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Impact of Noise Pollution on Residents' Health in Osogbo Metropolis, Nigeria

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Abstract:

The pervasive and persistent impact of pollution on the environment and societies is though well recognised but has been given whimsical empirical research attention. This study investigates noise pollution and its health impacts on residents of Osogbo, Nigeria. It examines noise prevalence, sources, severity, and clinically diagnosed health effects across different residential neighborhoods. From a compiled list of localities in the city, six were randomly selected in the ratio of 3:2:1 respectively from high, medium, and low residential neighborhoods. A total of 238 questionnaires were randomly administered to household heads in each selected locality. Six noise pollution sources, (traffic, markets, schools, industries, construction sites and hotels) were randomly selected and noise levels measured using Extech dosimeter. Analysis of Variance was employed to analyse variations in noise pollution levels across different residential densities, while Pearson correlation was used to assess the relationship between noise pollution and residents' health. Also, hospital records on clinically diagnosed health effects of environmental pollution from (2010-2019) were collected from LAUTECH Teaching Hospital Osogbo. Findings reveal that noise levels in the sampled neighborhoods were highest in the high-density areas, followed by the medium and low residential neighbourhoods. They however ranged from 50.0 to 114.2 dBA, exceeding WHO and FEPA limits in all cases. Furthermore, residents living closer to noise sources reported health issues such as headache and sleep disorders, with observable distance decay effect. The study highlights the urgent need for public awareness campaigns on the adverse effects of noise pollution.

Keywords: Pollution, Environment, Neighbourhood, Noise, Health.

1. Introduction

There is a general consensus in the literature on the role of the environment in the development of a nation. Also that there is pervasive and persistent impact of pollution on the environment and societies is well recognised and a recurrent theme in policy and programmatic discussion at the global level (OECD, Report, 2025). Apart from being the physical surrounding of organisms, the environment provides the basis for human exploits (Evelyn and Tyav, 2021; Loloei 2005). For this and several other reasons like technological development, environmental issues now occupy a centre stage at the national and international levels. One of the environmental issues is environmental imbalance, which gives rise to various environmental problems. One of the problems that the environment is facing today is environmental pollution (Morales-Jasso and Badano 2024)

Environmental pollution is generally understood to be the introduction of contaminants into a natural environment that causes instability, disorder, harm or discomfort to the ecosystem (OECD, 2025; Oyedepo, 2019), and also one of the most horrible ecological problems the world is subjected to today (Adesoji, 2020; Abassi and Abassi, 2021). Though noise, air, land and water pollution fall within the ambit of environmental pollution, the most prominent pollution affecting most cities in the world is noise pollution (Oyelami *et al*, 2023). Noise in the environment is, unwanted or harmful outdoor sounds created by human activities, including noise emitted through means of transport (e.g. road traffic, air traffic) and noise from sites of industrial activities (Malik Muhammad *et al*, 2017).

In Nigeria, numerous studies including (Mishra and Pathak, 2018; Adesoji 2020) have established the fact that environmental noise have varying degrees of effects on human health. Environmental noise in an urban area is a silent killer and prolonged exposure to low frequency noise can cause either permanent or temporal damage to hearing (Onuu, 2019). The effects of noise on human emotions range from negligible through annoyance and anger to psychological problem (Onuu, 2019), and, from harmless to painful and physically damaging impact (Akpan 2019), particularly on people residing in urban areas. Environmental noise particularly those from religious centres on the health of people causes ill health among residents (Oyedepo and Saadu, 2019). Furthermore, it has been revealed that participants were aware of the health effects of noise pollution and that it is causally related to major illnesses like cardiovascular diseases, ear impairment, accident and headache (Oyedepo and Saadu, 2020a).

According to Anomoharan and Iserhein (2019), noise activates the pituitary adrenal-cortical axis and the sympathetic-adrenal-medullary axis. Also, researchers frequently found changes in stress hormones including epinephrine, norepinephrine and cortisol in the acute and chronic noise experiments. Noise disturbs sleep and when sleep is disturbed, it affects mental functioning and

judgment. Even students living in such environment will lose concentration while reading at night and that alone is capable of reducing their productivity. Noise does affect human behaviour and physiological measurement such as blood pressure, heart rate and blood flow (Akpan, 2019) are associated with high noise levels.

In Osogbo, a rapidly growing medium size urban center, the increasing level of noise pollution has become a significant concern. The unregulated placement of garages, hotels and brothels, restaurants and bars, places of worship, and small-scale industries within residential neighborhoods has led to various forms of environmental disturbances, including excessive noise and other pollutants. One therefore needs to ponder on the followings: should there not be standard or regulations guiding noise pollution in the state? And, how does this pollution affect the health of the people?

