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Mitigating Urban Environmental Health Risks through Environmental Regulatory Strategies: A Case Study of Sagamu Metropolis, Ogun State, Nigeria

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Abstract

Urbanization, industrialization, and human activities have intensified environmental degradation and public health risks in developing countries, including Nigeria. This study evaluated Environmental Protection Agency (EPA) strategies for mitigating urban environmental health risks in Sagamu Metropolis, Ogun State. It examined awareness, intervention effectiveness, compliance, community reporting, and implementation challenges. A descriptive survey was conducted in Sabo, Ode Remo, and Surulere. Of 350 questionnaires distributed, 275 valid responses were retrieved and analysed. Data were collected using structured questionnaires, observational checklists, key informant interviews, and document reviews. Quantitative data were analysed using descriptive statistics and chi-square tests; qualitative data underwent thematic analysis. Awareness of EPA activities was highest in Ode Remo (69%), followed by Sabo and Surulere (64% each). Awareness was reported by 70% of respondents with secondary education and 75% with tertiary education, although educational attainment was not significantly associated with awareness (χ^2 = 3.61, df = 4, p = 0.461). 42% rated EPA activities highly effective, while 58% considered them moderately effective or ineffective. Compliance with directives was approximately 55%. In the preceding 12 months, 38% had reported environmental health concerns, and 60% were dissatisfied with official responses. Key challenges were inadequate funding (65%), weak enforcement (60%), and corruption (55%). Reported hazards included open dumpsites, industrial emissions, and stagnant water; health problems included respiratory conditions (45%), diarrhoeal diseases (30%), and skin irritations (25%). Findings indicate gaps between awareness and effective environmental governance. Strengthened enforcement, routine monitoring, public education, and institutional accountability are needed to improve environmental management and protect public health in Sagamu Metropolis.

Keywords
Environmental Protection Agencies, Environmental Health Risks, Public Awareness, Regulatory Enforcement, Sagamu Metropolis.

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1. INTRODUCTION

1.1 Background of the Study

Rapid population growth, urban expansion, economic development, industrialization, improved living standards and changing consumption patterns have contributed substantially to the increasing generation of waste worldwide (Ali & Sharif, 2022; Kumar *et al.*, 2023; Sharma *et al.*, 2024; Srivatava *et al.*, 2023a, 2023b). These developments have also accelerated the depletion of natural resources and increased pressure on existing environmental management systems (Zhang *et al.*, 2022).

Population growth is closely associated with rising waste generation because of the increasing demand for raw materials used in industrial production, healthcare services and other human activities (Ali & Sharif, 2022; Olukanni & Oresanya, 2018). These activities contribute significantly to the generation of hazardous waste, particularly from industrial and medical operations (Akpan & Olukanni, 2020). Consequently, the rapid expansion of production and consumption has resulted in an alarming increase in the volume of hazardous waste generated globally (Couto *et al.*, 2013; Kumar *et al.*, 2023). However, the quantity and composition of waste generated vary across countries, depending largely on their levels of economic development, industrial activities and consumption patterns.

The increasing burden of environmental pollution and waste generation has made effective environmental governance an essential component of public health protection. Environmental Protection Agencies (EPAs), operating at federal and state levels, are responsible for regulating environmentally harmful activities, promoting compliance with established environmental standards and supporting initiatives aimed at protecting human health and ecological systems. In Nigeria, environmental regulatory frameworks emphasize pollution prevention, waste management, industrial regulation and environmental monitoring as important measures for reducing environmental degradation and safeguarding public health (FEPA, 1991).

Sagamu Metropolis in Ogun State provides an important setting for examining the implementation and effectiveness of environmental regulatory interventions in an increasingly urbanized and industrialized environment. The metropolis accommodates several industrial and commercial activities, including cement production, quarrying, manufacturing and transportation. These activities have the potential to contribute to air and water pollution, particularly where environmental regulations and pollution-control measures are inadequately implemented (Ogunbode & Abiala, 2019).

Despite the existence of environmental regulatory frameworks, concerns remain regarding the effectiveness of environmental protection measures and their practical contribution to reducing environmental health risks within urban communities. In particular, limited empirical information is available on public awareness of environmental regulatory activities, community compliance with environmental directives, institutional responsiveness and the challenges confronting environmental regulatory authorities in Sagamu Metropolis.

Understanding these issues is important because effective environmental protection requires more than the existence of regulatory policies. It also depends on adequate institutional resources, consistent enforcement, public participation, environmental education and functional monitoring systems.

Against this background, the present study evaluates environmental regulatory strategies for mitigating urban environmental health risks in Sagamu Metropolis, Ogun State. It examines public awareness of environmental protection activities, perceived effectiveness of regulatory interventions, compliance with environmental directives, community reporting practices and the major challenges affecting environmental management. The findings are intended to provide information that may support improved

environmental governance and public health protection in the study area.

2. MATERIALS AND METHODS

2.1 Study Area

The study was conducted in Sagamu Metropolis, located in Ogun State, southwestern Nigeria. Sagamu is an urban and industrial centre characterized by residential, commercial, manufacturing and transportation activities. Its industrial environment includes cement production, quarrying and other manufacturing operations, making environmental management and public health protection important considerations.

The study focused on three residential areas: Sabo, Ode Remo and Surulere. These communities were selected to provide information on public awareness, environmental conditions, regulatory compliance and perceptions of environmental health risks across different parts of the metropolis.

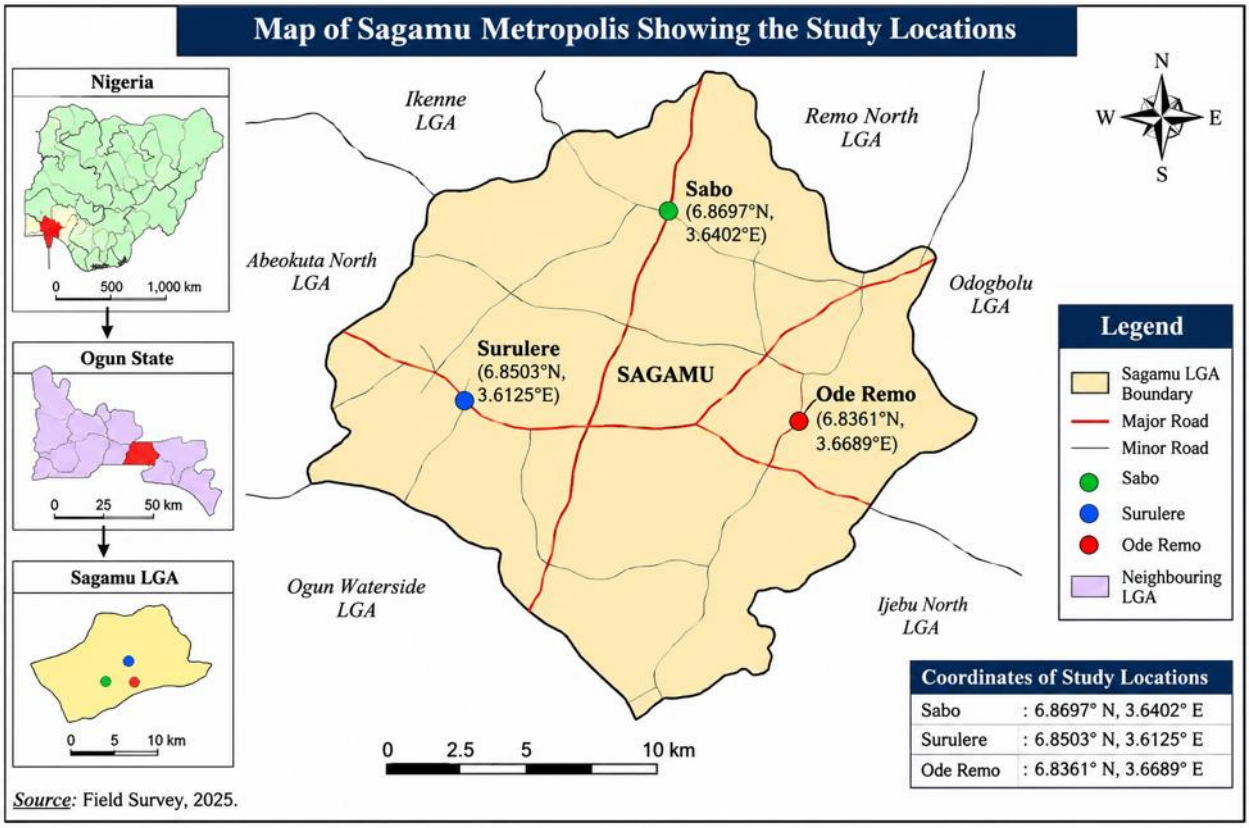

Figure 1. Location map of the study area: *Sagamu Metropolis showing the three selected study communities—Sabo, Ode Remo and Surulere.*

2.2 Research Design

The study adopted a descriptive survey research design to investigate environmental regulatory strategies for mitigating urban health risks in Sagamu Metropolis, Ogun State. This design was considered appropriate because it allows the systematic collection of information concerning the characteristics, perceptions, behaviours and prevailing conditions of a defined population.

