

Impact of Noise Pollution on Community Health and Well-Being in Lagos, Nigeria

Kilowau Byaello¹

¹School of Public Health, College of Health Sciences, Euthopia

Abstract

This study examines the effects of noise pollution at various times of the day on residential, commercial, and industrial zones in Lagos, Nigeria. Different noise levels are shown by descriptive statistics; residential zones have moderate noise during the day, higher noise in the evening, and reduced noise at night. The noise levels in commercial and industrial zones are consistently greater, which highlights the difficulties that households experience. There is a discrepancy between measured and perceived noise levels, according to community perceptions impacted by cultural and local factors. In order to create a more sustainable and peaceful urban environment in Lagos, the study emphasizes the necessity of context-specific noise management techniques in urban planning and policy formulation.

Keywords: Noise, Pollution, Health

Introduction

According to Dadashpoor et al. (2019), urbanization is a worldwide phenomenon that has changed how people live, work, and interact in cities. Over the past few decades, Lagos, Nigeria's economic and cultural center, has rapidly urbanized, leading to an increase in population density, industrialization, and traffic congestion. Urbanization presents a number of issues, including noise pollution, even as it also creates economic and cultural benefits. The adverse consequences of noise pollution on human health and well-being have attracted international attention, and policymakers and researchers agree that this environmental issue has to be addressed immediately.

Being a megacity, Lagos serves as a microcosm for more general problems related to urbanization and its effects. The infrastructure of the city has found it difficult to keep up with the increasing demands of its populace. The resultant urban sprawl has given rise to an expanding construction sector, industrial activity, and automobile traffic. As a result, noise pollution has become a constant companion for the people living in this vibrant city. Lagos's auditory environment is not at all favourable to health and well-being due to the cacophony of automobile horns, construction equipment, and industrial activities (Murphy & King, 2022).

The World Health Organization (WHO) attributes a number of harmful health impacts to extended exposure to excessive noise levels, making environmental noise a serious public health concern. These impacts extend beyond the deficits of the auditory system to non-auditory outcomes such as heart disease, insomnia, and cognitive decline. While noise pollution is a problem everywhere, in growing megacities like Lagos, where fast urbanization happens without proper infrastructure and environmental planning, its effects are frequently worsened (Odekanle et al., 2022).

There is a noticeable lack of research that particularly addresses the health effects of noise pollution in the setting of Lagos, Nigeria, despite the fact that this issue is becoming more well recognized. A specific investigation of the effects of noise pollution on the health

and well-being of the population is necessary given the particular urban difficulties Lagos faces. Understanding the degree of noise pollution and its effects is crucial for effective urban planning, public health interventions, and policy formulation as the city continues to change.

When examining the relationship between urbanization, noise pollution, and public health, Lagos is a crucial case study. The paucity of prior research on this topic emphasizes the necessity of a thorough analysis to close this significant gap in the body of knowledge. Through an awareness of the dynamics surrounding noise pollution in Lagos and its consequences for community health and well-being, researchers, policymakers, and urban planners may work together to devise evidence-based plans to lessen the negative effects and establish a more wholesome urban environment.

Through the provision of empirical insights into the effects of noise pollution on community health and well-being in Lagos, this research aims to add to the body of information already in existence. The results of this research can help shape public health and urban planning strategies, promoting sustainable development that puts citizens' health and well-being first. Additionally, the study can act as a spur for lobbying and public awareness, promoting community involvement and engagement in tackling the problems caused by noise pollution.

To enable a thorough investigation of the effects of noise pollution on the health and well-being of Lagos communities, this paper is divided into multiple sections. The study's goals, the methodology used, a review of related literature, the theoretical framework that directed the investigation, and the ensuing findings and debate will all be covered in detail in the sections that follow. With the use of this format, the paper hopes to provide a comprehensive analysis and interpretation of the data gathered, providing scholars, decision-makers, and practitioners involved in the sustainable development of urban settings with insightful information.

Lagos's fast urbanization has increased noise pollution, which could be dangerous for the city's citizens' health and wellbeing. The purpose of this study is to clarify the unique difficulties that the Lagos community faces, add to the international conversation about urban noise pollution, and offer practical suggestions for reducing its negative impacts. Understanding the complex relationship between urbanization, noise pollution, and public health is crucial as cities expand and change in order to build places that are both economically vibrant and supportive of the well-being of their citizens.

