



Environmental Noise Pollution and Perceived Health Outcomes among Residents of Mabwepande Ward, Kinondoni Municipal Council, Tanzania

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Abstract

Objectives: To assess community awareness of noise pollution, examine self-reported health effects, identify major noise sources and disturbance periods, and document community-suggested strategies in Mabwepande Ward, Kinondoni, Dar es Salaam, Tanzania.

Background: Environmental noise is a growing health concern in peri-urban communities where residential areas coexist with transportation routes, markets, and entertainment facilities. Although noise and health effects have been studied in Tanzania, local evidence on awareness, health effects, sources, and control measures remains limited.

Methodology: A cross-sectional study in Mabwepande Ward in August 2026 involved 100 participants via questionnaires, interviews, and observations, including household members, community leaders, health providers, and authorities. Data were analyzed with SPSS and Excel; qualitative data were summarized thematically.

Results: 96% of respondents knew about noise pollution, and 88% knew of its health effects. Night time was the most disturbed period (60%), followed by daytime (40%). Elders (61%) were seen as the most affected, followed by youth (24%) and children (15%). Common health effects included sleep disturbance (27%), headaches (21%), hearing loss (19%), stress and annoyance (16%), reduced concentration (10%), and mental health issues (7%). Daytime noise sources included motorcycles, vehicles, horns, traders, and customers; entertainment was a key night-time source. Suggested control measures included community education (19%), participation (17%), law enforcement (15%), and separating entertainment and markets from residences (13%).

Conclusion: Noise pollution is a significant issue in Mabwepande, caused by activities during both day and night. Addressing this requires environmental monitoring, community involvement, regulations, and land-use planning, especially in fast-growing peri-urban areas

Keywords: Noise Pollution, Human Health, Environmental Noise, Peri-Urban Communities, Mabwepande, Dar Es Salaam; Tanzania

1. Introduction

Environmental noise is a widespread environmental health concern in rapidly urbanizing communities. Transport, construction, commercial activities, industrial operations, and leisure activities can expose residents to unwanted sound, with consequences extending beyond annoyance to sleep disturbance, impaired well-being, and other health outcomes [1], [2]. Evidence synthesized by Basner et al. indicates that environmental noise is associated with auditory and non-auditory effects, while WHO guidance emphasizes reducing exposure to environmental noise to protect health and well-being [1], [2].

Noise exposure has also been associated with cardiovascular outcomes, stress responses, sleep disturbance, and impaired cognitive performance [3]. Systematic reviews prepared for the WHO Environmental Noise Guidelines report evidence on quality of life, mental health, and well-being, while also emphasizing that exposure and effects vary by source, timing, and population [4]. These relationships make noise management particularly relevant in densely settled areas where residential, transport, commercial and entertainment activities are spatially close.

Tanzania has documented community responses to environmental noise. Gaganija et al. reported that traffic was a major source of noise in Morogoro and that residents identified headaches, hearing problems, sleeplessness, and difficulty concentrating among the

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effects of noise exposure [5]. Earlier work in Dar es Salaam also documented hazardous occupational noise exposure in the textile sector [6]. Research on industrial workers in Nairobi similarly demonstrates the importance of occupational noise controls where machinery and processing activities generate high sound levels [7].

Mabwepande Ward is a rapidly growing peri-urban area of Kinondoni Municipal Council. The 2022 Population and Housing Census recorded 66,794 residents in the ward [8]. The study report describes a mixture of residential, market, transport, entertainment, and other activities, creating conditions in which multiple noise sources occur within the same community. Tanzania's Environmental Management (Standards for the Control of Noise and Vibrations Pollution) Regulations establish permissible noise levels and responsibilities for monitoring and control [9].

Despite these regulatory provisions, local evidence is needed to understand which sources residents experience most strongly, which health effects they report, and which control measures they consider practical. The present study therefore examined noise pollution and self-reported health effects in Mabwepande Ward and documented community-suggested strategies for reducing noise exposure.

1.1 Research problem

Rapid growth of peri-urban settlements can bring residential areas into close proximity with roads, markets, motorcycle and three-wheeler traffic, bars and other entertainment facilities. This spatial overlap may increase exposure to environmental noise, particularly when noisy activities continue into evening and night-time.