The design enabled the researchers to obtain information on residents' awareness of Environmental Protection Agency (EPA) activities, exposure to environmental hazards, compliance with environmental regulations and perceptions of institutional interventions. It also provided an opportunity to examine existing environmental conditions without manipulating the variables under investigation.

2.3 Population of the Study

The study population consisted of residents of Sagamu Metropolis, Ogun State, with an estimated population of 5,520 individuals across the three selected residential areas: Sabo, Ode Remo and Surulere.

The population included household residents, business owners and other adult members of the selected communities. In addition, relevant stakeholders, including environmental regulatory officials, local government health officers, community leaders and representatives of major industries operating within the metropolis, were identified as potential key informants for qualitative data collection.

2.4 Sample Size Determination and Sampling Techniques

2.4.1 Sample Size Determination

The sample size was determined using the Yamane (1967) sample size determination formula, which is commonly applied in survey research involving a defined population.

An additional allowance was considered to account for possible non-response and improperly completed questionnaires. Following this procedure, a final sample of 275 respondents was used for the study.

The original study further reported that 350 questionnaires were distributed, of which 275 valid responses were retrieved and analyzed.

2.4.2 Sampling Techniques

A multistage sampling procedure was employed to select respondents from the study area.

The first stage involved the purposive selection of Sagamu Metropolis because of its increasing urbanization and associated environmental health concerns.

In the second stage, the metropolis was stratified into three selected residential areas: Sabo, Ode Remo and Surulere.

The third stage involved proportionate allocation of the sample across the selected communities based on their respective population distributions.

In the fourth stage, systematic random sampling was used to select households and eligible respondents within each residential area.

The final distribution of respondents was as follows:

- Sabo: 103 respondents.
- Ode Remo: 83 respondents.
- Surulere: 89 respondents.

This sampling procedure was intended to ensure representation of the selected residential communities and capture variations in environmental conditions and public perceptions across the metropolis.

2.5 Instruments for Data Collection

Data were collected using four principal instruments: structured questionnaires, observational checklists,

key informant interviews (KIIs) and documentary review.

The structured questionnaire was divided into eight sections (A–H), covering the following areas:

- Section A: Eligibility criteria and informed consent.
- Section B: Socio-demographic characteristics of respondents.
- Section C: Awareness and perceptions of EPA strategies.
- Section D: Exposure to environmental health risks.
- Section E: Compliance with environmental protection practices.
- Section F: Perceived implementation barriers and available support mechanisms.
- Section G: Health-related experiences and access to environmental health services.
- Section H: Willingness to comply with environmental policies and preferred interventions.

An observational checklist was used to assess environmental sanitation conditions, waste disposal practices and visible indicators of environmental pollution within the selected communities.

Key informant interviews were designed to obtain additional information from relevant stakeholders, including environmental regulatory officials, community leaders and industry representatives. The interviews focused on regulatory approaches, enforcement capacity, institutional challenges and operational limitations.

Documentary review was also included to obtain relevant information from environmental policies, monitoring reports and regulatory records.

2.6 Validity of the Research Instruments

The validity of the research instruments was assessed through face and content validation. The structured questionnaire and observational checklist were reviewed by the researcher's supervisor, an Environmental Science specialist at the Federal University of Agriculture, Abeokuta (FUNAAB).

The review focused on the clarity, relevance and adequacy of the questions in relation to the objectives of the study. Corrections and recommendations provided during the review process were incorporated into the instruments to improve their suitability for data collection.

2.7 Reliability of the Research Instrument

The reliability of the questionnaire was assessed using Cronbach's alpha coefficient. A pre-test was conducted among 10 respondents from a community within Sagamu Metropolis that was not included in the final sample but shared similar environmental characteristics with the selected study areas.

The responses obtained during the pre-test were used to evaluate the internal consistency of the questionnaire. A Cronbach's alpha coefficient of 0.70 or above was considered an acceptable indication of reliability.

2.8 Procedure for Data Collection

Before the commencement of data collection, ethical approval and relevant community entry permissions were reportedly obtained from the appropriate authorities. The purpose and objectives of the research were explained to prospective participants, and informed consent was obtained before their participation.

The questionnaires were administered through direct hand delivery to selected respondents. Participants were encouraged to complete the questionnaires during the administration process to minimize questionnaire loss and non-response. Completed

questionnaires were subsequently retrieved for analysis.

Key informant interviews were conducted through scheduled face-to-face interactions, while environmental observations were undertaken using the observational checklist.

2.9 Data Analysis

Quantitative data obtained from the questionnaires were coded, organized and analyzed using the Statistical Package for Social Sciences (SPSS) and the R statistical package.

Descriptive statistical techniques, including frequencies, percentages and cross-tabulations, were employed to summarize respondents' characteristics, levels of awareness, perceptions of environmental hazards and compliance with environmental protection directives.

Inferential statistical methods, including chi-square tests and logistic regression analysis, were identified for examining associations between selected variables where appropriate.

Qualitative information obtained through key informant interviews was analyzed thematically to identify recurring issues relating to environmental governance, institutional performance and implementation challenges. Triangulation was also employed to integrate information from questionnaires, interviews, observational assessments and documentary sources.

For the interpretation of awareness and compliance, affirmative responses of 50% or above were classified as indicating a high level of awareness or compliance.

RESULTS

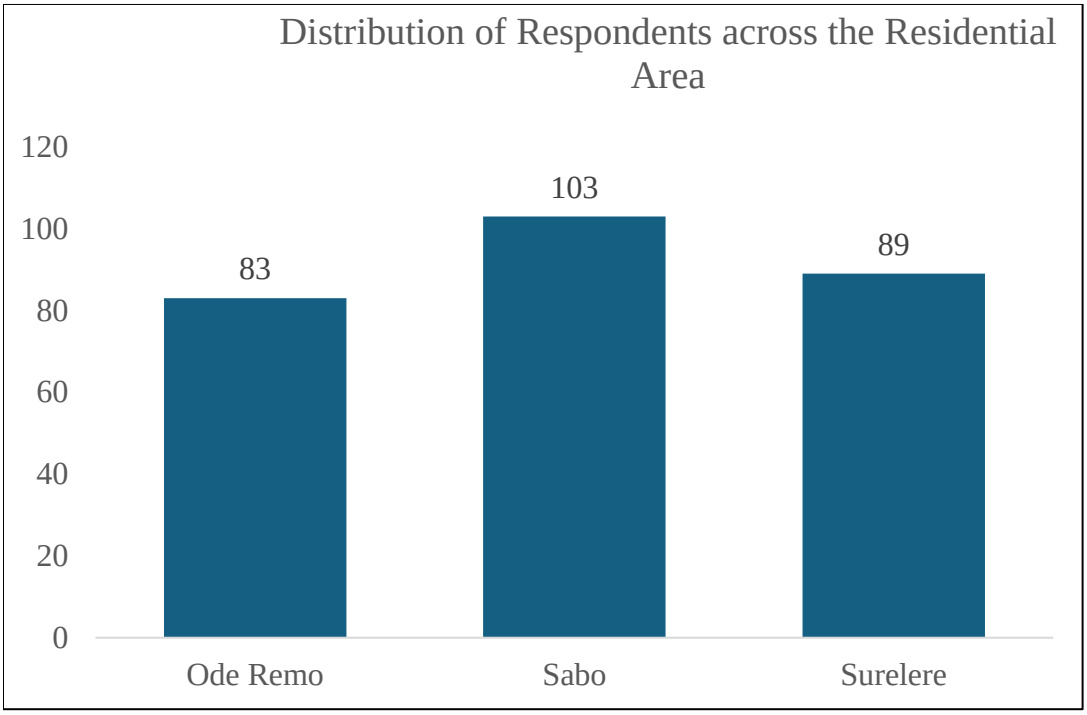

Figure 3.1 Distribution of Respondents across the Studied Residential Areas

3.1 Distribution of Respondents across the Studied Residential Areas

Of the 350 questionnaires administered across the selected residential areas of Sagamu Metropolis, 275 valid responses were retrieved and included in the analysis. As presented in Figure 3.1, Sabo contributed the largest proportion of respondents, with 103 participants (37.5%). This was followed by Surulere, with 89 respondents (32.4%), and Ode Remo, with 83 respondents (30.2%). The respondent distribution was relatively even across the three areas, providing representation from each of the locations investigated.