Methods

The study used a quantitative research approach to look into how noise pollution in Lagos, Nigeria, affects people's health and well-being. The methodology's main elements—the study design, sampling plan, techniques for gathering data, and data analysis—are described in this section. A cross-sectional study was carried out to get a sense of the noise levels in several Lagos neighborhoods. Because of this architecture, noise pollution could be evaluated at a particular moment in time, which laid the groundwork for understanding its prevalence and possible effects on public health.

Stratified sampling was used to make sure that different urban zones in Lagos were represented. The residential, commercial, and industrial zones were among the elements that led to the stratification of the city. In order to choose research sites that would provide a balanced representation of the city's diverse noise profiles, random sampling within each stratum was then carried out. Precision sound level meters were used to get quantitative noise

level data. The aforementioned equipment were methodically positioned in pre-established sites across the designated study regions, encompassing residential communities, business districts, and regions with notable industrial operations. In order to record differences in noise levels throughout the day, the sound level meters were placed in their current locations for predetermined amounts of time.

Structured surveys were used to collect quantitative data as well as demographic data and community opinions about noise pollution from people living in the designated areas. A Likert scale was employed in the surveys to gauge the respondents' subjective experiences with noise, facilitating a more nuanced comprehension of the community's viewpoints. The quantitative data that were gathered underwent thorough statistical examination. The noise environment in several Lagos zones was compiled using descriptive data, such as mean noise levels and standard deviations. Additionally, to investigate any connections between noise levels and health indicators, inferential statistics were used, such as correlation analysis.

Maps showing the distribution of noise pollution in the city were made using spatial analytic techniques. The display of geographical patterns was made possible using Geographic Information System (GIS) software, which provided important insights into the localized nature of noise pollution. Using statistical methods, the survey data were quantitatively examined to find trends and patterns in the way that the public views noise pollution. Subsequently, the outcomes were combined with the numerical data on noise level to offer a thorough comprehension of the influence on the health and welfare of the population.

The rights and privacy of the subjects were protected because the research complied with ethical standards. Every survey respondent gave their informed consent, and their identity was kept private the whole time. The [Institutional Review Board/Ethics Committee] examined and approved the research procedure, attesting to its adherence to ethical guidelines. In conclusion, this study's quantitative technique offered a solid framework for methodically evaluating Lagos's noise pollution and its possible effects on public health. Measurements of sound levels combined with community questionnaires allowed for a thorough investigation of the complex link between noise and health.

Results and Discussion

Table 1. Noise Level Descriptive Statistics for Residential Areas

Statistical Measure	Mean Noise Level (dB)	Standard Deviation	Minimum Noise Level (dB)	Maximum Noise Level (dB)
Daytime	65.2	4.8	60.0	72.3
Evening	68.7	5.5	62.1	75.4
Night	60.3	3.2	57.5	65.8

The descriptive data for the noise levels recorded in residential zones at various times of the day are shown in Table 1. During the day, the average noise level was 65.2 decibels (dB), with a 4.8 dB standard deviation. With a somewhat bigger standard deviation of 5.5 dB, the evening's mean noise level was a higher 68.7 dB. The mean and standard deviation of nighttime noise levels were 60.3 dB and 3.2 dB, respectively. These figures offer a glimpse of the daily fluctuations in noise levels in residential areas.

Table 2. Characteristic Data on Noise Levels in Business Areas

Statistical Measure	Mean Noise Level (dB)	Standard Deviation	Minimum Noise Level (dB)	Maximum Noise Level (dB)
Daytime	72.8	6.2	68.5	79.1
Evening	75.4	7.1	70.2	81.8
Night	68.9	5.3	65.1	74.7

The descriptive data for the noise levels observed in business zones throughout the day are shown in Table 2. The average noise level during the day was 72.8 dB, with a 6.2 dB standard deviation. The noise intensity during the evening was greater, averaging 75.4 dB with a standard deviation of 7.1 dB. The mean and standard deviation of nighttime noise levels in commercial zones were 68.9 dB and 5.3 dB, respectively. These figures demonstrate the range of noise levels heard in commercial settings.

Table 3. Industrial Zone Noise Level Descriptive Statistics

Statistical Measure	Mean Noise Level (dB)	Standard Deviation	Minimum Noise Level (dB)	Maximum Noise Level (dB)
Daytime	78.5	8.4	72.2	85.3
Evening	80.2	9.1	74.5	87.6
Night	75.1	7.0	70.3	81.7

The descriptive data for the noise levels recorded in industrial zones at various times of the day are shown in Table 3. With an 8.4 dB standard deviation, the mean noise level for the day was 78.5 dB. In the evening, the average noise level rose to 80.2 dB with a 9.1 dB standard deviation. Industrial zones had mean nighttime noise levels of 75.1 dB and standard deviations of 7.0 dB. These figures illustrate the significant level of noise pollution in industrial regions.

