

Level of Awareness of Transport Externalities on Noise Pollution in Akure, Nigeria.

Oluwasanya T., *Enyinda, C.A., Olisa B. S., Stephens, M. S.

Department of Logistics and Transport Technology, Federal University of Technology, Akure, Nigeria

**Corresponding Author*

DOI: <https://doi.org/10.51583/IJLTEMAS.2024.130213>

Received: 25 January 2024; Revised: 12 February 2024; Accepted: 16 February 2024; Published: 12 March 2024

Abstract: Transport conveys substantial socioeconomic benefits. It is a vital sector that facilitates progressive developments in economy of a nation. Advantages derived from transportation sector are vital in the integration of various regions and sectors of the economy of nations. Despite this advantage, one of the negative externalities it exhibits is noise pollution ‘an unwanted and undesirable sound’. Excessive noise in an environment is identified to constitute the most disturbing among the city pollutants and this is a serious urban crisis in Akure. This study ascertains the level of awareness of the users of transport services on the impact of transportation on the environment in Akure South LGA. and determines the effects of Noise pollution on the residents in the study area. Noise level measurement was done using a PCE-322A sound level meter and direct interview was conducted with residents and other road users. Noise data were collected at different time intervals to find out the variation of sound levels. Based on the findings, respondents reported that the most disturbing period of the day was evening (peak period) between 3 pm and 5.00 pm. The findings revealed that the level of awareness of negative effects of noise pollution is significantly low. The study recommended that public needs to be sensitized on the negative externalities of vehicular noise pollution and the need to curtail it.

I. Introduction

Transportation of goods, people and activities from points of origins to destinations is inevitable for the survival of human and its environment. It connects places to places, urban and remote locations providing accessibilities to economic and social activities. In the view of this, passenger and freight mobility demands are heightened most especially in urban areas where job opportunities, trade and commerce predominate. Transport provides employment and bridges the gap between consumers and manufacturers, therefore increasing the standard of living of the populace and permitting the spatial increase in the valuation of goods and services. No doubt then that transport has enormous benefits. Economic growth has been seen to spread with the development of roads and transportation in general. Nevertheless, inadequate transport investment can hold back economic development of urban systems. In countries with development potential, transport investment facilitates economic growth. (Wallis, 2016). On the other hand, transportation impacts on man and environment keeps increasing in response to associated environmental implications such as air and noise pollution. The attendant increase in urban population contributes to the growth of passengers and freight mobility with corresponding effects of the role of transportation as a source of emission of pollutant. (Rodrigue, 2020). Problems associated with Environmental pollution are universal and are almost present in all the countries. Total emissions are generally a function of the emission factor of each transport mode than their level of activity, which implies a variety of impacts on the environment. (Rodrigue, 2020). The contributions of road transportation to environmental degradation in urban cities of Nigeria cannot be over-emphasized. The problem is no longer limited to traditional cities such as Lagos, Ibadan, Benin-City, Port Harcourt, Abuja, Kano, and Kaduna but is now being experienced in virtually every state capital city in Nigeria. This is linked to the increase in disposable income and influx of used cars, vans and minibuses from developed nations into low- and middle-income developing countries like Nigeria (Rukikaire, 2020). The problem can be seen in Akure South Local Government Area (LGA) today with road congestions and traffic jams at some intersections, which was not the case before. Increased private motoring means more noise pollution which necessitated this study. It is not an overstatement that the affected population is constituted by both motorists and inhabitants of urban areas. The study aims to ascertain the level of awareness of the residents on the impact of noise pollution in Akure south Local government area. The objective of the study focuses on identifying the road transport corridors and their adjoining residential areas in Akure city, assess residents’ perception on the level of awareness of noise pollution, and suggest sustainable mitigating approach to reduce the effects on the environment and residents.

II. Literature Review

Noise is a subjective matter even with a sound measurement it does not necessary given a guide to what noise is. Noise is seen as unwanted sound, consequently it can be consider as the wrong sound in the wrong place at the wrong time (Kiely, 2017). Noise in this study can be defined as sound that is unwanted to human, it is the human as a recipient of sound that has the right to judge either the sound can be called noise or not. Every human receives noise in different ways. It depends on some factors such as age, sex and mood of a person. Noise is measured in Decibel (dB). Noise pollution associated with household electricity generators is an emerging environmental degradation in many developing nations. The average noise level of 97.60 dB obtained exceeded the WHO value of 50 dB allowed for residential areas (Menkiti, *et al.*, 2015). Sound is an environmental factor, and it is relevant to look at human exposure to and effects of noise. The exposure depends on the emission of sound; how the sound is received by the human body; and the setting for the emission and perception of sound.