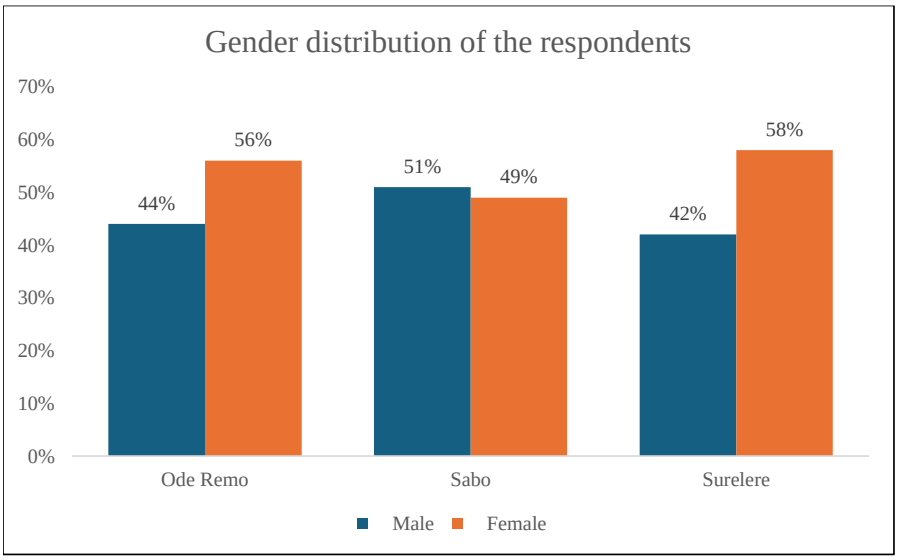

Figure 3.2: Gender Distribution of Respondents across the Metropolis

3.2 Gender Distribution of Respondents

Figure 3.2 presents the gender composition of respondents in the three residential areas. Female respondents represented the larger proportion in Ode Remo (56%) and Surulere (58%), whereas males accounted for a slightly higher proportion in Sabo (51%). Overall, the reported distribution indicates participation by both male and female respondents across the study locations.

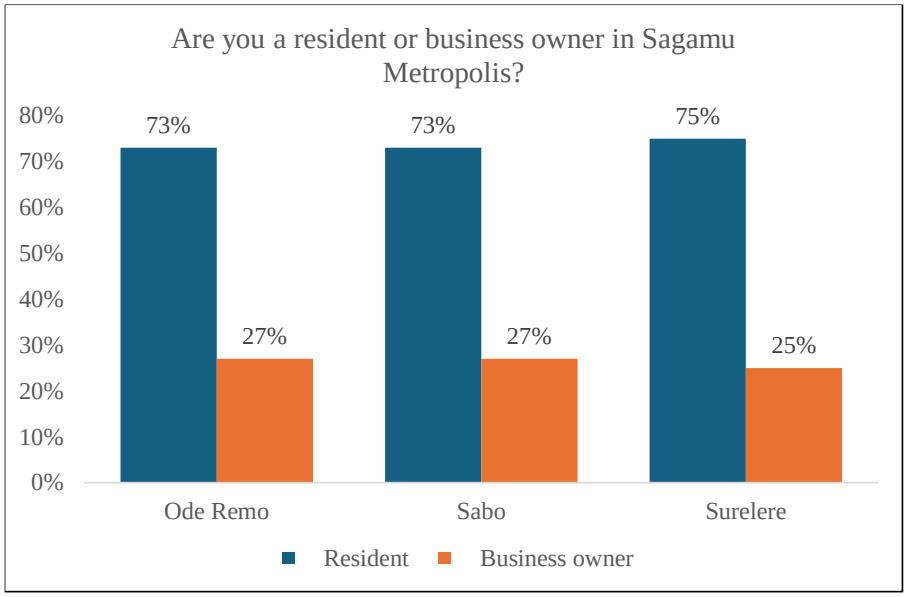

Figure 3.3: Distribution of Respondents by Residential or Business Status

3.3 Residential or Business Status of Respondents

As shown in Figure 3.3, residents constituted the majority of participants, accounting for approximately 65–70% of the sample, while business owners represented about 30–35%. Thus, the sample included both people living in the study area and those operating businesses there, with residents forming the larger respondent group.

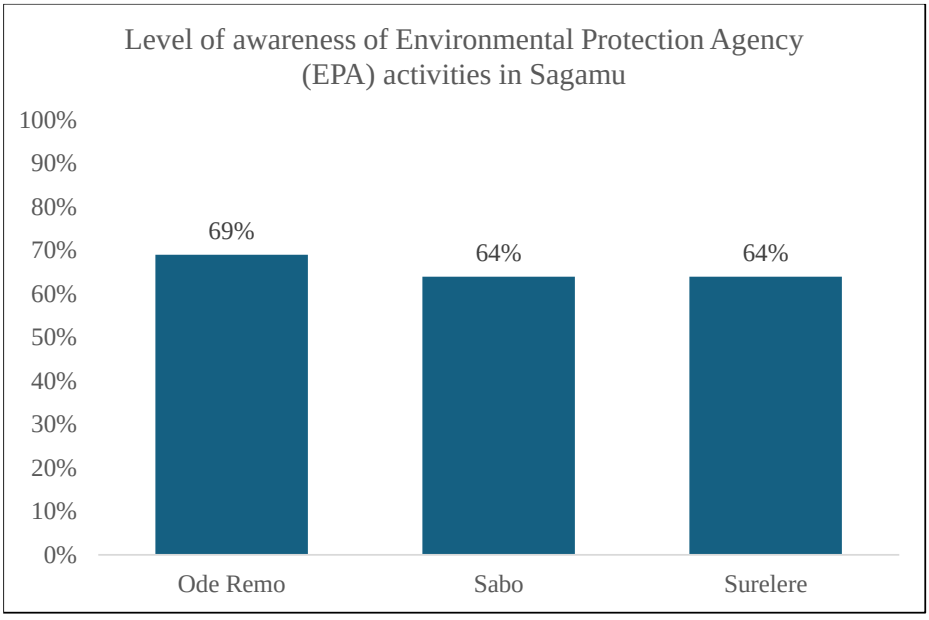

Figure 3.4: Level of Awareness of Environmental Protection Agency (EPA) Activities in Sagamu

3.4 Awareness of Environmental Protection Agency Activities

Figure 3.4 shows respondents' awareness of Environmental Protection Agency (EPA) activities in Sagamu Metropolis. Awareness was highest in Ode Remo (69%), while Sabo and Surulere each recorded 64%. Therefore, the reported awareness level exceeded 60% in all three residential areas, although a modest difference was observed between Ode Remo and the other locations.

The source material contains two additional figure entries (originally labelled Figures 3.5 and 3.6) that repeat this same awareness description. These entries appear duplicative. They should not be retained as separate results unless the corresponding graphs represent different variables or analyses. The final figure sequence below assumes that only one overall-awareness graph is required.