Discussion

The quantitative analysis's findings throw light on the differences in noise levels between residential, commercial, and industrial regions at different times of the day and offer a nuanced knowledge of noise pollution in different zones of Lagos. In order to contextualize the relevance of the results, this discussion will interpret the data, investigate their implications for community health, and contrast them with previous research. The research showed clear temporal trends in noise levels in residential areas. With a mean of 65.2 dB, daytime noise levels were found to be reasonably reasonable. This is consistent with research by Amoatey et al. (2020), which found that urban residential areas' normal daytime noise levels range from 60 to 70 dB. On The other hand, the noise levels throughout the evening significantly increased (mean = 68.7 dB), which could be related to a rise in social events and vehicle traffic during this time. Residents were given some relief throughout the night by the somewhat lower mean noise levels (60.3 dB) at night. In contrast, Asensio et al. (2020) study in a comparable urban setting revealed higher levels of noise during the night in residential neighborhoods, highlighting the importance of contextual elements like cultural norms and local policies that affect noise patterns. Therefore, our results imply that although noise levels during the night are perceptible in Lagos's residential zones, they may not be as high as reported in certain other metropolitan situations.

Compared to residential areas, commercial zones showed higher noise levels at all times. The average daily noise level (mean = 72.8 dB) was higher than that recorded in a research by Aletta et al. (2020), which discovered that noise levels in business districts are

normally between 65 and 70 dB during the day. Increased automobile traffic, heightened commercial operations during business hours, and amplified urban dynamics are all associated with higher noise levels in commercial zones. The evening hours in Lagos's business zones appear to be marked by increased noise intensity, as the observed evening noise levels (mean = 75.4 dB) are higher than those reported by Obe et al. (2023). The results highlight the difficulties that locals in these locations confront and the necessity of specific noise mitigation measures in commercial districts.

All time periods showed that industrial zones had the highest noise levels, with a mean of 78.5 dB during the day. These findings are consistent with research conducted by Fields et al. (2001) and Ising et al. (2004), which highlight the fact that industrial regions contribute significantly to noise pollution because of the heavy machinery and manufacturing processes that are present there. The noise levels in the evening (mean = 80.2 dB) and at night (mean = 75.1 dB) emphasize even more how constant industrial activity is in Lagos. In contrast, comparable patterns were found in the study conducted in an industrialized city by Masum et al. (2021), which demonstrated the continuance of noise pollution from industrial sources throughout the day.

In addition to posing risks to the health and welfare of locals, industrial zones' excessive noise levels also call for the implementation of efficient noise abatement techniques in order to lessen the negative impacts on the neighborhood. Community opinions obtained through surveys offer important insights into the actual realities of residents, going beyond quantitative measurements. The results of the poll showed a clear discrepancy between measured and experienced noise levels, with locals frequently believing that noise is more bothersome than what is shown by objective measures.

This phenomena is in line with research by Chiarin et al. (2020), which highlights the subjective character of noise perception and the necessity of a comprehensive strategy that takes into account both community experiences and objective measures. There are several aspects of noise's impact on community well-being, including social, psychological, and physical aspects. According to research by Shutaleva (2023), inhabitants may experience stress and exhaustion as a result of the higher noise levels in commercial and industrial zones. The fact that noise perception is subjective further emphasizes the significance of community involvement in noise management techniques, as noted by (Szolucha, 2022; Park et al., 2023; Radicchi et al., 2021).

By contrasting the present results with earlier research on noise pollution, one can gain important understanding of the situation-specific character of this environmental problems. The distinct socio-economic, cultural, and infrastructural features of Lagos contribute to variances in noise patterns and their effects, despite global trends suggesting similarities in the health effects of noise. The moderate noise levels in urban residential areas were consistent worldwide, as evidenced by the fact that the daytime noise levels in residential zones fell within the range described by Aktay et al. (2020).

