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INFLUENCE OF COMMUNITY PARTICIPATION IN SOLID WASTE MANAGEMENT ON SUSTAINABLE DEVELOPMENT IN NGONG', KAJIADO COUNTY, KENYA

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Abstract: *Community participation in solid waste management (SWM) can greatly enhance sustainable development. The community plays a pivotal role in ensuring that trash is regularly collected, clean-up activities are carried out, and incidences of environmental hazards are reported to the local authority. This active participation ensures that available resources are carefully utilized. Nevertheless, the role of community participation in SWM is often overlooked by decision makers, derailing the process of sustainable development. This study aimed at determining the influence of community participation in SWM on sustainable development in Ngong', Kajiado County, Kenya. Underpinned by the Social Capital Theory, which advocates for strong social networks in any enterprise, the study used a mixed-method approach with a convergent parallel descriptive design combining both quantitative and qualitative data collection techniques. A total of 289 residents (community leaders, youth, and the elderly) participated in the study and responded to the survey. Primary data was collected through questionnaires and photography-based observation. Data analysis was both descriptive and inferential, processed using the Statistical Package for Social Sciences (SPSS). Descriptive statistics were presented in tables, graphs, and charts, while inferential analysis employed the Chi-square test of independence. The key findings revealed that low public awareness, weak law enforcement, inefficient waste transportation, and poor stakeholder coordination undermined sustainable solid waste management efforts. Importantly, the Chi-square test of independence established a statistically significant association between community participation and sustainable development,* $\chi^2(1, N = 289) = 48.72, p < .001$, *confirming that community participation is a critical determinant of sustainable development in Ngong' town. The study concludes that community participation in SWM not only mitigates environmental hazards but also strengthens pathways toward sustainable urban living. Based on these findings, the study recommends inclusive governance in environmental management, with emphasis on active sensitization, enforcement of waste management laws, and integration of community-led initiatives into local government strategies. For further research, this study could be replicated in other townships struggling with rising quantities of solid waste.*

Keywords: *Solid Waste Management, Community Engagement, Sustainable Development,*

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INTRODUCTION

Human interactions are a key component of solid waste production and management. Waste is produced in communities as small as a home or as large as a city (Raghu & Rodrigues, 2020). According to Social Capital Theory, a group of people can collaborate well to accomplish a shared objective (Fiorini et al,2018) such as cleanup efforts, waste segregation, reporting instances of unlawful waste dumping.

On global scale almost all countries are in great pursuit of urbanization and industrialization which are powerful global indicators of development (Kyule & Wang, 2024). However, due to unsustainable solid waste management practices, this economic growth has resulted in environmental degradation, contaminating the environment and derailing sustainable development (United Nations Environment Programme, 2024)

According to National Environmental Management Authority (NEMA,2014), some societies at the height of their growth have stagnated due to poor waste management; as a result, diseases have proliferated, the environment has deteriorated and livelihoods have been lost. Proper management of solid waste through collection, transfer, treatment, recycling, resource recovery, and engaging the community actively in SWM could lead to SD (Singh & Singh, 2022)

Studies done in some European (EU) countries and United States of America (USA) reveal that community involvement in solid waste management is indispensable (Yasmeen et al, 2023). Deshpande et al (2024) noted that economic growth is the significant reason for increase in solid waste production. To reduce waste production, public awareness is one of the key factors that needs to be considered. To address challenges faced by some underserved communities in USA, it was noted that community engagement coupled with Artificial Intelligence (AI) in solid waste management, led to more efficient, equitable and sustainable waste management practices (Nwokediegwu et al, 2024).

In Jakarta, Indonesia, a study carried out to identify the factors that support community members' involvement in solid waste management policy, Brotosusilo et al. (2020) concluded that the degree of education and the frequency of social activities within the community were important factors. The study suggested that in order to help communities reach their sustainable development goals, the government should make use of community empowerment to improve solid waste management. Similarly, Abdillah et al. (2024) noted that Indonesia's solid waste trend produced impressive results when waste management shifted the emphasis from government to community-based social programs. The social capital theory stated that the foundation of any effective social activity is community (Fiorini et al,2018).