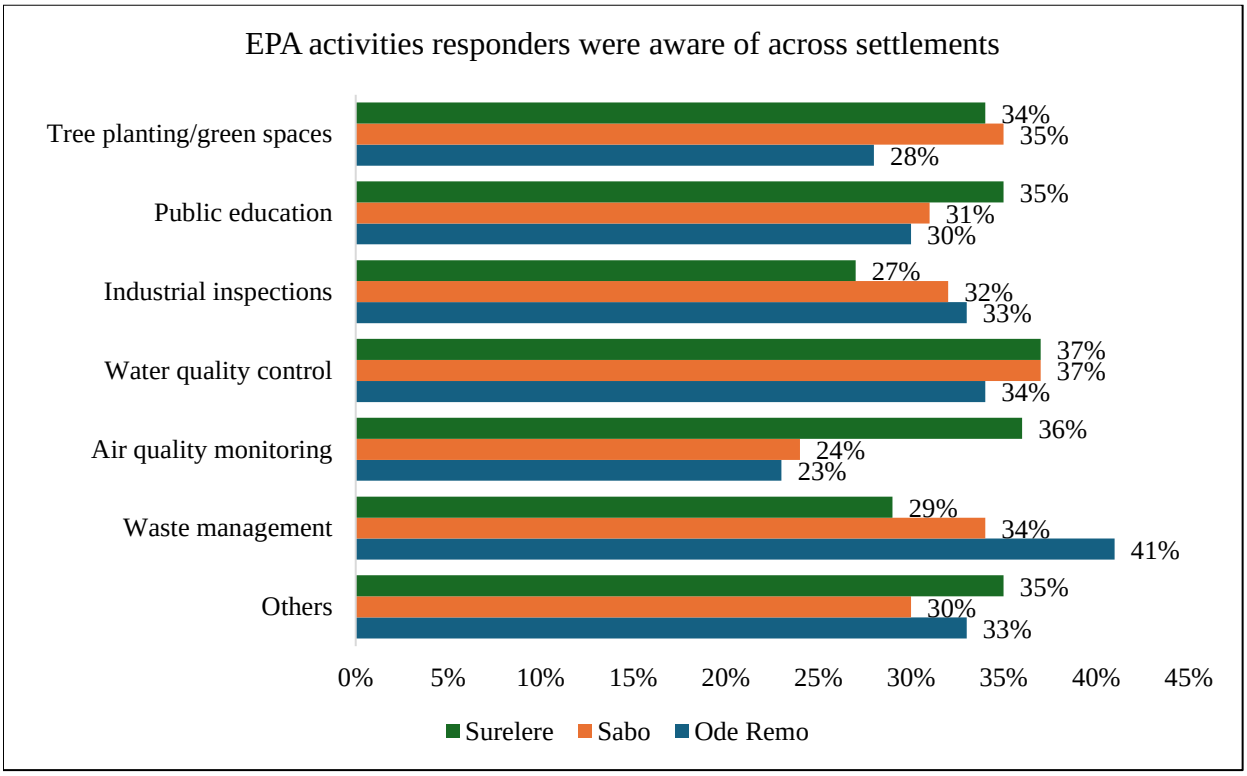

Figure 3.5: Level of Awareness of EPA Activities across the Metropolis

3.5 Perceived Effectiveness of EPA Interventions

Figure 3.5 presents respondents' assessments of the effectiveness of EPA interventions in reducing environmental health risks in Sagamu Metropolis. A total of 42% of respondents rated the interventions as highly effective, whereas the remaining 58% described them as moderately effective or ineffective. The responses therefore indicate that fewer than half of the participants are considered effective.

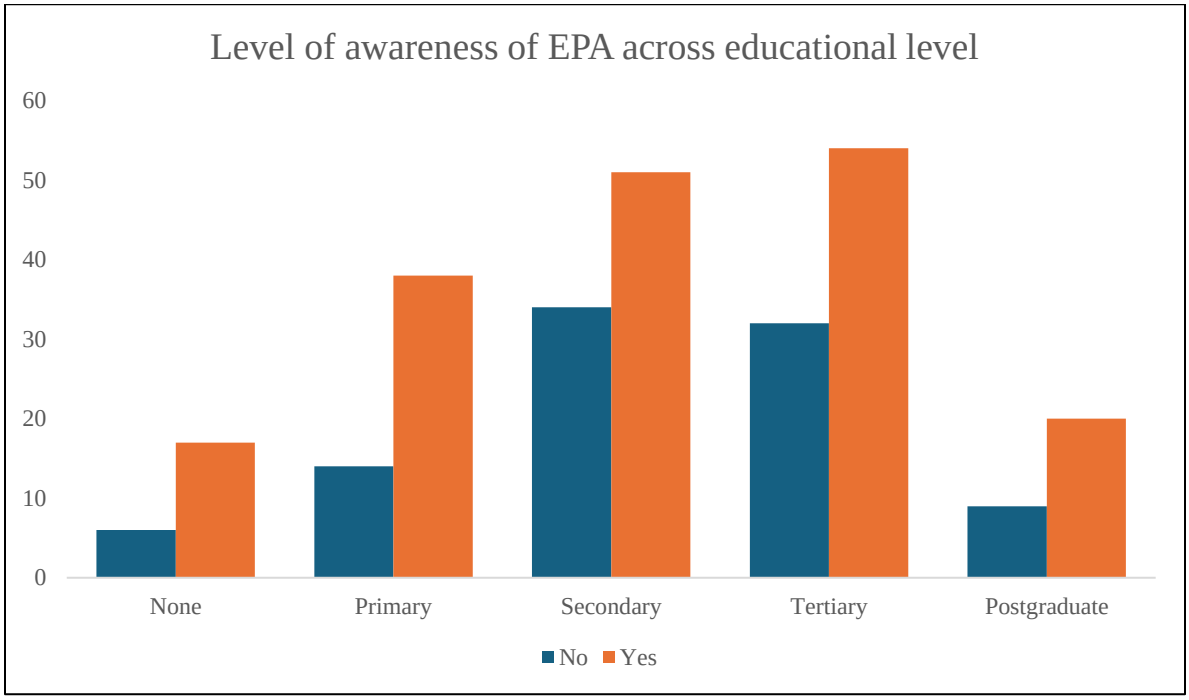

Figure 3.6 Awareness of EPA Activities across Educational Levels

Figure 3.6 compares awareness of EPA activities across respondents' educational levels. The reported awareness proportions were 50% among respondents with primary education, 70% among those with secondary education, and 75% among those with tertiary education. Although the descriptive percentages suggest higher awareness among respondents with secondary and tertiary education, the association was not statistically significant (Pearson $\chi^2 = 3.61$, df = 4, p = 0.461). The result does not provide sufficient statistical evidence of an association between educational level and awareness of EPA activities in this sample.

The other reported chi-square statistics were: likelihood ratio = 3.675, df = 4, p = 0.452; and linear-by-linear association = 0.856, df = 1, p = 0.355. The analysis was based on 275 valid cases. These results are presented in Table 3.1.

Table 3.1. Chi-square test of independence between educational level and awareness of EPA activities

Test	Value	df	Asymptotic significance (2-sided)
Pearson Chi-Square	3.610	4	0.461
Likelihood Ratio	3.675	4	0.452
Linear-by-Linear Association	0.856	1	0.355
N of Valid Cases	275	—	—

3.7 Perception of Environmental Hazards near Residences or Workplaces

Figure 3.7 summarises respondents' perceptions of environmental hazards in the vicinity of their homes or workplaces. Approximately 60–70% identified conditions such as open dumpsites, industrial emissions, and stagnant water as hazards present in their surroundings. The reported responses indicate that these environmental concerns were commonly recognised by participants. The percentage range is retained as supplied in the source material; category-specific values were not provided.

