns, crackers, television and poor city planning.



## V. CONCLUSION

The study examined sources of noise pollution in cities in Nigeria. The study found that generators are the major sources of noise pollution in cities in Nigeria. The study also revealed that the second main cause of noise pollution is automobiles with 54.1%. The study further showed that the third predominant causes of noise pollution in cities in Nigeria are religious centres. The study found that the fourth and fifth causes of noise pollution are industries and musical equipment respectively. The other causes include blenders, car horns, washing and spinning machines, television, radio, poor town planning and public gatherings including weddings and burials. The study concludes that the noise pollution sources are numerous and adversely affect humans and the environment. Generator noise pollution can be stop by providing twenty four hours electricity supply in cities in Nigeria. The study recommends that noise pollution can be control by law, advocacy, conscious prevention by the polluters and imposing polluters pay principle.

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