The plethora of existing studies on air pollution have largely focused on either major metropolitan areas or specific noise-generating activities, often overlooking spatial variations within urban centers (Dockery *et al*., 1993; Anomoharan and Iserhein 2014; Oyelami *et al* 2023, Adesoji 2020). For instance, large-scale studies such as the Harvard study on air pollution and health effects in six U.S. cities (Dockery *et al*., 1993) and research on particulate matter levels across 56 of the world's largest cities (Molina & Molina, 2004) highlight the health and environmental challenges posed by high population densities and industrial activities. Conversely, more localized studies, such as those by Oyelami *et al* (2023) and Adesoji (2020), have examined the narrower impacts of specific pollution sources. However, both approaches tend to treat urban areas as homogeneous or monolithic entities, failing to account for spatial variations in urban morphology and the uneven distribution of pollution sources. These variations significantly influence the concentration of air pollutants and their associated health risks.

This study addresses this gap by focusing on a medium-sized, rapidly expanding urban center, aiming to provide context-specific policy recommendations for mitigating air pollution. By using the study area as a template, this research contributes empirically to the global discourse on urban pollution solutions, offering insights that can inform targeted interventions in similar urban environments.

2. Research Methodology

Sampling Frame and Sample Size

Osogbo metropolis comprises two local governments which are Olorunda and Osogbo local governments. Urban neighbourhoods in these local government areas were used for this study.

Stratified sampling technique was used to segregate the study area into three (3) strata, which are high, medium and low residential densities. All the urban neighbourhoods in each local government were segregated under each stratum. A map containing classification of residential areas into different residential neighbourhoods was sourced from Town Planning Authority in Osogbo and Olorunda Local Government Areas and the map was updated to arrive at the streets' classification into residential densities in Osogbo metropolis as presented in Table 1. From the identified localities, random sampling was used to select sample population from the localities in the ratio of 3, 2 and 1 respectively from high, medium and low residential densities. This method was also used by Adeboyejo and Onyeonoru (2012) to reflect the generally believed pattern of population distribution in the different residential neighbourhoods. Thereafter, 0.5% of the population of each selected localities was sampled. This gives a total of 238 questionnaires that were administered in the study area.

Table 1: Residential Densities and Identified Streets in Osogbo, Osun State Nigeria

Residential densities	Identified localities	Sampled localities	Projected Population of selected localities	Number of questionnaire administered (0.5%)
High density	Fakunle, okebaale, alekuwodo, igbona, ojaoba, atelewo, ajagbe, oritagbemu, dagbolu, latona	Fakunle Okebaale Igbona	7,679 8,124 10,418	**38** **40** **52**
Medium density	Ogooluwa, ataoja, onward, awosuuru,otaefun, dada estate	Ataoja Ota efun	10,690 8,754	**53** **44**
Low density	GRA, oroki estate	GRA	2,332	**11**
Total				**238**

Source: National Population Census (NPC) 2006, Authors' computation (2024)

Types, sources of data and method of data collection

The types and sources of data used for the study include:

(1) the socio-economic characteristics which were obtained through questionnaire administration to selected households in these localities with the household heads as respondents. Systematic random sampling was used to select the first household at random and the subsequent households were selected at every 3rd interval along the sampled streets

(2) Noise pollution types, sources, varying levels and severity of noise pollution as well as, its prevalence in the area were obtained through direct field measurement from randomly selected noise sources. Eight noise pollution sources were detected in the sampled localities. Random sampling technique was used to select five noise sources. Extech Noise Dosimeter was used to measure

the noise level for the sampled noise sources. The unit of measurement is dB. The instrument was placed close to the point of noise sources. The noise level readings displayed on the screen were recorded. Noise readings were taken in the morning and evening respectively from noise sources. The measurements were then compared with the WHO and Federal Environmental Protection Authority (FEPA) standards.

(3) Ten years hospital records on clinically diagnosed health effects of environmental noise pollution from (2010-2019) were collected from LAUTECH Teaching Hospital Osogbo. This hospital was selected because it is a tertiary health institution with high level of patronage by residents from low, medium and high residential densities and even beyond the city limits. Relevant case notes during the period were reviewed and such parameters as: incidence, types of noise related ailment diagnosed, complications associated, prognosis and, location address of patients were recorded using a proforma form designed for the purpose.