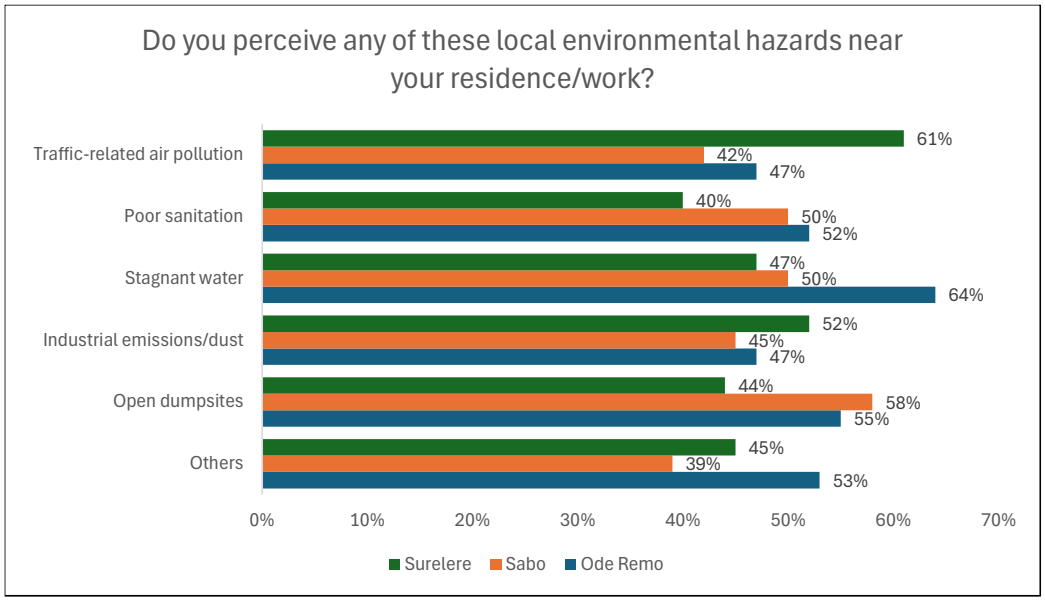

Figure 3.7 Perception of Environmental Hazards near Residences or work places.

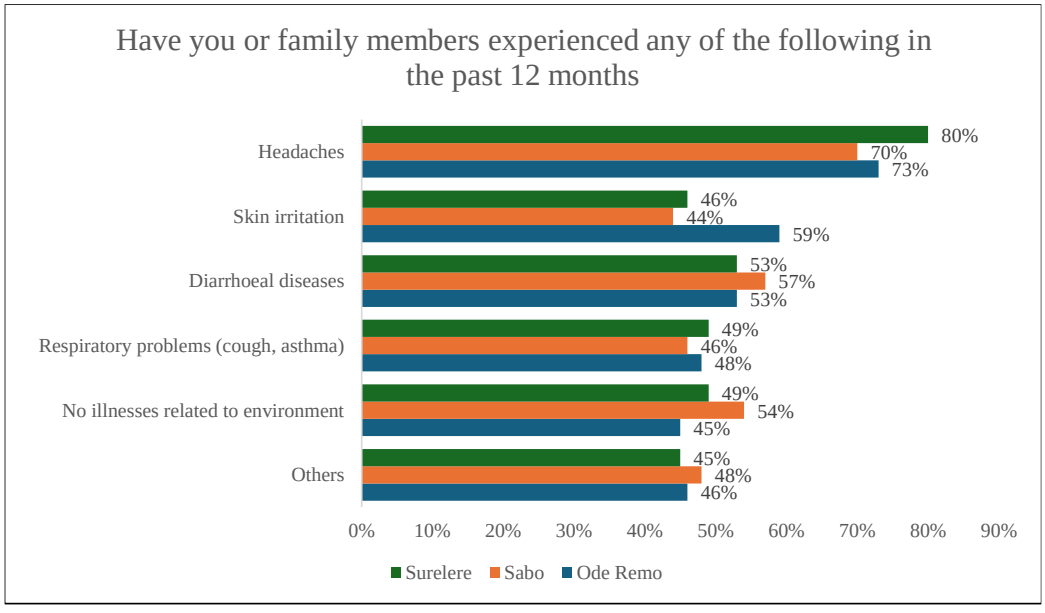

Figure 3.8 Health Issues Reported by Responds or family Members.

3.8 Health Issues Reported by Respondents or Family Members

Figure 3.8 presents health problems that respondents or members of their families reportedly experienced during the 12 months preceding the survey. Respiratory complaints, including asthma and persistent cough, were the most frequently reported, at approximately 45%. Diarrhoeal diseases accounted for about 30%, while skin irritation represented approximately 25%. These figures describe respondents' reported health experiences; on their own, they do not establish that the conditions were caused by particular environmental exposures.

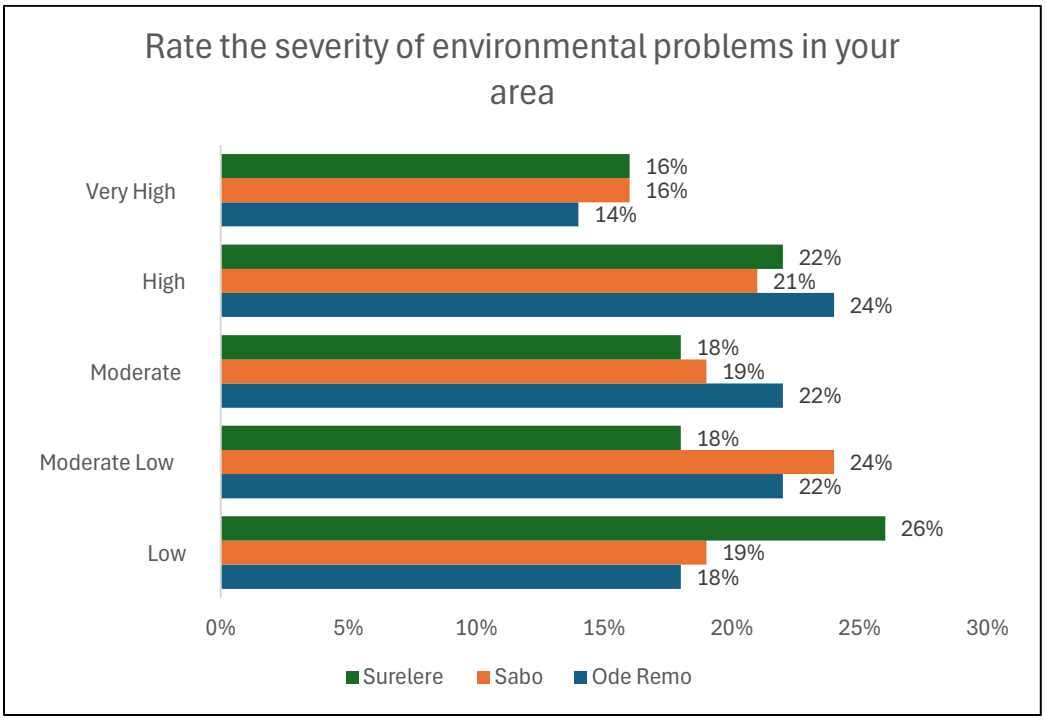

Figure 3.9 Perceived Security of Environmental Problems.

3.9 Perceived Severity of Environmental Problems

As illustrated in Figure 3.9, approximately 65–70% of respondents rated environmental problems in their residential or work areas as having high or very high severity. The remaining respondents rated the problems as moderate or low. The responses suggest that a substantial proportion of participants perceived environmental problems in their immediate surroundings as serious.