1.2 Objectives

- The general objective was to assess the effects of environmental noise pollution on human health among residents of Mabwepande Ward.
- To assess the community's level of awareness about noise pollution.
- To examine perceived health effects associated with noise exposure.
- To identify major noise sources and the periods when noise is most frequently experienced.
- To document community-suggested strategies and control measures for reducing noise pollution.

2. Materials and Methods

2.1 Study area

The study was conducted in Mabwepande Ward, Kinondoni Municipal Council, Dar es Salaam, Tanzania. The source report places the ward approximately 40 km from the city centre and about 4 km from Bagamoyo Road and describes it as a satellite town within the Dar es

Salaam planning area. The report also identifies its proximity to Pande Game Reserve and gives approximate coordinates of 6°40'32"S–6°44'10"S and 39°04'10"E–39°05'40"E. The 2022 census recorded 66,794 residents in Mabwepande Ward [8]. The local economy includes informal trading, small-scale manufacturing, services and other activities, with transport and market activities forming visible components of the urban environment.

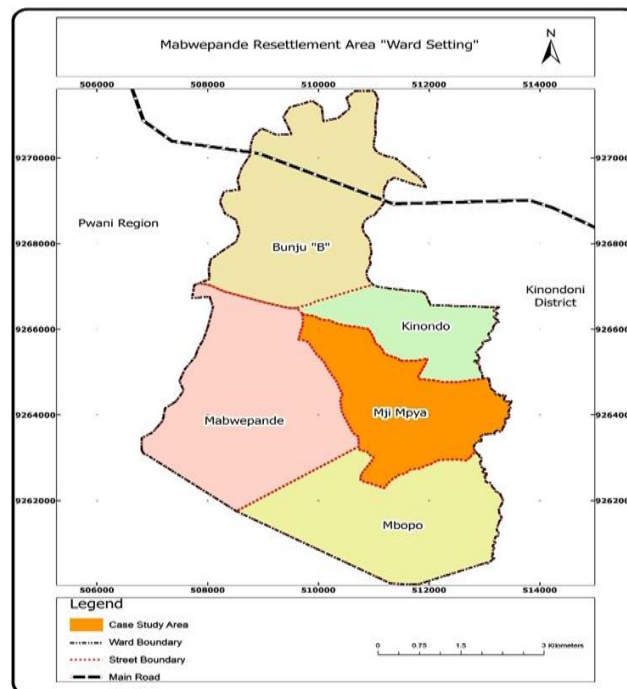


Fig. 1. Location map of Mabwepande Ward

2.2 Research design

A cross-sectional survey design was used. The study collected quantitative information through questionnaires and qualitative information through interviews and direct observation. The approach allowed the study to combine reported experiences with observations of noise-generating activities in the study area.

2.3 Population, sample size and sampling

The study involved two distinct participant groups: community respondents and institutional stakeholders. The community group comprised 71 respondents, including 60 randomly selected household representatives and 11 other community members. The stakeholder group comprised 29 purposively selected key informants: 5 community leaders, 10 health-care providers, 3 health officers, 1 environmental officer, and 10 local-authority representatives responsible for environmental and public-health matters. The 2022 population of Mabwepande Ward was 66,794 [8]. A sample of 100 participants was estimated using the Yamane/Slovin formula with a 10% precision level: $n =$

$N/[1 + N(e^2)]$. With $N = 66,794$ and $e = 0.10$, the calculated sample was approximately 99.8 and was rounded to 100.

Simple random sampling was used to select the 60 household representatives. A household list was obtained from the Ward Executive Office, households were assigned identification numbers, and the required households were selected through a lottery or random-number procedure. The remaining community members and institutional stakeholders were selected purposively because of their residence, professional responsibilities, leadership roles, or knowledge of environmental noise and public-health issues. Therefore, the purposively selected participants were included to provide contextual and professional perspectives rather than statistically representative estimates of the ward population.