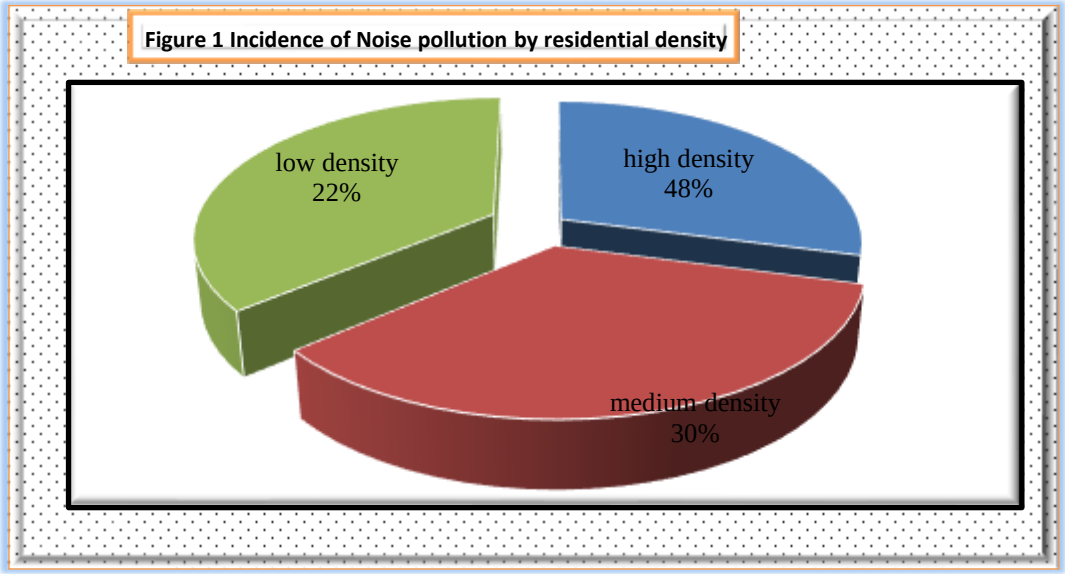
(4) Analysis of Variance (ANOVA) was used to analyse the variations in the incidence of noise pollution across residential densities while Pearson Product Moment correlation was used to examine the relationship between noise pollution and health of residents. A linear extrapolation technique was applied to project the observed ten years incidence till 2040 AD

3. Results and Discussion

3.1 Perception of the effects of environmental pollution on health and environment

Incidence of noise pollution

Figure 1 shows that noise pollution was highest in high residential areas with 48%, followed by medium 30% and low density residential areas 22%. This observation aligns with findings in the literature indicating that increased residential density often leads to higher noise levels due to the concentration of noise sources such as traffic, restaurants, bars and markets compared to medium and low density residential areas (HomeSight, 2023; Tong, & Kang, 2021; King, G.*et al* 2012; Lam and Chan 2018)



Source: Authors' fieldwork 2025

Further result as summarised in Table 1 reveals that Noise pollution is more experienced in the morning, especially in high (94.8%) and medium (82.9%) residential areas (Table 2). Several studies have documented diurnal variations in noise levels, with elevated levels during morning hours in urban residential zones. This has been attributed to intensified human activities, particularly restaurants, bars, markets, schools and traffic flow during the morning hours in both high and medium density areas. Gavin, 2012; Mahata *et al*. 2013; Lam and Chan 2008),

Table 2: Diurnal and intra-urban variations in Incidence of Pollution

Pollution type	Period	High	Medium	Low
Noise pollution	Morning	94.8	82.9	40.7
	Evening	5.2	17.1	59.3

Source: Authors' fieldwork 2025

3.2 Severity of noise pollution in residential neighbourhoods

In most cities of developing countries, Osogbo inclusive, land uses associated with noise pollution are majorly; schools, traffic, religious centres, restaurants/hotels and markets. The profile of the residential areas with respect to presence of five most prevalent noise pollution sources (see Table 3) reflects earlier observation on incidence of noise pollution with high density areas featuring most prominently with presence of schools (79%); noise from traffic (91.3%); Religious centres (85.5%); markets (62%) and music from hotels (57.8%), followed by the the medium and low density residential areas. The observed variations is statistically significant in all cases with $p < 0.05$.

Table 3: Variations in Existence of Pollution Sources across Residential Densities

Pollution sources	Existence	Residential densities				X^2 value
		High	Medium	Low	Total	
School	present	79.8	67.3	19.4	73.9	0.039
	not present	20.2	32.7	80.6	26.1	
Traffic	present	91.3	83.7	83.9	27.2	0.015
	not present	8.7	16.3	16.1	12.8	
Religious centre	present	85.5	92.8	93.1	89.6	0.012
	not present	14.2	7.2	6.9	10.4	
Market	present	62.8	64.7	6.5	65.4	0.020
	not present	37.2	35.3	93.5	34.6	
Music from hotel	present	57.8	42.5	41.9	49.5	0.001
	not present	42.2	57.5	58.1	50.0	
	not present	39.7	31.8	61.3	37.1	

Source: Authors' fieldwork 2025

Further result shows that the bulk of the respondents (63.8%) from high residential areas lived close (less than 20 metres to some pollution sources), while those in the medium and low density areas lived further away in that order. This might be attributed to the fact that some pollution sources such as markets and grinding machines) are major sources of their income and they have to be sited very close to residential areas for easy access and patronage.