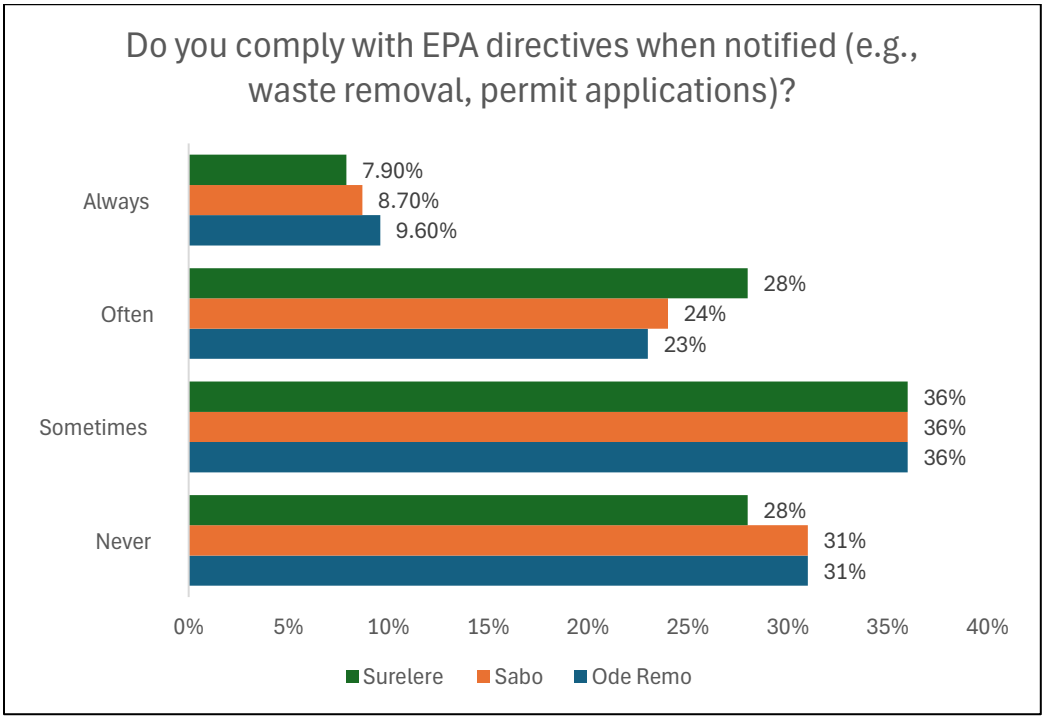

Figure 3.10. Compliance with EPA Directives.

3.10 Compliance with EPA Directives

Figure 3.10 shows respondents' reported compliance with EPA directives, including requirements relating to waste removal and permit applications. Approximately 55% indicated that they complied with the directives, while 45% reported partial compliance or non-compliance. The findings indicate that compliance was not uniform among the respondents.

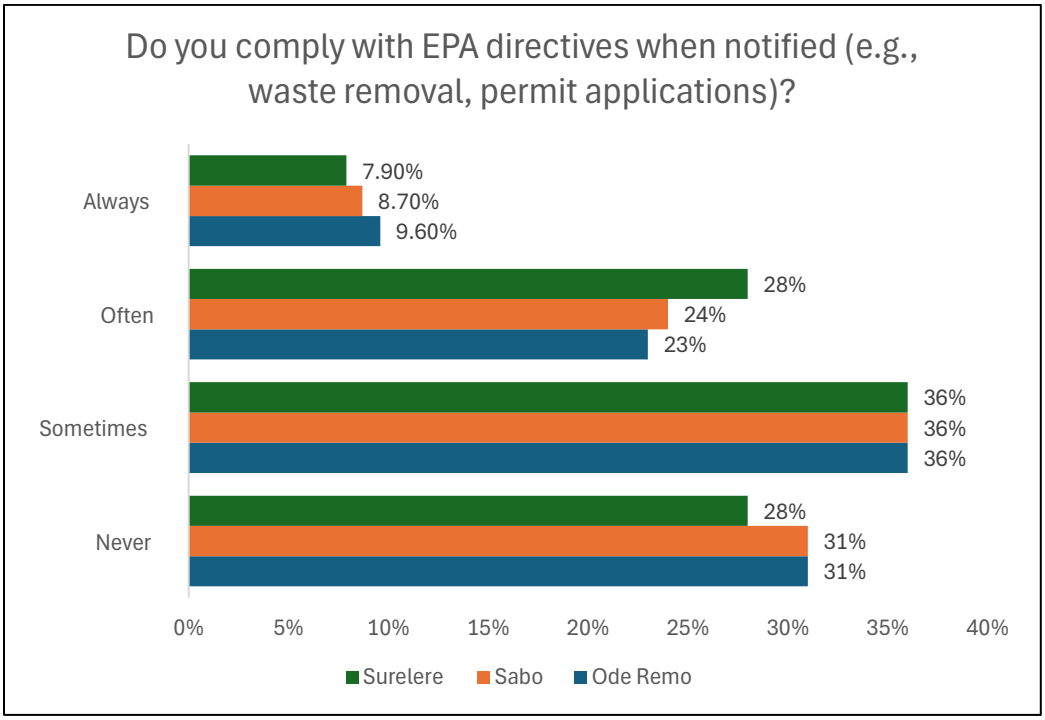

Figure 3.11 Perceived Barriers to Effective EPA Interventions

3.11 Perceived Barriers to Effective EPA Interventions

Figure 3.11 presents the barriers respondents associated with the effectiveness of EPA interventions. Funding constraints were identified by approximately 65% of respondents, followed by weak enforcement (60%) and corruption (55%). These responses identify resource limitations, enforcement challenges, and governance concerns as commonly perceived obstacles to effective environmental

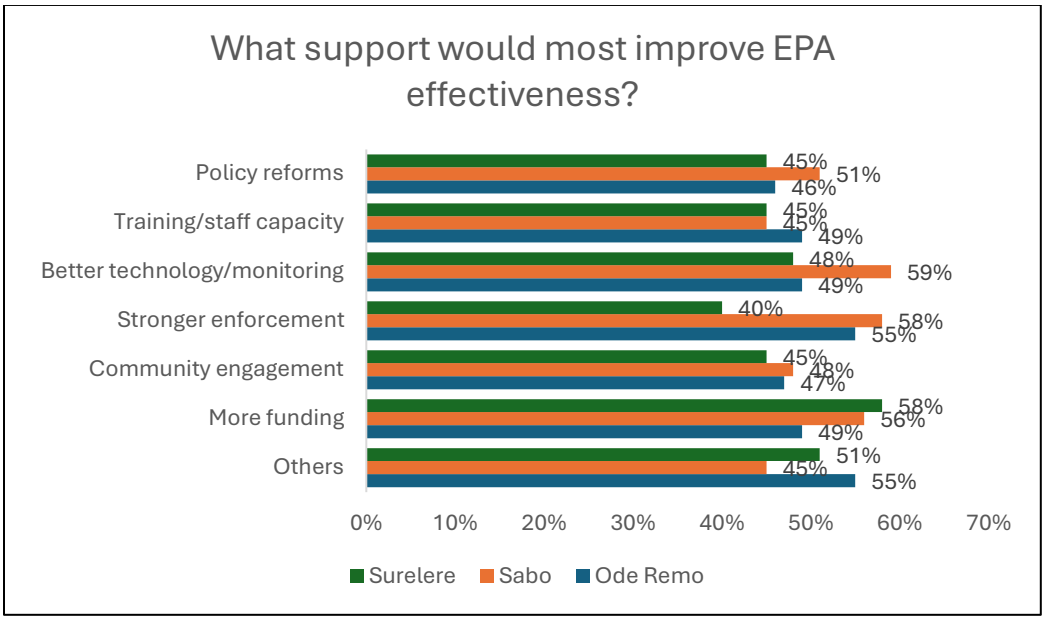

Figure 3.12 Support Required to improve EPA Interventions

3.12 Support Required to Improve EPA Interventions

As shown in Figure 3.12, stronger enforcement was identified by approximately 68% of respondents as a support measure needed to improve the effectiveness of EPA monitoring systems as prominent areas

interventions. Better technology and monitoring systems were also identified, by about 62% of respondents. The responses therefore point to enforcement capacity and improved

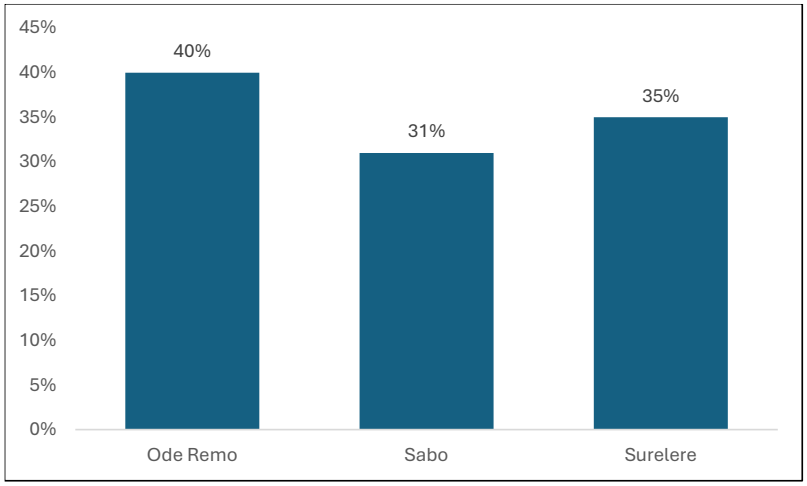

Figure 3.13 Reporting of Environmental Health Concerns

3.13 Reporting of Environmental Health Concerns

Figure 3.13 presents respondents' reports of whether they had notified the relevant authorities about environmental health concerns during the preceding 12 months. Only 38% reported having made a report, whereas 62% had not reported any concern. This distribution indicates that fewer than half of the respondents used formal or other reporting channels during the period considered.