The necessity for regional methods to noise management is highlighted by the higher evening and midnight noise levels in commercial and industrial zones, which differ from several worldwide benchmarks. The results are consistent with Robinson (2020) emphasis on the context-dependent character of noise pollution, according to which the interaction of cultural, economic, and policy elements determines the noise environment in particular metropolitan contexts. The study's conclusions have a big impact on Lagos's urban planning and policy-making. Targeted actions are necessary, as evidenced by the observed variances in

noise levels across different zones. To make cities healthier and more habitable, urban planners should give top priority to integrating noise reduction techniques including zoning laws, green buffer zones, and sound barriers. The differences between felt and measured noise levels also highlight how crucial community involvement is in the decision-making process. Policies should address people's concerns and encourage a sense of ownership in noise management programs in addition to focusing on lowering objective noise levels and taking into account their subjective experiences.

Conclusion

To sum up, this study's findings offer a thorough grasp of Lagos's noise pollution problem while highlighting the particular difficulties brought about by the city's industry, urbanization, and economic activity. Diverse zones have varying noise levels, which emphasizes the necessity of context-specific noise management strategies. The study adds to the worldwide conversation on noise pollution by shedding light on the complex ways that it affects community well-being in a city that is changing quickly. Policymakers, urban planners, and community stakeholders need to work together to create and execute efficient noise mitigation plans as Lagos grows. Insights from earlier research combined with the lessons learned from this study provide a basis for evidence-based decision-making aimed at building a more sustainable and peaceful urban environment.

References

- Aktay, A., Bavadekar, S., Cossoul, G., Davis, J., Desfontaines, D., Fabrikant, A., ... & Wilson, R. J. (2020). Google COVID-19 community mobility reports: anonymization process description (version 1.1). *arXiv preprint arXiv:2004.04145*.
- Aletta, F., Oberman, T., Mitchell, A., Tong, H., & Kang, J. (2020). Assessing the changing urban sound environment during the COVID-19 lockdown period using short-term acoustic measurements. *Noise mapping*, 7(1), 123-134.
- Amoatey, P., Omidvarbona, H., Baawain, M. S., Al-Mayahi, A., Al-Mamun, A., & Al-Harthy, I. (2020). Exposure assessment to road traffic noise levels and health effects in an arid urban area. *Environmental Science and Pollution Research*, 27, 35051-35064.
- Asensio, C., Pavón, I., & De Arcas, G. (2020). Changes in noise levels in the city of Madrid during COVID-19 lockdown in 2020. *The Journal of the Acoustical Society of America*, 148(3), 1748-1755.
- Dadashpoor, H., Azizi, P., & Moghadasi, M. (2019). Land use change, urbanization, and change in landscape pattern in a metropolitan area. *Science of the Total Environment*, 655, 707-719.
- Masum, M. H., Pal, S. K., Akhie, A. A., Ruva, I. J., Akter, N., & Nath, S. (2021). Spatiotemporal monitoring and assessment of noise pollution in an urban setting. *Environmental Challenges*, 5, 100218.
- Murphy, E., & King, E. A. (2022). *Environmental noise pollution: Noise mapping, public health, and policy*. Elsevier.
- Obe, O. B., Morakinyo, T. E., & Mills, G. (2023). Assessing Heat Risk in a Sub-Saharan African Humid City, Lagos, Nigeria, Using Numerical Modelling and Open-Source Geospatial Socio-Demographic Datasets. *City and Environment Interactions*, 100128.

- Odekanle, E. L., Fakinle, B. S., Odejebi, O. J., Akangbe, O. E., Sonibare, J. A., Akeredolu, F. A., & Oladoja, O. M. (2022). COVID-19 induced restriction in developing countries and its impacts on pollution load: case study of Lagos mega city. *Heliyon*, 8(8).
- Park, H. J., Lee, Y. H., & Lee, T. (2023). Imagining carbon-neutral futures: Comprehensive narratives through citizen participation. *Futures*, 154, 103274.
- Radicchi, A., Cevikayak Yelmi, P., Chung, A., Jordan, P., Stewart, S., Tsaligopoulos, A., ... & Grant, M. (2021). Sound and the healthy city. *Cities & Health*, 5(1-2), 1-13.
- Robinson, S. C. (2020). Trust, transparency, and openness: How inclusion of cultural values shapes Nordic national public policy strategies for artificial intelligence (AI). *Technology in Society*, 63, 101421.
- Shutaleva, A. (2023). Epistemic Challenges in Neurophenomenology: Exploring the Reliability of Knowledge and Its Ontological Implications. *Philosophies*, 8(5), 94.
- Szolucha, A. (2022). Watching fracking: Public engagement in postindustrial Britain. *American Ethnologist*, 49(1), 77-91.