In order to examine the significance of observed variations in severity of noise pollution across residential densities, One-way Analysis of Variance was employed to analyse respondents' view on the subject matter. The result as summarised in Table 4 shows that severity of noise from markets and music noise from hotels/restaurants and brothels each with $p = 0.000$ varied significantly in favour of the high density residential areas. This implies that in the study area, markets and hotels are mostly concentrated in the high density areas. On the other hand, schools, religious centres and traffic noise are more universal in their relative distribution within the city as there is no statistically significant variations with $p > 0.05$ in their distribution across the city. They are activities equally, if not more required in the medium and low density areas than the high density residential areas.

Table 4: Variations in Severity of Noise Pollution across Residential Neighbourhood

		Sum of Squares	df	Mean Square	F	Sig.
Severity of noise from school	Between Groups	.037	2	.018	.042	.959
	Within Groups	183.545	418	.439		
	Total	183.582	420			
Severity of noise from religion center	Between Groups	7.962	2	3.981	4.232	.015
	Within Groups	460.971	490	.941		
	Total	468.933	492			
Severity of noise from market	Between Groups	140.103	2	70.051	8.933	.000
	Within Groups	2979.975	380	7.842		
	Total	3120.078	382			
Severity of music noise from hotel, brothel, cinema e.t.c)	Between Groups	184.663	2	92.331	200.094	.000
	Within Groups	129.203	280	.461		
	Total	313.866	282			
Severity of noise from traffic)	Between Groups	2.013	2	1.007	1.571	.210
	Within Groups	191.563	299	.641		
	Total	193.576	301			

Source: Authors' fieldwork 2025

3.3. Effects of environmental pollution on residents

Against the background that generally believed impact of noise pollution include: headache, insomnia, hypertension, hearing problem or artificial deafness and such psycho-social issues as annoyance (WHO, 2011; El-Masri, & al-Ali, 2006; Basner, & McGuire, 2018; Pirrera, & Ferrara, 2018), the focus of analysis here is empirical understanding of effects of noise pollution on residents' health. In order to analyse the effects noise pollution on the residents, both the effects as perceived by the respondents and as diagnosed clinically are examined. First, the question of what the respondents in different residential areas perceived as major impact of noise pollution on their health is first examined.

3.4. Perceived effects of environmental pollution on residents

The result summarised in Table 5 are weighted responses to the question of whether the identified ailments are causally related to noise pollution.

Table 5: Whether Noise Pollution is Associated with Diseases

Pollution related disease	Response type	Residential densities			
		High	Medium	Low	Total
Headache	Yes	87.5	60.3	16.1	74.7
	No	12.5	39.7	83.9	25.3
Insomnia	Yes	88	66.9	0	62.3
	No	12	33.1	100	37.7
Hypertension	Yes	68.4	19.4	16.3	56.6
	No	31.6	80.6	83.7	43.4
Hearing problem	Yes	87.5	64.5	63.9	75.3
	No	12.5	35.5	36.1	24.7
Annoyance	Yes	57.8	61.3	83.9	50.1
	No	42.2	38.7	16.1	49.9

Source: Authors' Fieldwork 2025

Table 5 shows that most respondents opined that such diseases as headache (74.7%), sleep disorder or Insomnia (62.3%), hypertension (56.6%) hearing problem (75.3%) are associated with noise pollution, while about half of the respondents perceived annoyance as being associated with incidence of noise pollution, particularly due to long exposure. The profile of the respondents in different urban neighbourhoods on each of theses ailments is similar with the above general observation, but perception is higher in all cases in the high density than the medium and low density residential areas. This observation is in line with findings and reports of several studies in the literature. (Pirrera, & Ferrara, 2018; Basner,, & McGuire, 2018; Münzel, *et al* 2014; Hygge *et al* 2010, WHO, 2019; EEA, 2020; Tong *et al*, 2021)

3.5 Relationship between Resident's Health and Distances to Noise Pollution Sources.

Although perception data does not provide strong support for causal relationship between noise pollution and related diseases, further evidence closely related with causality is seen in the correlation analysis of ten variables (X1…X10) measuring severity of noise related diseases (residents' health), length of exposure to noise pollution and distances to noise pollution sources. Various responses to the questions on severity of the diseases, distances to noise sources and length of stay of respondents or length of exposure to noise pollution sources were summed and weighted and then correlated. The result of correlation analysis is summarised in Table 6

3.6. Relationship between Resident's Health and Distances to Noise Pollution Sources.

Pearson Product Moment Correlation was used to further examine the relationship between residents' closeness to noise pollution sources and their health"

Table 6: Pearson correlation of residents' closeness to noise sources and their health