2.1 Source of Noise

The urban areas are generally noisier than rural areas, and because larger numbers of people live in urban areas, where they are presumably affected by the noise, the benefits may be expected to be proportionally larger. Urban noise levels are a complex mixture of noise from transportation, factories, industries, machines, and people. And there are different sources. Basically, in the study area, noise sources can be grouped into five types: surface transportation noise, aircraft noise, construction equipment and industrial noise, commercial area & business sectors, and residential noise. Traffic noise caused by road traffic is the most common type of noise in urban areas and as such poses a serious problem. (Sanja Grubesa and Mia Suhanek, 2020) Transportation sources of noise are comprised principally of automotive and aircraft noises; A main contributor to transportation noise is automotive traffic. At speeds in excess of 60 miles/h (mph), tire noises are most discernible, whereas at lower speeds, engine noises tend to dominate. The road gradient can also have an effect on vehicular noise emission; for example, a 5% road gradient adds about 3 dB to truck noise, whereas the effect on cars is usually insignificant. Noise levels increase as the number of vehicles and average speed increases. (WHO, 2019).

2.2 Impact of Noise Pollution

There are two types of sounds that can damage the sensitive ear cells in the inner ear that help make hearing possible. The first are extremely loud, sudden noises such as explosions, crackers, and gun shots. The second are loud sounds experienced at such events as high-volume music concerts. Regardless of the cause, this form of hearing loss can't be reversed. Sudden and unexpected noise has been observed to produce marked changes in the body, such as increased blood pressure, increased heart rate, and muscular contractions. Moreover, digestion, stomach contractions, and the flow of saliva and gastric juices all stop (WHO, 2018).

Because of the changes are so marked, repeated exposure to unexpected noise should obviously be kept to a minimum. These changes fortunately wear off as a person becomes accustomed to the noise (Broadbent D, 2017).

2.3 Noise as a Public Health Issue

Noise as a public health issue is relevant to the general public and to politicians and administrations at the local, national and international levels. As the population grows, there is increasing exposure to noise pollution, which has profound public health implications. Noise pollution creates a need for action at the local level, as well as for improved legislation and management.

Table 1: WHO Community Noise Guidance

S/n	Environment	Critical Health Effect	Sound Level dB(A)	Time Hours
1	Outdoor living areas	Annoyance	50-55	16
2	Indoor dwellings	Speech intelligibility	35	16
3	Bedrooms	Sleep disturbance	30	8
4	School classrooms	Disturbance of Communication	35	During class
5	Industrial, commercial, and traffic areas	Hearing impairment	70	24
6	Music through earphones	Hearing impairment	85	1

7	Ceremonies	Hearing impairment	100	4
---	------------	--------------------	-----	---

Source:(Hodgson, 2004)

III. The Study Area

Akure city is located in Akure South Local government area located in the Central Senatorial District of Ondo state, with over 353,211 populations (National Population Commission, 2006). It has a land area of 331km square. The town is located within 7°15'North of the Equator and Longitude 5°05' East of the Greenwich Meridian (Figure 1). Presently, as the state capital of Ondo State, it has the largest volume of vehicular traffic with the highest number of vehicles and road network which makes its environment subjected to the impact of road operation in the state. In the current study, Sampling was planned only for week days and weekend.