2.4 Data collection

Questionnaires contained closed- and open-ended questions covering demographic characteristics, awareness of noise pollution, major noise sources, time of greatest disturbance, groups perceived to be most affected, self-reported health effects, and suggested mitigation measures. Key-informant interviews were conducted with environmental and health officers and community leaders. Direct observations documented traffic congestion, market activity, entertainment facilities and other visible noise-generating activities. Field photographs were taken to document representative conditions.



Fig. 2. Transport and market activities observed in Mabwepande Ward during the field survey.



Fig. 3. Mwanandio Sports Lounge along the road in the study area, identified in the field report as a source of evening and night-time noise.

2.5 Data analysis

Questionnaire data were edited, coded, classified, and tabulated. Descriptive analysis was conducted using SPSS version 25.0 and Microsoft Excel. Frequencies and percentages were calculated for categorical variables and presented in tables and figures. The study summarized qualitative information from interviews and observations thematically and used it to contextualize the quantitative results. The study did not use an inferential model to estimate causal effects of noise exposure on individual health outcomes; therefore, health findings are reported as self-reported experiences and community perceptions.

2.6 Ethical considerations

The researchers obtained an introduction letter from the Institute of Environment, Climate and Development Sustainability and authorization from Kinondoni Municipal Council before collecting field data. Participation was voluntary, informed consent was obtained, confidentiality was maintained, and findings were reported in aggregate form.

3. Results

3.1 Socio-demographic characteristics

Table I. Socio-demographic characteristics of respondents (N = 100).

Characteristic	Category	n	%
Gender	Male	57	57
Gender	Female	43	43
Age	18–25	12	12
Age	26–35	33	33
Age	36–45	35	35
Age	46 and above	20	20
Education	No formal education	3	3
Education	Primary	32	32
Education	Secondary	44	44
Education	College	13	13
Education	University	8	8
Residence	<1 year	5	5
Residence	1–5 years	15	15
Residence	6–10 years	12	12
Residence	>10 years	68	68

The sample comprised 57% males and 43% females. Respondents aged 26–35 years and 36–45 years represented 33% and 35%, respectively, while 20% were aged 46 years and above. Most respondents had received formal education: 44% had secondary education, 32% primary education, 13% college education, and 8% university education. Sixty-eight percent had lived in Mabwepande for more than 10 years, providing substantial residence experience for reporting changes in local noise conditions.

3.2 Awareness of noise pollution

Ninety-six percent of respondents reported awareness of noise pollution, while 4% reported not being aware of it.

A separate question concerning awareness of the effects of noise on human health produced 88% affirmative responses and 12% negative responses. These results indicate high general recognition of noise as an environmental issue, although awareness of specific health implications was lower.

Table II. Community awareness of noise pollution and its health effects

Awareness measure	Yes n (%)	No n (%)
Aware of noise pollution	96 (96%)	4 (4%)
Aware of health effects	88 (88%)	12 (12%)

3.3 Timing and groups perceived to be most affected

Table III Reported timing of noise disturbance and groups perceived to be most affected

Indicator	Category	n	%
Time of greatest noise	Night	60	60
Time of greatest noise	Day	40	40
Group perceived most affected	Elders	61	61
Group perceived most affected	Youth	24	24
Group perceived most affected	Children	15	15

60% of respondents identified night-time as the period of greatest noise disturbance, compared with 40% who identified daytime. Respondents identified elders as the group most affected (61%), followed by youth (24%) and children (15%). The field report linked night-time disturbance mainly to entertainment activities, including bars and clubs near residential areas, while daytime disturbance was linked to transport and market activity.

3.4 Perceived health effects

Table IV. Perceived health effects associated with noise exposure

Reported health effect	n	%
Sleep disturbance	27	27
Headaches	21	21
Hearing loss	19	19
Stress and annoyance	16	16
Reduced concentration and performance	10	10
Mental health problems	7	7
Total	100	100

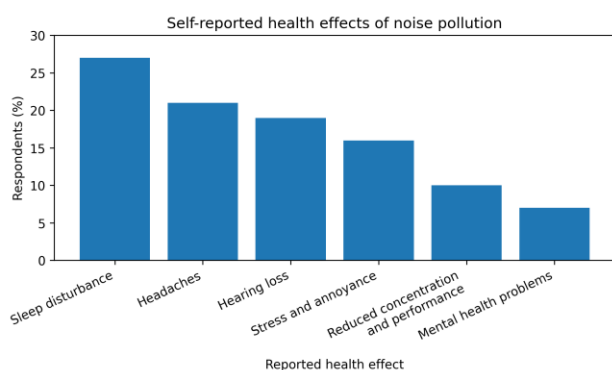


Fig. 4. Distribution of self-reported health effects associated with noise pollution.