		X1	X2	X3		X4	X5	X6	X7	X8	X9	X10
X1	Pearson Correlation	1										
	Sig. (2-tailed)											
	N	419										
X2	Pearson Correlation	.674**	1									
	Sig. (2-tailed)	.000										
	N	195	226									
X3	Pearson Correlation	.515**	.616**	1								
	Sig. (2-tailed)	.000	.000									
	N	288	207	325								
X4	Pearson Correlation	-.315**	-.473**	.276**		1						
	Sig. (2-tailed)	.000	.000	.000								
	N	419	226	325		513						
X5	Pearson Correlation	.308**	-1.000**	.483**		.609**	1					
	Sig. (2-tailed)	.000	.000	.000		.000						
	N	256	71	189		310	319					

X6	Pearson Correlation	.147*	.036	.226**		.277**	.321**	1				
	Sig. (2-tailed)	.003	.656	.003		.007	.000					
	N	298	154	228		388	244	421				
X7	Pearson Correlation	.014	.274**	.003		.255**	.404**	.094	1			
	Sig. (2-tailed)	.797	.041	.954		.000	.000	.065				
	N	352	193	277		437	243	383	476			
X8	Pearson Correlation	-.449**	-.283**	-.550**		-.074	.006	-.064	.343**	1		
	Sig. (2-tailed)	.000	.000	.007		.147	.928	.251	.000			
	N	307	158	239		389	257	323	364	431		
X9	Pearson Correlation	.775**	.819**	.768**		.306**	.612**	.523**	.234**	-.333**	1	
	Sig. (2-tailed)	.000	.000	.007		.000	.041	.000	.000	.000		
	N	184	107	145		259	145	264	277	191	283	
X10	Pearson Correlation	.094	.042	-.051		-.432**	.093	.099	-.042	.417**	.238**	1
	Sig. (2-tailed)	.089	.628	.446		.000	.016	.092	.460	.000	.001	
	N	329	136	229		353	262	293	313	268	199	374

**. Correlation is significant at the 0.01 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Authors' Fieldwork 2024

(Where X1= severity of headache, X2= severity of insomnia, X3= severity of hypertension, X4= severity of hearing problem, X5= severity of annoyance, X6= scaled house distance to noise pollution sources, X7= % respondent who stayed <5yrs with noise pollution sources, X8= % respondent who stayed 5-10yrs with noise pollution sources, X9= % respondent who stayed 11-15yrs with noise pollution sources, X10=% respondent who stayed >15yrs with noise pollution sources

Significant observation from the table are that:

(a) there is significant positive relationships between X9 (% respondent who stayed 11-15yrs with noise pollution sources), X10 (% respondent who stayed >15yrs with noise pollution sources). This implies that, as the length of stay in areas close to noise level increases, the more severe the level of annoyance.

(b) There is positive relationship between X5 (severity of annoyance) and X6, (the house distance) and also between X3,(severity of hypertension) and X2 (severity of insomnia). The closer the residences to sources of noise pollution, the more severe the cases of hypertension and insomnia.

(c) Other relationships show either low positive or negative correlations with diseases associated with noise pollution and so may not provide specific direction.

The above observations are supported by several empirical studies on the effects of noise pollution on health. For instance, the view that longer duration of exposure to noise leads to increased annoyance is logical and aligns with stress response theory. For instance, An umbrella review by Xia Chen *et al*. (2023) found that environmental noise exposure is associated with a range of adverse health outcomes, including cardiovascular diseases, diabetes, and sleep disturbances. Also, Stansfeld and Matheson (2003) found that prolonged exposure to noise pollution is associated with increased stress, anxiety, and annoyance, Research by the University of Texas School of Public Health indicates that exposure to noise levels above 60 dB(A) during the day and 45 dB(A) at night is linked with several diseases, including sleep disturbance and physiological stress responses, including annoyance.

3.7 Analysis of Ten years Hospital records (2010-2019)

For more emphatic conclusion, ten years hospital record of incidence of noise pollution related diseases obtained from Ladoke Akintola University of Technology (Lautech) Teaching Hospital Osogbo, are analysed. These diseases are: Insomnia, Hypertension, Headache and Hearing problem. The following discussions are based on the hospital data

Prevalence of clinically diagnosed Pollution Related Diseases

Table 7 shows the most common noise pollution related diseases that were recorded in the hospital between 2010-2019. Major observations from the table are that:

(a) the most prevalent noise related disease in the study area was hypertension hypertension (38.8%), followed by Headache (33.7%); Hearing problem (16.7%) and Insomnia (10.8%)

(b) There is strong positive relationship of all diseases with time (r = 0.987; 0.982; 0.909 and 0.911 respectively for hypertension, headache, hearing problem and insomnia.