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In Minna Nigeria, Salamatu (2020) pointed out that some factors that derail the efforts to scale up SD are insufficient waste collection services, corruption, ineffective policy regulation and implementation, a lack of public education and awareness, a lack of public engagement or participation, negative public attitudes, and outdated or insufficient transportation facilities. In recommendation government could develop measures for community involvement through public education and sensitization in SWM (Debrah et al. 2021); similar recommendation could scale up SD in Ngong'.

Kenya's solid waste production stands at 3,000 and 4,000 tons of waste every day (Fie 2023), with Nairobi City producing 2,400 tons per day (World Bank, 2021). It is worth noting that one of the main goals of Kenya's Vision 2030 is to establish a rich, globally competitive nation with a high standard of living (Sessional Paper No. 10 of 2012), however, SWM has not been on top notch (Omokaro et al. 2024). If sustainable development is to be accomplished, community involvement in solid waste management should be a primary focus in every metropolitan area.

A study on the privatization of solid waste management and the ongoing pollution in Makadara, Nairobi, Kenya's residential neighbourhoods was conducted by Wambani (2024). It was observed that the community should pay an agreed amount of fee in facilitating the process in order for solid waste management to be effective. Nevertheless, for the solid waste management process to run smoothly, such a fee necessitates accountability and transparency (Fiorini et al,2018).

In Ngong', with a population of about 11,575 (KNBS,2019) rapid solid waste production has been accelerated by the urban sprawl (Kajiado County Government, 2018). The gap in environmental knowledge among the residents has led to indiscriminate dumping of solid waste which in turn leads to unsightly scenes in the town. However, some impressive attempts to clean up Ngong' and move the previous dumpsite have been noted, nevertheless, litter strewn around the town and its environs have raised concerns on best practices to curb the rising menace of solid waste. Scarce studies conducted on the role of community in SWM in this area intensify the need for further studies. It is against this backdrop that this study was conducted to examine the influence of community participation in solid waste management on sustainable development in Ngong'', Kajiado county, Kenya

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METHODOLOGY

Research Design

The study adopted a mixed-method research design, specifically the concurrent triangulation strategy, to integrate both quantitative and qualitative data. This approach enabled the researcher to obtain a comprehensive understanding of solid waste management (SWM) in Ngong' by corroborating findings from different sources. As Creswell (2014) observes, the combination of quantitative and qualitative approaches enhances the depth and validity of research findings. To mitigate possible biases from the use of questionnaires alone, a case study design was also incorporated due to its ability to generate rich, context-specific insights on SWM.

Sampling Procedure and Sample Size

Stratified sampling was used to ensure adequate representation of different groups within Ngong', including residents, community leaders, and market leaders. Purposive sampling was further applied within the strata to identify participants with relevant knowledge and experiences in solid waste management. To determine the sample size, Yamane's formula for sample size calculation (1967) was applied, yielding a total of 387 participants. Of these, 289 respondents successfully took part in the study.

Data Collection Instruments

Primary data was collected through structured questionnaires and photographic observation. The questionnaires were administered to the respondents to capture information on areas such as waste collection practices, responsibility for waste management, enforcement of regulations, and recycling initiatives. Photographs were taken at strategic locations, including dumpsites, drainage systems, and market centers, to provide visual documentation of solid waste management practices and to complement the questionnaire responses.

Data Analysis Procedure

Quantitative data obtained from questionnaires were coded and processed using the Statistical Package for Social Sciences (SPSS). Both descriptive and inferential statistical methods were employed. Descriptive analysis involved the use of frequencies and percentages, which were presented in tables and charts. Inferential analysis was carried out using the Chi-Square Test of Independence to examine the relationship between community participation in SWM and sustainable development.