Sleep disturbance was the most frequently reported health effect (27%), followed by headaches (21%) and hearing loss (19%). Stress and annoyance accounted for 16%, reduced concentration and performance for 10%, and mental health problems for 7%. Interviews conducted during the field study included reports from elderly residents of poor sleep at night and reports from bar and grinding-mill workers of headaches and hearing difficulties.

3.5 Observed sources of noise pollution

Field observations identified transport and market activity as important daytime noise sources. The observed combination of motorcycles, three-wheelers, motor vehicles, vehicle horns, traders, and customers generated a high level of activity around market and road spaces. The study identified a sports lounge/bar along the road as a source of loud music during evening and night-time periods. These observations correspond with the questionnaire finding that 40% of respondents identified daytime as the period of greatest noise and 60% identified night-time.

3.6 Awareness and community-suggested control measures

Eighty-one percent of respondents reported awareness of measures that could be used to control noise pollution, whereas 19% reported no awareness of such measures.

Table V. Community-suggested measures for reducing noise pollution

Suggested measure	n	%
Provision of education on effects of noise pollution	19	19
Community participation and stakeholder collaboration	17	17
Implementation of laws and regulations	15	15
Separate entertainment/market activities from residential areas	13	13
Urban planning and zoning	11	11
Soundproofing of buildings	10	10
Regular noise monitoring and assessment	9	9
Using quieter machinery	6	6
Total	100	100

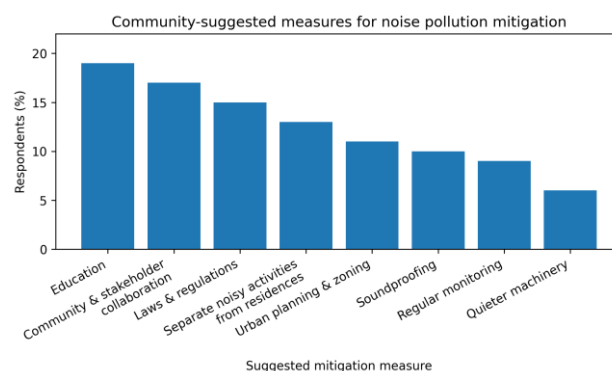


Fig. 5. Community-suggested measures for noise pollution mitigation.

4. Discussion

4.1 Awareness and exposure pattern

The high level of awareness reported in Mabwepande Ward is consistent with evidence from Tanzania showing that communities recognize environmental noise as a problem. Gaganija et al. found that residents in Morogoro recognized traffic noise and reported several associated health effects [5]. The present study extends this evidence to a rapidly developing peri-urban setting in Dar es Salaam, where residential development, transport, markets, and entertainment create multiple potential exposure pathways.

The finding that 60% of respondents identified night-time as the period of greatest disturbance is important because night-time noise can interfere with sleep and recovery. WHO guidance identifies environmental noise as a public-health concern and provides health-based recommendations for reducing exposure, including attention to night-time noise [2]. The field evidence from Mabwepande indicates that entertainment venues located close to residences are an important local source requiring targeted management.

4.2 Health effects reported by residents

Sleep disturbance was the most frequently reported health effect, followed by headaches and hearing loss. This pattern is broadly compatible with the established literature on environmental noise. Basner et al. documented both auditory and non-auditory health effects of noise, including sleep disturbance and impaired well-being [1]. Münzel et al. further summarized evidence linking environmental noise with stress, sleep disturbance, and cardiovascular outcomes [3]. However, the present findings should be interpreted as self-reported symptoms and experiences rather than clinical diagnoses.