The above findings align with existing literature on the health impacts of noise exposure. For instance, it has been established that occupational and air traffic noise exposure were positively associated with hypertension. (Sørensen *et al* 2011; van Kempen, *et al*, 2002). Also, the prevalence, severity, exposure, and treatment patterns of tinnitus in the United States were reported among individuals with consistent exposure to loud noises at work and during recreational activities, and that, years of work-related

noise exposure correlated significantly with increasing prevalence of tinnitus (Chang, *et al*. 2016; Babisch, 2014; Sørensen *et al.*, 2011)

Table 7: Noise pollution Related Diseases: Cases in LAUTECH Hospitals 2010-2019

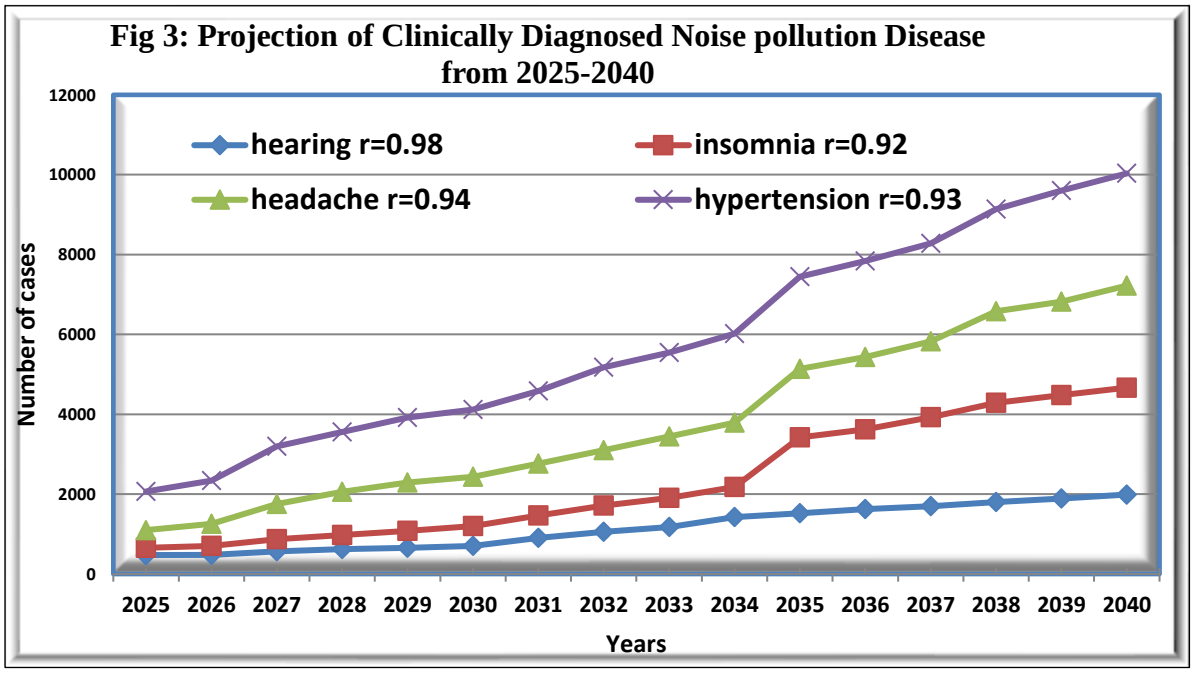
YEAR	INSOMNIA	HYPERTENTION	HEARING PROBLEM	HEADACHE
2010	23	167	73	62
2011	36	176	74	121
2012	57	254	75	229
2013	63	257	78	244
2014	86	278	87	277
2015	80	292	96	296
2016	93	312	125	297
2017	112	346	180	301
2018	117	387	208	332
2019	135	400	245	345
Total	802	2869	1241	2504
Total/percent of total 7416	10.8%	38.9%	16.7%	33.7%
Pearson correlation (r)	0.987	0.982748	0.90948	0.911757

Source: Authors' fieldwork 2025

Projecting Clinically Diagnosed Noise Pollution Diseases from 2025-2040.

In order to examine what the current trend portends for residents in the study area in the future, a simple linear extrapolation of the future distribution of the diseases is carried out and the result as illustrated in figure 4 reveals that: given the current underlying mechanisms, the present trend will become more aggravated by the year 2040, except drastic measures are put in place to curb the incidence of noise pollution in the study area.

The correlation coefficient (r) of each clinically diagnosed disease shows that all the r coefficients of the diseases are between +0.92 to +0.98. This gives a continuous strong positive relationship. The continuous rise in noise pollution-related diseases indicates a serious and escalating public health crisis that requires immediate intervention through policy changes, environmental management, and community awareness.



4. Recommendations and conclusion

Following the observations from the analysis and discussion in this study, it is recommended as follows:

(a) Need for Policy Intervention – The incidence, prevalence and particularly the trend of noise pollution highlights the urgency for stricter noise regulations through, better urban planning, and public awareness campaigns. Implementing soundproofing measures while enforcing noise limits, and promoting green spaces can help mitigate the problem in the study area.