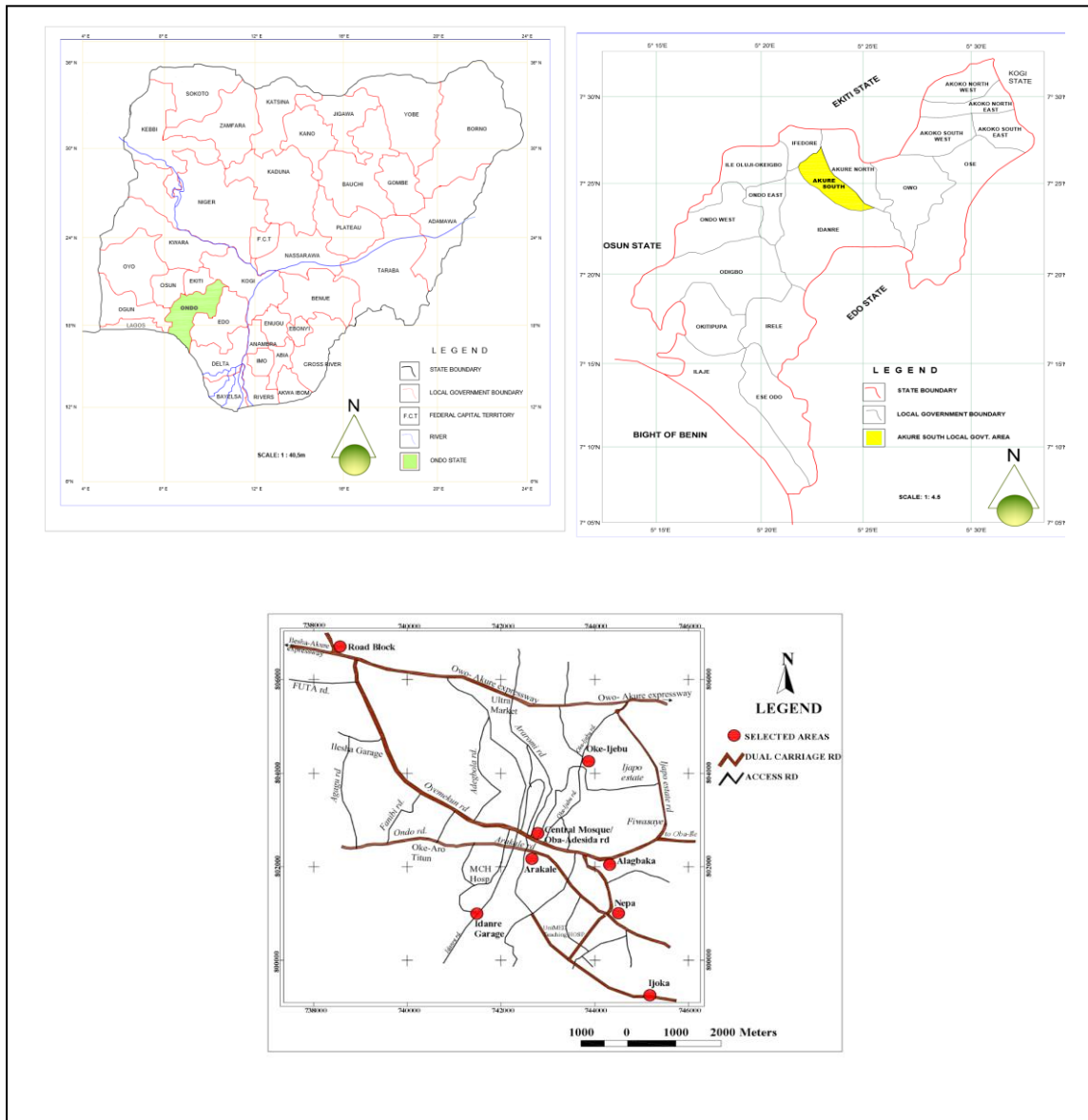


Figure 1: Map showing the study area

Source: Ministry of Works, Akure Ondo State

IV. Methodology

The study employed descriptive survey design to take noise data by questionnaires from several residents and shop owners at some locations in the study area. The target population comprised of shop owners, and residents along the road corridors and at intersections. 250 respondents were considered in the questionnaire administration using simple random sampling technique. Noise levels were measured using a PCE-322 sound level meter (manufactured by PCE Instrument) installed on a computer system; the instrument was first installed on its tripod stand along the road corridor. The instrument was calibrated prior to taking measurements. A wind screen was also used to prevent on the microphone from wind blow which may alter the record precision.

However, the sound measurements were taking in the morning during peak period between 7am and 10am; also, in the afternoon (12noon – 3pm) and Evening (4pm–7pm). Some specific days of the week were selected for data capturing. The days include Monday, Wednesday, Friday, and Sunday. The study took cognizance of vehicle types and their differences in noise generation. Traffic composition was also taken into consideration in order to examine the effects of traffic composition and vehicle types. Consequently, traffic flow was determined for 5 vehicle types (i.e. cars, motorcycles, buses, trucks and Tricycles) alongside the noise measurements. Eight (8) road corridors were selected for the study, these are: Central mosque/adesida road, NEPA road corridor, Arakale corridor, Road block axis, Oke Ijebu corridor, Alagbaka road corridor, Idanre garage corridor and Ijoka road corridor.

V. Results and Discussions

The study was carried out at some selected locations and questionnaire administration was administered to 250 respondents in the study area. As indicated in table 1 showing the socio-economic characteristics; female respondents in the study were 58% while, male respondents were 42% out of 250 respondents. The age distribution of respondents revealed that 43% of respondents were between the ages of 26-35 years, while 26% of the total respondents are between the ages of 36-45. The study revealed that the majority of the sampled respondent were working class. Other classes of age include 18% teenagers, 8 % aged, and 5 percent child category.

