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NOISE POLLUTION IN THE NIGER DELTA, NIGERIA: SOURCES, HEALTH EFFECTS, LEGISLATION, AND ENFORCEMENT GAPS

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Introduction

Noise pollution is an important environmental and occupational health concern because excessive environmental and workplace sound can affect hearing, sleep, psychological well-being, and other health-related outcomes. In the Niger Delta of Nigeria, rapid urbanization, road traffic, commercial activities, oil and gas operations, industrial development, and socio-cultural activities create multiple potential sources of environmental and occupational noise (Mordecai *et al.,* 2024; Oweibia *et al.,* 2024). The region also contains densely populated communities located near industrial and transportation activities, making exposure an important environmental-health and governance concern. Despite these pressures, evidence on noise pollution in the Niger Delta remains dispersed across site-specific studies involving different populations, settings, exposure sources, and outcome measures (Suleiman *et al.,* 2019; Raimi *et al.,* 2020; 2022a; 2022b). This fragmentation limits an integrated understanding of the principal sources of noise, public awareness, reported health effects, and the implementation of regulatory provisions. Nigeria has a national environmental regulatory framework, including the National Environmental Standards and Regulations Enforcement Agency (NESREA) Act and relevant state-level legislation, but the extent to which regulatory provisions are implemented at community and occupational levels remains insufficiently synthesized. This systematic review therefore consolidated peer-reviewed evidence on noise pollution in the Niger Delta and examined the associated regulatory and enforcement context to identify priorities for environmental health protection and sustainable development. The study aimed to systematically review and thematically synthesize evidence on noise pollution in the Niger Delta region of Nigeria. Specifically, it sought to identify documented noise sources; characterize reported public perceptions and awareness;

synthesize reported human health outcomes; examine the relevant Nigerian and state-level legal and regulatory framework; and summarize available evidence concerning implementation and enforcement of noise-control provisions in the region.

Methodology

A systematic literature review was undertaken using a PRISMA-guided approach. Searches were conducted using Google Scholar, PubMed, and publisher/database platforms identified in the study protocol as Elsevier and Springer Nature. Search terms included combinations of "noise pollution," "Niger Delta," "Nigeria," "Rivers State," "Bayelsa," "Delta State," "environmental noise," "occupational noise," "noise laws," and "NESREA enforcement." Eligible records were original, peer-reviewed English-language studies reporting primary evidence on noise levels, noise sources, perceptions or health-related outcomes in the Niger Delta states of Akwa Ibom, Bayelsa, Cross River, Delta, Edo and Rivers. Studies conducted exclusively outside these states were excluded. Titles, abstracts and full texts were assessed for eligibility, with final inclusion determined through reviewer consensus. Thirty-one articles met the stated inclusion criteria and were critically reviewed. Relevant legal and policy documents, including the 1999 Constitution of the Federal Republic of Nigeria, the NESREA Act 2007 and applicable state-level environmental legislation, were separately examined to contextualize the regulatory findings. Because the included studies differed substantially in populations, exposure settings, measurement approaches, and outcomes, the evidence was synthesized narratively and thematically rather than pooled statistically. Five analytical themes were developed: noise sources, public perceptions and awareness, health effects, legislation, and enforcement.