(b) Psychological and Cognitive Effects – Chronic noise exposure has been linked to increased stress, anxiety, cognitive decline, and reduced productivity. A continued increase in noise-related diseases suggests a growing mental health concern in the study area, particularly among affected populations.
(c) Environmental Degradation and Urbanization Impact – The trend indicates worsening environmental noise levels, often linked to rapid urbanization, uncontrolled location of noise generating activities, particularly cottage industrial activities, traffic congestion, schools and markets, and poor urban planning. Without proper regulations, noise pollution will continue to increase. It is therefore recommended as follows:

- There is the need for a prompt legislative framework to be put in place to make laws that would tackle headlong issues of noise pollution in Osogbo.
- The Pubic needs to be sensitized on the evil of noise and the need to curtail it. The three tiers of government and the Non Governmental Organisations, including Community Based Associations need to cooperate in educating the masses in this area.
- Government should set up monitoring and enforcement agencies from its different tiers designated to monitor and enforce sanctions. The role of the Community Based Associations in this regards is also essential
- Residents should be mindful of their obligations to their neighbour for peaceful coexistence in the community.
- Urban Planners should adhere strictly to Master plan, they should monitor and control development, particularly, the haphazard location of noise generating activities such as schools and religious centres in residential areas.

Conclusion

This study has been able to establish that there are adverse health effects when noise pollution sources are sited near residential areas. It is therefore believed that, if the above recommendations are worked upon, there will be a better, healthy, safe and beautiful environment, for living and recreation.

References

1. Abbasi, T and Abbasi, S. (2021). "Water quality indices based on bioassessment: the biotic indices", *Journal of Water and Health, pp. 330–348 vol. 9, no. 2.*
2. Adeboyejo A.T; L. Matamale and D.S. Kharidzha (2012) "Analysis of Climate Change and Children's Health in Limpopo Province, South Africa" *International Journal of Environmental Research and Public Health*. March 8, 2012, 9, 831 - 854;doi:10.3390/ijerph 9030831 www.mdpi.com/ journal/ijerph
3. Adesoji, D. (2020). "Evaluating the pattern of residential quality in Nigeria: the case of Osogbo township". *Facta universities Series: Architecture and Civil Engineering Vol. 8, No 3,*
4. Anomoharan, O., and Iserhein, E. (2019). "Environmental noise assessment study of Agbor metropolis in Delta state". *Adv. Nat. Appl. Sci. Res., 2: 168-174*.
5. Akpan, A.O. (2019). "Measurements and Analysis of Industrial Noise and its Impact Workers in AkwaIbom State, South-Eastern Nigeria". Nig. *Journal of Phys, Vol 15 (2,) 41-45*.
6. Basner, M., & McGuire, A. L. (2018). The cumulative effect of noise on sleep: A systematic review. *Sleep Medicine Reviews*, *42*, 1–15. (A review article summarizing the research on noise and sleep.)
7. Chang, T. Y., Beelen, R., Li, S. F., Chen, T. I., Lin, Y. J., Bao, B. Y., & Pan, W. H. (2016). Occupational noise exposure and incident hypertension in men: a prospective cohort study. *American Journal of Epidemiology*, 184(2), 120–128.
8. Dockery, D. W., Pope, C. A. III, Xu, X., Spengler, J. D., Ware, J. H., Fay, M. E., Ferris, B. G. Jr., & Speizer, F. E. (1993). An association between air pollution and mortality in six U.S. cities. *The New England Journal of Medicine*, 329(24), 1753–1759.□□
9. European Environment Agency (EEA, 2020). *Environmental noise in Europe*.
10. El-Masri, M. A., & al-Ali, A. K. (2016). Noise-induced headache among industrial workers. *Industrial Health*, *44*(2), 253–259.
11. Evelyn, M., and Tyav, T. (2021). "Environmental pollution in Nigeria: the need for awareness creation for sustainable development".
12. Fields, J. M. (1990). A review of studies relating annoyance to noise. *Journal of the Acoustical Society of America*, *88*(2), 781–793.
13. Gavin King, Marek Roland-Mieszkowski, Timothy Jason,and Daniel G. Rainham (2012) *Noise Levels Associated with Urban Land Use*. Journal of Urban Health: Bulletin of the New York Academy of Medicine, Vol. 89, No. 6doi:10.1007/s11524-012-9721-7* 2012 The New York Academy of Medicine. *(PDF)* Available from: https://www.researchgate.net/publication/227177804_Noise_Levels_Associated_with_Urban_Land_Use #fullText FileContent [accessed Feb 10 2025].
14. *HomeSight*, October 2023.Sustainable Urban Development and the Challenge of Noise Pollution https://homesight.org/sustainable-urban-development-and-the-challenge-of-noise-pollution/
15. Hygge, S., & Evans, G. W. (2010). Noise and cognitive performance. In *Handbook of Environmental Psychology* (pp. 293–309). John Wiley & Sons. (A chapter in a handbook that explores noise and cognitive effects.)