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Qualitative data derived from photographic observations were thematically analyzed to highlight visible patterns in waste management practices, including open dumping and blocked drainage systems. The integration of quantitative and qualitative findings enhanced the reliability and validity of the results.

RESULTS

Community Participation in Solid Waste Management

Community participation is a critical determinant of sustainable solid waste management in rapidly urbanizing areas such as Ngong'. Effective waste management requires not only governmental responsibility but also the active involvement of residents in practices such as recycling, clean-up campaigns, and compliance with existing policies. The present study examined the views of residents on key aspects of community participation in solid waste management.

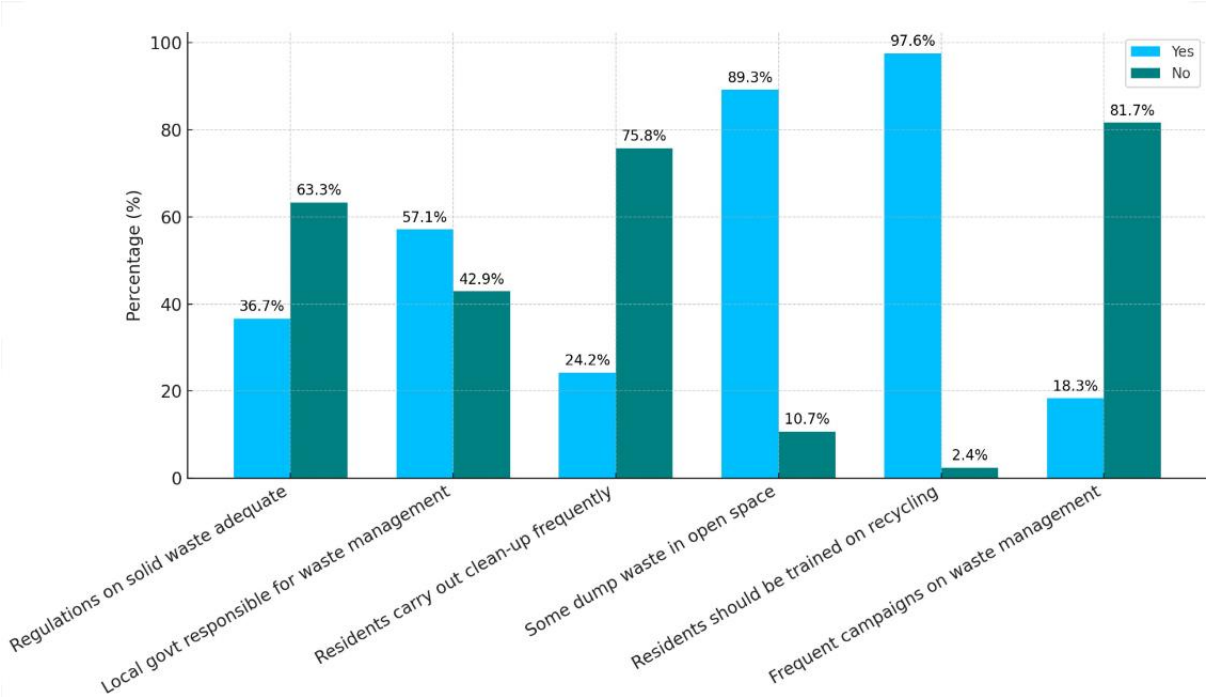

Figure 1: Community Participation in SWM in Ngong'

The analysis of community participation in solid waste management in Ngong' revealed varied levels of engagement across different dimensions. As shown in Figure 1, only 36.7% of respondents considered current regulations and policies on solid waste management adequate,

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while a majority of 63.3% expressed dissatisfaction. This indicates that most residents perceive existing frameworks as ineffective in addressing solid waste challenges.