The proportion identifying elders as the group most affected was 61%. This result reflects community perception rather than a clinical comparison of exposure or disease rates across age groups. Nevertheless, the finding is relevant for local environmental-health planning because it indicates that older residents are perceived as particularly affected by existing noise conditions. The reported concentration problems among workers and residents are also consistent with literature describing relationships between environmental noise and cognitive performance, although the present study did not conduct standardized cognitive testing [4].

4.3 Local sources of noise

The observed transport and market environment represents a combination of mobile and stationary noise sources. Motorcycles, three-wheelers, motor vehicles, horns, traders, and customer activity occur

simultaneously in busy market-road spaces. This is comparable with Gaganija et al., who identified traffic as the principal noise source in their Morogoro study [5]. The Mabwepande findings also show an important temporal distinction: daytime noise is associated strongly with transport and commercial activity, while night-time noise is more closely associated in respondents' accounts with entertainment venues.

4.4 Regulatory and planning implications

Tanzania's Environmental Management (Standards for the Control of Noise and Vibrations Pollution) Regulations provide a regulatory basis for controlling environmental noise. The Regulations address permissible noise levels, monitoring, noise-control zones, licensing, enforcement, and responsibilities of facility owners and occupiers [9]. The community's preference for stronger implementation of laws and regulations (15%) and separation of noisy activities from residential areas (13%) therefore corresponds with existing regulatory and land-use management mechanisms.

The finding that education was the most frequently suggested measure (19%) indicates that residents view awareness and behavior change as important complements to enforcement. Community participation and stakeholder collaboration ranked second (17%), followed by regulatory enforcement. This combination suggests that local noise management can benefit from a multi-layered approach involving community reporting, municipal enforcement, environmental monitoring, land-use planning and source-specific controls.

4.5 Practical control strategies for Mabwepande

The results support five interconnected intervention areas. First, education should explain health effects, acceptable noise practices and reporting procedures. Second, enforcement should focus on repeated or persistent sources, particularly entertainment facilities operating near residences. Third, land-use planning should reduce incompatible adjacency between residences and high-noise activities. Fourth, routine monitoring should provide objective sound-level data for enforcement and evaluation. Fifth, encourage source controls such as soundproofing and quieter machinery where technically and economically feasible.

These measures are consistent with the regulatory framework, which assigns duties for controlling noise and provides for monitoring and enforcement [9]. They also align with WHO's emphasis on evidence-based interventions to reduce harmful environmental noise exposure [2].

Conclusion

The study highlights that noise pollution is a substantial environmental and health concern in Mabwepande Ward,

with high community awareness of its effects. Key sources include transportation, markets, and entertainment venues, especially during nighttime. Reported health impacts such as sleep disturbance, headaches, and hearing loss underscore the need for targeted interventions. To effectively address these issues, an integrated approach is recommended. Kinondoni Municipal Council should implement regular environmental noise monitoring across residential, commercial, and entertainment areas, enforce compliance inspections on entertainment facilities near residential zones, and incorporate noise considerations into land-use planning and licensing processes. Such measures will help mitigate noise pollution and protect community health.

Declarations

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Author Contributions:

Simon B. Yeremia: Conceptualization, methodology, supervision, data analysis, interpretation of results, and manuscript review and editing.

Maria Locken: Data collection, field investigation, data organization, and manuscript review.

Cleophace Emanuel: Methodology, data analysis, interpretation of findings, and manuscript review.

Mkyanuzi Alimachius: Literature review, field investigation, data validation, and manuscript review.

Veneranda Dosla: Field investigation, data collection, and manuscript review.

Neema Mpanga: Data organization, analysis, preparation of tables and figures, and manuscript review.

All authors: Reviewed and approved the final version of the manuscript and agreed to be accountable for the accuracy and integrity of the work.

Conflicts of Interest: The authors declare no competing interests.

Data Availability: The questionnaire dataset is not publicly deposited, and aggregated data are presented.

Ethics Approval and Consent: The study followed institutional introduction and local authorization, voluntary participation, informed consent, confidentiality, and aggregate reporting.

Consent for Publication: Consent for publication is not applicable because the findings are aggregated and individuals are not identified.

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