16. King, G., Roland-Mieszkowski, M., Jason, T., & Rainham, D. G. (2012). Noise Levels Associated with Urban Land Use. *Journal of Urban Health*, 89(6), 1017–1030.
17. Lam, K. C., & Chan, P. K. (2008). "Noise Levels Associated with Urban Land Use." *Journal of Urban Health*, 85(5), 762–772.
18. Loloei (2005) The Role Of Environment In Sustainable Development And Its Relation With Development Management. WIT Transactions on Ecology and the Environment Volume 84 DOI 10.2495/SPD050421
19. Malik Muhammad Anees, Muhammad Qasim, Aroj Bashir Physiological and Physical Impact of Noise Pollution on Environment Journal of Earth Science Pakistan (ESP) http://www.razipublishing.com/journals/earth-science-pakistan-esp/ https://doi.org/10.26480/esp.01.2017. 08.10
20. Mishra, V., and Pathak, V. (2018). "Evaluation of traffic noise pollution and attitudes of exposed individuals in working place" pp 38,92
21. Molina, M. J., & Molina, L. T. (2004). Megacities and atmospheric pollution. *Journal of the Air & Waste Management Association*, 54(6), 644–680.
22. Morales-Jasso and Badano (2024) "Environment: a key concept for science development and decision making" Environment Development and Sustainability DOI: 10.1007/s10668-024-05826-5
23. Münzel, T., Gori, T., Babisch, W., & Basner, M. (2014). Cardiovascular effects of environmental noise exposure. *European Heart Journal*, 35(13), 829–836.
24. OECD Policy Scenarios for Eliminating Plastic Pollution by 2040 https://doi.org/10.1787/76400890-en
25. Organisation for Economic Co-operation and Development (OECD). (2025). *Environmental Pollution and Its Impact on Ecosystems and Human Health*. Retrieved Feb. 18, 2025
26. Onuu, M. (2019). "Environmental Noise Control: Review and Assessment of Theories and Models, *Nigeria". Nig. Journal of Phys, Vol 11, 91-96.*
27. Oyedepo, O., and Saadu, A. (2019). "A comparative study of noise pollution levels in some selected areas in Ilorin metropolis, Nigeria". Environmental Monitor Assessment, 1158: 155-167
28. Oyelami S , Oyetunji B. Okedere, Kehinde A Oyewole , Kazeem O. Rabiu , Oguntola J. Alamu , Olakunle Olukayode, Wasiu O. Adedeji (2023) "Ambient Air Emission Profiles of Polycyclic Aromatic Hydrocarbons around a Typical University Power House in Nigeria" *Tanzania Journal of Engineering and Technology* 2023, 42(3): 25-33 OPEN ACCESS articles distributed under Creative Commons Attribution Licence [CC BY-ND] Websites: https://ajol.org/tjet; https://tjet.udsm.ac.tz
29. Oyedepo, O., and Saadu, A. (2020a). "Assessment of noise level in sundry processing and manufacturing industries in Ilorin metropolis, Nigeria". Environmental Monitor Assessment, 162: 453-464
30. Pirrera, S., & Ferrara, M. (2018). Acute sleep deprivation: Psychobiological correlates and changes in emotional processing. *Behavioural Brain Research*, *355*, 111–121.
31. Sørensen, M., Hvidberg, M., Andersen, Z. J., Nordsborg, R. B., Lillelund, K. G., Jakobsen, J., Tjønneland, A., Overvad, K., & Raaschou-Nielsen, O. (2011). Road traffic noise and stroke: a prospective cohort study. *European Heart Journal*, 32(6), 737–744.
32. Stansfeld, S. A., & Matheson, M. P. (2003).3 Noise pollution: Cognitive performance, and health. *Scandinavian Journal of Work, Environment & Health*, *29*(4), 243–251.
33. Tong, H., & Kang, J. (2021). "Characteristics of noise complaints and the associations with urban morphology: A comparison across densities." *Science of the Total Environment*, 770, 145370.
34. van Kempen, E. E. M. M., Kruize, H., Boshuizen, H. C., Ameling, C. B., Staatsen, B. A. M., & de Hollander, A. E. M. (2002). The association between noise exposure and blood pressure and ischemic heart disease: a meta-analysis. *Environmental Health Perspectives*, 110(3), 307–317.
35. World Health Organization (WHO, 2019).. *Environmental Noise Guidelines for the European Region*. 30 January
36. Xia Chen, Mingliang Liu, Lei Zuo, Xiaoyi Wu, Mengshi Chen, Xingli Li (2023) European Journal of Public Health, Volume 33, Issue 4, August 2023 .