When asked about the responsibility of the local government, 57.1% of respondents affirmed that waste management is a government function, whereas 42.9% did not share this view. The results therefore suggest that while over half acknowledge the role of local authorities, a sizeable proportion lack confidence in the government's effectiveness in carrying out this responsibility.

Participation in clean-up activities was reported to be low, with only 24.2% of respondents indicating that residents frequently engage in such exercises, compared to 75.8% who stated otherwise. This reflects limited community-driven initiatives towards maintaining a clean environment.

In relation to waste disposal practices, 89.3% of respondents confirmed that some residents continue to dump waste in open spaces such as rivers and roadsides, while just 10.7% disagreed. This finding highlights the persistence of improper disposal behaviors that compromise environmental health.

On the other hand, the study established strong community support for training on waste recycling. An overwhelming 97.6% of respondents indicated that residents should be trained on recycling solid waste, while only 2.4% opposed this view. This demonstrates a clear demand for capacity-building initiatives that could improve waste management practices.

The majority of respondents (81.7%) also reported that there were no frequent campaigns on solid waste management in the area, whereas only 18.3% affirmed the presence of such campaigns. The findings suggest that public sensitization efforts remain inadequate and sporadic.

Direct field observation revealed visible evidence of poor solid waste management practices in Ngong' town. See plate 1.

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Source: Wawira, 2025

Plate 1: Solid waste in a dump site and drainage system in Ngong town, Kenya

As shown in Plate 1, heaps of uncollected garbage were observed at an open dumpsite, where domestic waste such as food remains, plastics, and other organic materials were indiscriminately disposed. Livestock, particularly goats, were feeding on the waste, highlighting a serious risk of zoonotic disease transmission and contamination of the human food chain. This underscores the lack of effective waste segregation and control measures, with the dump site functioning as both a grazing ground and an informal disposal space.

In addition, the drainage system in the same locality was clogged with polythene bags, bottles, and decomposing organic matter. The accumulation of solid waste in water channels has created stagnant pools, which are potential breeding grounds for mosquitoes and other disease vectors. Blocked drains also increase the risk of urban flooding during heavy rains, posing further environmental and health hazards to residents.

The situation documented in Ngong' reflects weak institutional waste collection mechanisms, inadequate public sensitization, and poor enforcement of environmental regulations. The observations corroborate survey findings in this study, where 89.3% of respondents reported

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indiscriminate dumping and 81.7% highlighted the absence of sustained sensitization campaigns. These visual indicators provide tangible evidence of how systemic and behavioral gaps translate into environmental degradation on the ground.

Relationship between Community Participation and Sustainable Development

In order to examine the relationship between community participation and sustainable development in Ngong' town, a Chi-square test of independence was conducted. This test is appropriate for determining whether there is a significant association between two categorical variables (McHugh, 2013).

Hypotheses: **H_0:** There is no significant association between community participation and sustainable development.

To examine the relationship between community participation and sustainable development, a Chi-square test of independence was conducted. The results are presented in Table 1.

Table 1
Chi-square Test of Independence Results

Test Statistic	Value	df	Asymp. Sig. (2-sided
Pearson Chi-Square	48.72	1	<.001
Likelihood Ratio	49.11	1	<.001
Linear-by-Linear Association	47.86	1	<.001
N of Valid Cases	289		

The Chi-square test of independence revealed that the association between community participation and sustainable development was statistically significant, $\chi^2(1, N = 289) = 48.72$, $p < .001$. The findings provide robust evidence that sustainable development outcomes in Ngong' are not independent of community participation. Residents who engaged in waste management initiatives were more likely to link their efforts with sustainable environmental and developmental benefits, while those who did not participate were more inclined to perceive unsustainable conditions. This suggests that sustainable development in peri-urban contexts such as Ngong' cannot be achieved without the active involvement of the community.