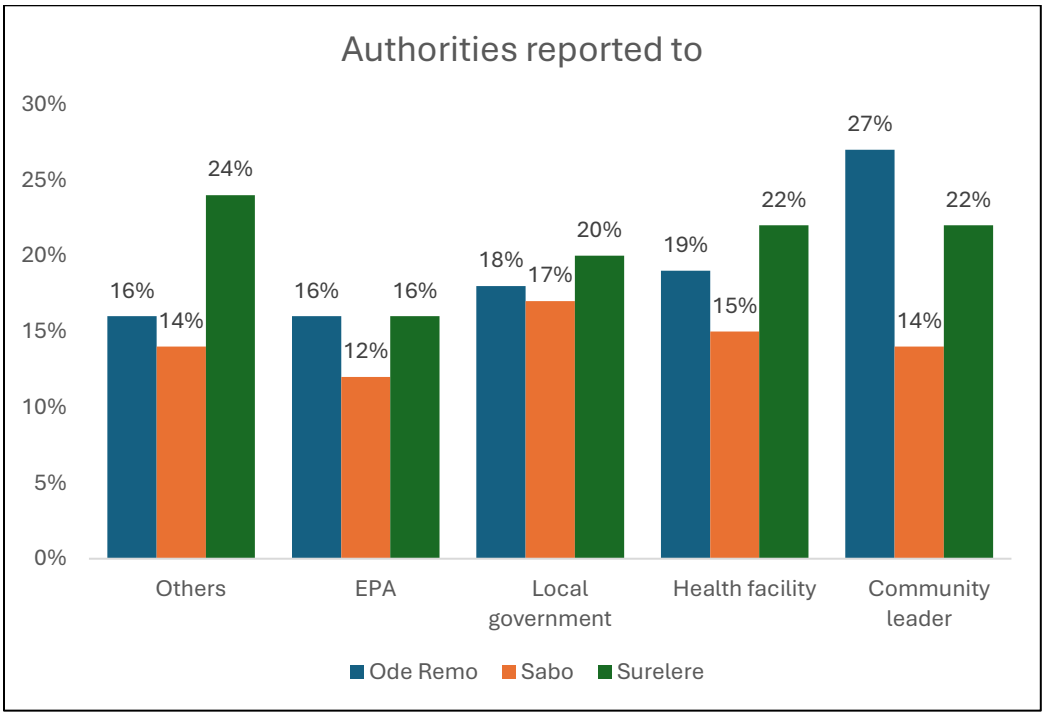

Figure 3.14 Authorities Contacted by Respondents

3.14 Authorities Contacted by Respondents

Figure 3.14 shows the authorities contacted by respondents who reported environmental health concerns. Among this reporting subgroup, 45% indicated that they contacted local government environmental offices, 35% reported to the EPA, and 20% approached other authorities, including community leaders or health departments. These percentages describe the distribution of reported destinations among those who made a report, rather than among the full sample of 275 respondents.

5.1 Discussion

This study assessed the contribution of the Environmental Protection Agency (EPA) to the mitigation of environmental health risks in Sagamu Metropolis, with particular emphasis on public awareness, perceived effectiveness of environmental interventions, compliance with environmental regulations, community reporting practices, and environmental health concerns. The findings provide useful insights into public perceptions of environmental governance and the challenges associated with implementing environmental protection measures in urban communities. These issues are particularly important in developing countries where rapid urbanisation, inadequate

environmental infrastructure, poor waste management, and institutional limitations continue to present considerable public health challenges (World Health Organization [WHO], 2025; Xu & Kang, 2025). Although awareness of EPA activities was relatively high, the results also revealed shortcomings in perceived intervention effectiveness, regulatory compliance, and community participation in environmental reporting.

The findings showed that awareness of EPA activities was relatively high across the three residential areas, ranging from 64% in Sabo and Surulere to 69% in Ode Remo. This suggests that a considerable proportion of residents were familiar with the activities of the agency, although awareness was not uniform across the metropolis. The observed level of awareness may reflect residents' exposure to environmental sanitation activities, public information channels, and community-level environmental engagement. However, awareness of an environmental regulatory institution does not necessarily indicate adequate understanding of its responsibilities, regulatory procedures, or intervention programmes. Adekola et al. (2021), in their investigation of public perception and awareness of waste management in Benin City, Nigeria, demonstrated the importance of public awareness and community involvement in improving environmental management practices. Their findings further highlighted the need to integrate public education, environmental infrastructure, and regulatory enforcement to achieve sustainable waste management. Consequently, public sensitisation in Sagamu should extend beyond general awareness to include practical information on environmental regulations, pollution prevention, waste management, and procedures for reporting environmental violations.

The relationship between educational attainment and awareness of EPA activities provides another important insight into public environmental knowledge. Respondents with tertiary education recorded the highest awareness (75%), followed by those with secondary education (70%), while respondents with primary education recorded 50%. Despite this descriptive variation, the chi-square analysis revealed no statistically significant association between educational level and awareness of EPA activities ($\chi^2 = 3.610$, $df = 4$, $p = 0.461$). This indicates that the observed differences across educational categories do not provide sufficient statistical evidence of an association in the study population. It also suggests that formal educational attainment alone may not adequately explain public awareness of environmental regulatory activities. Other factors, including community sensitisation, access to environmental information, media exposure, and direct interaction with environmental authorities, may contribute to variations in awareness. This interpretation is consistent with Adekola *et al.* (2021), who emphasised the importance of integrating public awareness, community participation, and institutional communication into effective environmental management. Similarly, the WHO (2025) identified coordinated urban governance and the strengthening of environmental information systems as important components of urban health protection. These observations support the need for inclusive environmental education programmes that are accessible to individuals irrespective of their educational backgrounds.

The perception of EPA intervention effectiveness revealed another important dimension of environmental governance in Sagamu Metropolis. Only 42% of respondents considered the agency's interventions highly effective, while 58% rated them as moderately effective or ineffective. This finding suggests that although EPA activities are recognised by members of the community, their perceived impact on environmental health risk reduction remains limited. Public perception of institutional effectiveness is an important consideration in environmental management because confidence in regulatory institutions can influence public acceptance of environmental policies and willingness to comply with environmental directives. Xu and Kang (2025), in their investigation

of administrative mechanisms influencing sustainable waste disposal practices in Nigeria, demonstrated that specialised waste management authorities can contribute to improved household waste disposal practices. However, their findings also indicated that institutional effectiveness is influenced by socioeconomic and administrative conditions. Similarly, Essien and Jesse (2025) identified limitations in local government autonomy, funding arrangements, and infrastructure provision as important challenges affecting urban governance in Nigeria. These findings provide a relevant institutional context for interpreting the moderate assessment of EPA interventions reported in the present study.

The findings on compliance with EPA directives further demonstrate the challenges associated with translating environmental awareness into appropriate environmental practices. Approximately 55% of respondents reported compliance with EPA directives, whereas 45% indicated partial compliance or non-compliance. Although more than half of the respondents reported adherence to the directives, the proportion of participants who did not demonstrate full compliance remains considerable. This may reflect limitations in public understanding of regulatory requirements, inadequate waste management infrastructure, inconsistent enforcement, or socioeconomic constraints affecting the ability of residents and business operators to comply. However, these possible explanations were not independently tested in the present study and should therefore be interpreted as potential contributing factors rather than established causes. In a related Nigerian investigation, Oni *et al*. (2024) reported that 69.7% of respondents in Akure complied with mandatory environmental sanitation policies and identified monitoring and enforcement as important considerations for improving compliance. Similarly, Xu and Kang (2025) demonstrated that the administrative organisation of waste management services can influence household disposal practices. These findings reinforce the importance of combining environmental education with effective regulatory supervision, accessible waste management services, and consistent enforcement to achieve sustainable compliance.