Results

The 31 included studies documented four broad categories of noise sources: road traffic and transportation activities; socio-cultural and religious activities; industrial and occupational operations; and commercial or market activities. Road traffic was frequently reported in urban settings, including major junctions and transport terminals in Port Harcourt and Uyo, with some studies reporting sound levels in the range of 85-95 dB(A) at busy locations. These measurements indicate substantial exposure at the investigated sites; however, individual measurements should not be generalized to the entire cities or Niger Delta population. Socio-cultural and religious activities, including worship centres, entertainment venues, funerals and night-time activities, were also repeatedly identified as important sources. Industrial studies reported elevated occupational noise among workers in oil and gas and quarrying environments, while market studies documented high sound levels in commercial centres including Mile 1 Market in Port Harcourt, Ogbogonogo Market in Asaba and Swali Market in Yenagoa. The heterogeneity of measurement locations and protocols prevented estimation of a pooled regional exposure level. Evidence on public awareness was inconsistent across populations and settings. Some studies reported relatively high awareness of noise-related health effects among selected market users and transport workers, whereas limited awareness was reported among some church workers, teachers and residents of oil-producing communities. These differences indicate that awareness cannot be assumed to be uniform across the Niger Delta and may vary according to occupation, setting and previous exposure to environmental-health information. Reported health outcomes included noise-induced hearing impairment among occupationally exposed groups, as well as sleep disturbance, annoyance, stress and reduced productivity in several community and occupational settings. Some studies also reported cardiovascular-related outcomes, including hypertension, among exposed populations. However, because the included studies were observational and heterogeneous, these findings should be interpreted primarily as reported associations or health outcomes observed in exposed populations rather than evidence that noise exposure alone caused the outcomes. The legal review identified a multi-level regulatory framework involving constitutional environmental provisions, the NESREA Act 2007 and relevant state-level legislation. The reviewed evidence described gaps in implementation, including reported non-compliance, limited regulatory monitoring, inadequate public awareness and weaknesses in enforcement across some locations. However, the available

studies did not provide sufficient standardized quantitative evidence to estimate an overall enforcement rate for the Niger Delta. The evidence consistently identifies multiple and overlapping sources of potentially excessive noise across urban, occupational, commercial and community settings in the Niger Delta. Road traffic, industrial operations, markets and socio-cultural activities recur across the literature, although exposure magnitude varies substantially by location and measurement conditions. Hearing impairment, sleep disturbance, stress, annoyance and other adverse health indicators were reported across different study populations, but the heterogeneous observational evidence does not support a pooled estimate of the regional health burden or definitive causal attribution. Awareness was variable, while regulatory implementation appeared inconsistent across documented settings. Importantly, the review identified an evidence gap: although individual studies report high noise levels and regulatory challenges, standardized region-wide measurements and quantitative assessments of enforcement effectiveness remain limited.

Conclusion

Noise pollution represents an important but insufficiently characterized environmental and occupational health concern in the Niger Delta. The available evidence demonstrates diverse sources of potentially hazardous noise and reports adverse hearing, sleep, psychological and other health-related outcomes among selected exposed populations. However, substantial heterogeneity in study design, population, exposure measurement, outcome assessment and reporting prevents calculation of a pooled regional noise burden or direct comparison across all settings. Nigeria has an established legal and institutional framework relevant to noise control, but the reviewed literature indicates implementation and enforcement challenges in several documented locations. The principal evidence gap is therefore not simply the existence of legislation but the limited availability of standardized data demonstrating how consistently regulatory requirements are monitored, implemented, and enforced across the region. Environmental and occupational noise surveillance should be strengthened through standardized measurement protocols, repeated monitoring, and consistent reporting of measurement duration, location, timing, and relevant regulatory benchmarks. Regulatory agencies and state environmental authorities should improve routine monitoring and transparent reporting of compliance with applicable noise standards. Noise considerations should also be incorporated into urban and land-use planning, particularly where residential communities are located close to major roads, markets, entertainment venues, places of worship and industrial facilities. Occupational hearing-conservation programmes should be prioritized in sectors with documented high noise exposure, including oil and gas, quarrying, construction, manufacturing and other high-risk workplaces. Such programmes should include exposure assessment, worker education, appropriate hearing protection and periodic audiometric surveillance where indicated. Public-health communication should be tailored to populations with limited awareness of noise-related risks. Future research should use longitudinal or repeated-measures designs where feasible, incorporate standardized exposure and outcome measures, evaluate vulnerable populations such as children and informal workers, and quantitatively assess the effectiveness of regulatory enforcement interventions and their economic consequences.

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