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DISCUSSION

The findings reveal that the majority of residents in Ngong'' (63.3%) considered existing regulations and policies on solid waste management inadequate. This reflects broader challenges in Sub-Saharan Africa, where waste management policies often suffer from weak enforcement mechanisms and insufficient institutional support (Onungwe, Hunt, & Jefferson, 2023). In Ngong', this perceived inadequacy appears to have undermined public confidence in governance systems and limited collective participation. Similar evidence from Zambia shows that inconsistent policy enforcement and weak governance discourage households from complying with structured waste management practices (Chisanga et al., 2024).

Concerning accountability, 57.1% of respondents indicated that solid waste management is the responsibility of the local government, while 42.9% disagreed. This mixed perception highlights fragile trust in public institutions. Such skepticism poses challenges to collaborative approaches, as community members may hesitate to participate in initiatives if they perceive the government as ineffective. Strengthening institutional credibility through transparency and consistent service delivery is therefore essential for improved community engagement.

Participation in clean-up activities was reported to be low, with 75.8% of respondents indicating that residents rarely engage in such practices. This reflects a broader lack of organized grassroots involvement, despite evidence that community-driven initiatives are critical to achieving sustainable waste management outcomes. Where participation is low, neighborhood cleanliness and environmental safety remain compromised. Njoroge et al. (2024) observe that without accessible waste collection services, residents often abandon collective responsibility, which resonates with the situation in Ngong'.

The persistence of indiscriminate dumping, confirmed by 89.3% of respondents, further illustrates the structural and behavioral constraints undermining waste management. Such practices endanger public health, pollute water sources, and degrade urban environments. The findings suggest that, in Ngong', the absence of robust disposal infrastructure and enforcement has contributed to entrenched unsafe behaviors.

A notable finding is the overwhelming support for recycling training, with 97.6% of respondents emphasizing the need for capacity-building in this area. This indicates untapped potential for community-led innovation and sustainability. Evidence from Mombasa demonstrates that recycling not only reduces waste accumulation but also generates livelihood opportunities for women and youth (Wesonga & Van der Westhuizen, 2025). Therefore, empowering Ngong'

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residents through recycling training could serve as a transformative intervention with both environmental and socio-economic benefits.

The study also established that 81.7% of respondents perceived campaigns on solid waste management to be infrequent. Limited sensitization reduces public awareness, accountability, and behavioral change. Research indicates that sustained awareness programs, when combined with strong local leadership, significantly improve compliance with waste management regulations (Chisanga et al., 2024). Hence, revitalizing campaign strategies in Ngong' is a critical step toward improving public participation.

From a policy perspective, the results underscore the necessity of enhancing community participation through structured programs, training, and awareness campaigns. Strengthening institutional mechanisms to support community-led waste management could bridge the gap between environmental governance and grassroots action. These findings align with recent research in African urban settings, where community engagement has been shown to significantly improve environmental sustainability outcomes (Chisanga et al., 2024; Njoroge et al., 2024).

This study contributes new knowledge by showing that while community willingness to adopt sustainable practices, particularly recycling, is high in peri-urban contexts like Ngong', systemic weaknesses in governance, policy enforcement, and sensitization campaigns suppress active participation. The findings uniquely highlight that demand for training and community empowerment significantly exceeds institutional efforts, suggesting that interventions should prioritize resident capacity-building alongside strengthened institutional trust. This offers a pathway for bridging the gap between policy frameworks and practical action, thereby advancing both environmental sustainability and socio-economic empowerment in Kenyan peri-urban areas.

CONCLUSION

The study revealed that community participation is a critical determinant of sustainable development. Thus, active involvement of community in solid waste management not only mitigates environmental hazards but also strengthens pathways toward sustainable urban living. Therefore, integrating community-led initiatives into local government strategies may offer a viable route toward achieving long-term sustainability goals. The study recommends that local authorities prioritize capacity-building, continuous sensitization campaigns, and recycling training to empower residents as active partners in waste management and sustainable development.

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