The identification of environmental hazards within respondents' residential and workplace environments provides further evidence of the environmental health concerns confronting Sagamu Metropolis. Approximately 60–70% of respondents identified hazards such as open dumpsites, industrial emissions, and stagnant water in their immediate surroundings. The recognition of these conditions suggests that environmental pollution and inadequate sanitation remain visible concerns within the studied communities. Open dumpsites and indiscriminate waste disposal can facilitate human exposure to biological and chemical hazards, while stagnant water may create suitable breeding conditions for disease vectors. Similarly, exposure to industrial and other combustion-related emissions may adversely affect respiratory health, depending on pollutant concentrations, duration of exposure, and individual susceptibility. The WHO (2025) identified inadequate sanitation, polluted air, poor waste management, and unhealthy urban environments as important contributors to urban health challenges. In Nigeria, Adekola *et al*. (2021) also highlighted the environmental and public health implications of indiscriminate waste disposal and the need for coordinated waste management strategies. These findings demonstrate the importance of improving waste collection, providing appropriate disposal facilities, monitoring industrial emissions, and strengthening environmental sanitation activities in Sagamu Metropolis.

Regarding reported health conditions, respiratory complaints, including asthma and persistent cough, were the most frequently identified health problems, accounting for approximately 45% of responses. Diarrhoeal diseases represented 30%, while skin irritation accounted for 25%. The predominance of respiratory complaints may be considered in relation to respondents' reported exposure to environmental

conditions such as industrial emissions and other potential sources of air pollution. Similarly, diarrhoeal diseases may be associated with environmental conditions involving inadequate sanitation, poor waste disposal, and possible contamination of water or food sources. Skin irritation may also occur following contact with contaminated water, waste materials, or other environmental irritants. These observations are consistent with the WHO (2025), which identified air pollution, inadequate sanitation, and poor waste management as important environmental determinants of urban health. Furthermore, Ababio et al. (2025), in their assessment of ambient air pollution across 57 cities in Ghana, reported elevated concentrations of particulate matter and other air pollutants associated with substantial potential health risks. Their findings demonstrate the public health importance of monitoring urban air quality and implementing targeted pollution control measures in West African cities. Nevertheless, although the reported health conditions in the present study may be considered alongside the identified environmental hazards, the findings are based on self-reported health experiences and do not establish direct causal relationships between specific environmental exposures and the reported illnesses.

The study also identified several institutional and administrative barriers that may limit the effectiveness of EPA interventions. Funding constraints were identified by approximately 65% of respondents, followed by weak enforcement (60%) and corruption (55%). These findings suggest that respondents perceive financial limitations, inadequate regulatory supervision, and governance-related challenges as important obstacles to effective environmental protection. Funding is particularly important for the provision of environmental monitoring equipment, waste collection infrastructure, personnel training, public sensitisation, and routine inspection of potentially hazardous locations. Similarly, weak enforcement may reduce compliance with environmental regulations, particularly where violations are not consistently investigated or sanctioned. These observations are supported by Essien and Jesse (2025), who identified institutional and financial limitations as important challenges affecting urban governance and infrastructure provision in Nigerian cities. Xu and Kang (2025) also demonstrated the importance of administrative arrangements and the availability of effective waste management authorities in promoting sustainable household waste disposal practices. Collectively, these findings suggest that improving environmental health governance requires more than the formulation of environmental policies; it also demands adequate financial resources, transparent administration, effective supervision, and sustained institutional commitment.

Furthermore, respondents identified stronger enforcement (68%) and improved technology and monitoring systems (62%) as important forms of support needed to improve EPA interventions. The preference for stronger enforcement suggests that residents recognise the importance of consistent implementation of environmental regulations in addressing pollution and sanitation challenges. Improved technology and monitoring systems are equally important because they can facilitate the identification of pollution sources, environmental surveillance, waste management planning, and the timely detection of environmental violations. These measures should be complemented by adequate personnel, institutional training, inter-agency collaboration, and community participation. Ababio *et al.* (2025) emphasised the importance of robust real-time monitoring of air pollutants and targeted mitigation policies in addressing urban air pollution in Ghana. Similarly, the WHO (2025) highlighted coordinated urban governance, environmental surveillance, and evidence-based policy development as important strategies for addressing environmental health risks. These findings support the need for the EPA and relevant local authorities to strengthen their technical capacity and adopt more effective

environmental monitoring approaches in Sagamu Metropolis.

Community participation in environmental reporting was another important finding of the study. Only 38% of respondents indicated that they had reported environmental health concerns to relevant authorities within the preceding 12 months, whereas 62% had not made any report. This relatively low reporting proportion may limit the ability of environmental authorities to identify emerging environmental problems, respond promptly to complaints, and priorities intervention activities. Possible explanations may include limited knowledge of reporting procedures, inadequate access to reporting channels, low confidence in institutional responsiveness, or a preference for resolving environmental concerns through informal community arrangements. Nevertheless, these factors were not directly examined in the present study and require further investigation. Adekola *et al*. (2021) emphasised the importance of community involvement and collaboration with regional authorities in strengthening environmental management practices in Nigeria. The WHO (2025) also advocated coordinated and multisectoral approaches to urban health management, including active participation of communities and relevant institutions. These perspectives reinforce the need to establish accessible reporting mechanisms and encourage residents to participate actively in identifying and communicating environmental health concerns.

Among respondents who reported environmental concerns, 45% approached local government environmental offices, 35% contacted the EPA, while 20% reported to other authorities, including community leaders and health departments. The greater proportion of reports directed to local government environmental offices suggests that these offices may serve as more accessible reporting channels for some residents. This finding highlights the importance of strengthening collaboration between local government environmental departments, the EPA, community leadership structures, and public health institutions. Establishing clearly communicated reporting procedures and accessible complaint channels could improve community engagement and facilitate more timely responses to environmental health concerns. This approach is consistent with the findings of Adekola et al. (2021), who identified collaboration among community members and regional authorities as an important component of sustainable waste management. Furthermore, the WHO (2025) recommended coordinated institutional responses and multisectoral collaboration to address the interconnected environmental determinants of urban health.

The findings demonstrate that environmental health risk mitigation in Sagamu Metropolis involves interconnected public awareness, institutional performance, regulatory compliance, environmental surveillance, and community participation. Although awareness of EPA activities was relatively high, the moderate perception of intervention effectiveness, incomplete compliance with environmental directives, and low reporting of environmental concerns indicate that awareness alone may not be sufficient to achieve effective environmental protection. Strengthening institutional capacity, improving environmental monitoring, ensuring consistent regulatory enforcement, and promoting community participation are therefore important considerations for improving environmental health management in Sagamu Metropolis. These priorities are consistent with the recommendations of the WHO (2025) on coordinated urban health governance and the findings of Xu and Kang (2025) on the role of specialized administrative structures in promoting sustainable waste management practices.

5.2 Conclusion

This study demonstrates that the Environmental Protection Agency plays an important role in environmental health management in Sagamu Metropolis, although its effectiveness is constrained

by inadequate funding, weak enforcement, and perceived corruption. Despite relatively high public awareness of EPA activities, intervention effectiveness, regulatory compliance, and community reporting remain areas of concern. Open dumpsites, industrial emissions, and stagnant water were identified as major environmental hazards, while respiratory complaints, diarrhoeal diseases, and skin irritation were commonly reported health concerns. However, the findings do not establish direct causal relationships between these hazards and the reported health conditions. Strengthening environmental protection in Sagamu therefore requires adequate institutional funding, transparent governance, effective enforcement, improved monitoring systems, sustained public education, and greater community participation. These measures will enhance environmental management and help reduce potential environmental health risks across the metropolis.

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Conflict of interest

The authors declare no conflict of interest.

Data Availability

Data produced from this study are available from the corresponding author upon reasonable request.

Ethical Approval

Ethical approval was obtained from the Departmental Ethical Committee, Federal University of Agriculture, Abeokuta (approval number: FUNAAB/ CBS/BCH/SP/2480).

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