Table 1: The socio-economic characteristics of Respondents

		Frequency	Percentage
Sex	Male	104	42
	Female	146	58
	Total	250	100
Age group	5 – 15	13	5
	16-25	45	18
	26-35	107	43
	36-45	65	26
	45 and above	20	8
	Total	250	100

Source: Field Survey, 2020

5.1 Awareness on Noise Pollution

Study revealed the level of awareness of respondents is high as high awareness in the rating has the highest score of 480 (64%) and were highly aware about the harmful effect of noise pollution; the second category of respondents those that have medium or moderate awareness of noise pollution, this category scored 94 (19%) of the total aggregate score of 750, while 10% of the respondents acknowledged that their level of awareness is low as they do not always stay around the road corridors. Furthermore to the findings, 7% of the respondents were unable to give a concise answer to the question on their level of awareness. The study

showed that some residents are already used to the noise as a normal environmental phenomenon which has nothing to do with their health or comfort.

Table 2: Respondents' awareness on noise pollution

Categories	Frequency	%	Mean	Standard Deviation
High	160	64		
Medium	47	19	62.5	66.2
Low	25	10		
I don't know	18	7		
Total	250	100		

Source: Field Survey, 2020

5.2.Sources of Noise pollution in the study area.

The study indicated that vehicular noise pollution in the study area is generated by motorcycle, truck, car, bus, and vehicular horns. As shown in the table below, findings revealed that vehicular horn constituted largest amount noise pollution in the study area. 243 respondents spoke about Bus movement, thirdly motorcycle by 239 respondents, car by 212, truck by 176, the Peoples activity by 98 respondents, while religious activity by 54 respondents was found to be the least source of noise.

Table 3: Exposure to different noise sources

Sources of Noise	Frequency	%
Motorcycle	17	6.8
Truck	12	4.8
Bus	24	9.6
Car	15	6.0
By religious activity	4	1.6
Vehicular horn	26	10.4
Peoples activity	2	0.8

Source: Field Survey, 2020

5.3Period of Noise Exposure

Study revealed the period of the day that residents of Akure are mostly exposed to noise. Majority 60 (24%) of respondents acknowledged that their time of noise exposure time was 3pm to 5 pm, followed by 56 (22.4%) respondents acknowledging that time between 8am -10am are common time of exposure. The least time of noise exposure was observed to be period after 10pm. The study showed that the volume of vehicles on the roads had significant reduction and noise on the road were low. Majority of the Respondents acknowledged that they are frequently exposed to noise during the day between the hours of 8am and 10am in the morning. In the evening, another time of noise exposure was observed between the hours of 3pm and 5pm. The period of the day was peak period when volume of traffic is usually high. It can be inferred that majority of the residents of Akure metropolis are aware of noise as a universally disturbing sound generated by some of observable noise pollutants such as honking vehicles horn, dog barking, motorcycle noise, daily music hawking on streets, music stores, drumming, market noise, vehicle types rolls on rough roads and daily early morning tooting across the street for the carpool. As shown in the figure below, the levels of noise vary depending on the time of the day. The chart shows high noise level at 8am-10am and recorded a fall between 10am and 12noon. Between 12noon and 1pm, there was a little pick-up and the rise in the noise level continued upward the chart at 3pm-

5pm. The noise level began to drop down at 6pm until 10pm reaching the lowest level to the period which can be termed as quiet time in the study area.

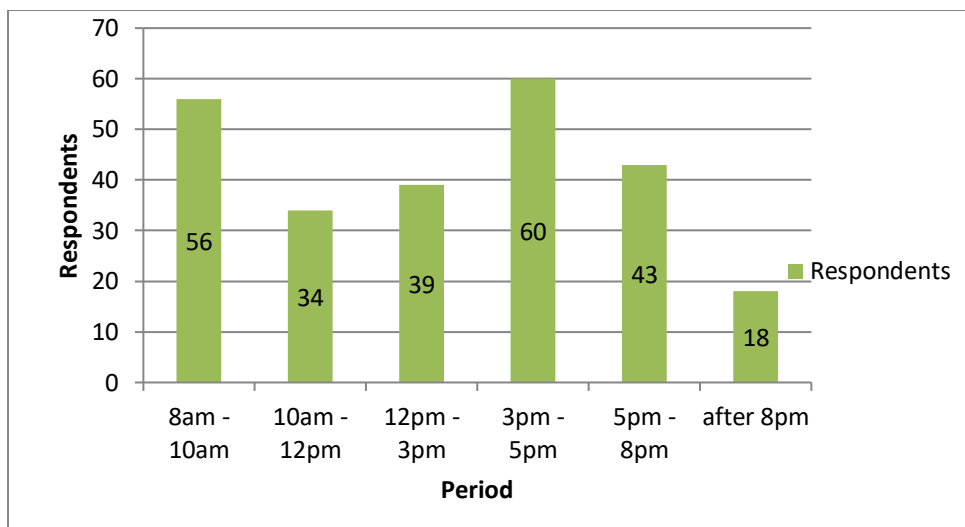


Figure 2: Period of Noise Exposure

Source: Field Survey, 2020

VI. Summary of Findings

Findings revealed that majority of the people in the study area are aware about the hazard of noise and were affected by exposure to vehicular noise in one or two ways. The distribution of respondents according to their participation in noise pollution level indicated that, noise was at unbearable state at the selected locations in the study area.

The study revealed that awareness on noise pollution is ranged from 18 to 160 score, the average was 62.5 and standard deviation 66.2, however, majority (64 percent) of the respondents were highly aware about the harmful effect of noise pollution, 19 percent respondents had medium awareness, 10 percent of the respondents said noise pollution is harmful and 7 percent respondents felt that noise pollution does not have any effect on them. The inference from this statistics showed that noise pollution is a real threat to the health of residents in the study area as majority confirmed exposure to noise pollution and awareness of noise hazard. Study on the period of noise exposure in the study area showed out of the total population (250), majority of respondents said period of noise exposure in the day is between 3pm to 5pm, while periods after 8 pm was recorded as the least period for noise exposure time. The noise pollution level was classified into four categories namely, strongly unbearable, Unbearable, Bearable, and no response. The distributions of respondents according to their participation in noise pollution level are showing in table 4.5. It was found that majority of the respondents (47.20percent) were under unbearable category, 40.40 percent were strongly unbearable. 10.4 percent bearable and 2.0 percent respondent had no response on noise. Study concluded that noise was at unbearable state at the selected locations for this study.

VII. Conclusion and Recommendations

The study showed that residents are adaptive to traffic noise as a normal phenomenon and a way of lifestyle. It is quite noteworthy to affirm that noise pollution is recognized as a detrimental factor to human health and especially to the residents of the study area. Previous study about noise finds that; traffic police, industrial worker, Transportation stall and construction workers were greatly affected by the noise pollution. On this research, it was discovered that not only the residents but also the transport workers, shop owners, and passers-by are also affected by the noise.

However, there is need for sensitization program on hazards associated with traffic noise pollution and the need to curtail it. Long hours of exposure to noise can lead to not only health problems but loss of lives. Government should promulgate law forbidden either public or religion bodies or individual from installing external speakers on automobile. Hence, monitoring and enforcement agencies from its different tiers should be designated to monitor and enforce sanctions. A strict law concerning noise pollution in residential areas should be implemented, the policy documents regulating the activities of those generating the pollution must updated in other to alien with international best practices.

References

1. Broadbent D. (2017). Noise in Relation to Annoyance, Performance and Mental Health. *J. Acoust. Soc. Am*, Vol. 68(1): 15-17.
2. Hodgson, M. (2004). UBC-Classroom acoustical survey",. *Canadian Acoustics*.
3. Kiely., G. (2017). Environmental Engineering. In *Environmental Engineering*, McGraw-Hill: (pp. 390-418).
4. Menkiti, Nwasinachi U.; Agunwamba, Jonah C. (2015). "Assessment of noise pollution from electricity generators in a high-density residential area". *African Journal of Science, Technology, Innovation and Development*, 7 (4): 306–312,. doi:doi:10.1080/20421338.2015.1082370
5. National Polulation Commission. (2006). *National Polulation Census*. Abuja: National Polulation Commission.
6. Rodrigue, J.-P. (2020). *The Geography of Transport Systems*. In *Transportation and the Environment* (fifth edition ed., p. 456 pages). New York: Routledge. Retrieved 2021
7. Rukikaire, K. (2020). New UN report details environmental impacts of export of used vehicles to developing world. *News and Media, UN Environment Programme (UNEP)*.
8. Sanja Grubesa and Mia Suhanek. (2020). *Traffic Noise, Noise and Environment*. doi:DOI: 10.5772/intechopen.92892.
9. Wallis, I. (2016). *Contribution of transport to economic development: Summary Report on Economic development and transport project*. New Zealand: Ministry of Transport New Zealand.
10. WHO. (2018). *Guidelines for Community Noise*. World Health Organization information.
11. WHO. (2019). *Environmental health criteria of noise*.