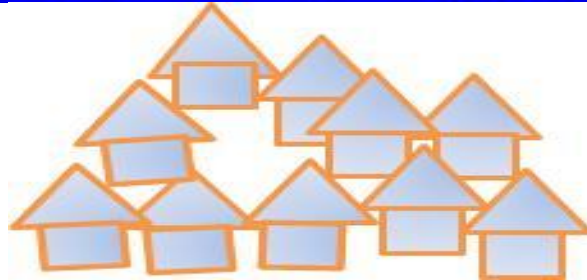
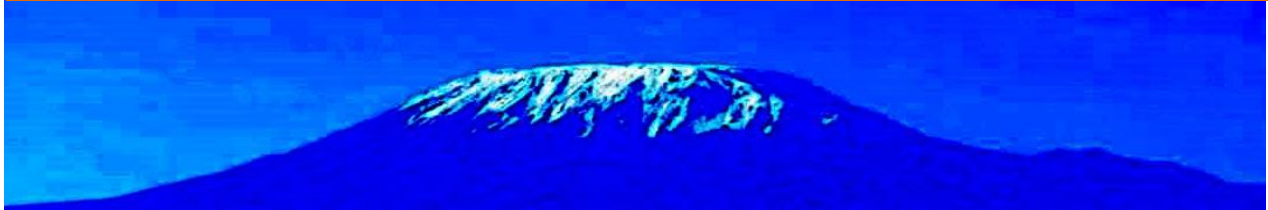


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Assessment of community perception on Proper solid waste management at Household-level in Morogoro Municipality, Tanzania

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Effective solid waste management is integral to environmental sustainability and public health. The success of waste management initiatives is intricately linked to community perceptions, as their awareness and attitudes significantly influence outcomes. This study, conducted in Morogoro Municipality, Tanzania, aimed to assess the community's perception of proper solid waste management at the household level. Employing a descriptive cross-sectional design, data were gathered from 70 respondents across three randomly chosen wards: Mazimbu (26), Mji Mkuu (22), and Mji Mpya (22). These wards were pivotal in capturing a comprehensive view of solid waste management practices, accounting for variations across different areas within Morogoro Municipality. Data were also collected from five key informants using the Kobo Collect survey tool. Inferential statistics, specifically Pearson chi-square tests, were applied to analyze the data. Descriptive statistics, including frequencies and percentages, were used to explore the types of solid waste generated at the household level. The findings revealed that 38.6% of respondents produced vegetable waste, 28.6% generated leaves/grass, 20% produced plastic waste, and 12.9% generated other types of solid waste. The chi-square tests showed no significant differences in community awareness regarding the importance of proper solid waste management across wards, except for a significant difference in relation to disease outbreak reduction. Descriptive statistics were employed to analyze the community's perception of obstacles hindering proper solid waste management. To evaluate the community's perception of solid waste management, a composite mean score was calculated; a mean score above 2.00 indicated a positive perception, while a score below 2.00 suggested a negative perception. In conclusion, while the community generally holds a positive perception of solid waste management, factors such as collection fees and inadequate infrastructure hinder its effectiveness and efficiency at the household level. It is recommended that municipal authorities enhance solid waste management strategies and implement educational campaigns to raise awareness within the community.

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1.0. Introduction

Solid waste includes discarded materials from various sources, such as residential, commercial, industrial, agricultural, and institutional activities, as well as construction debris and street sweepings (Kassaye, 2018; Nanda & Berruti, 2021). Effective solid waste management requires active participation to enhance environmental quality and public health. A well-designed waste management system should prioritize human health and safety while being environmentally sustainable and economically feasible. However, solid waste management remains a significant challenge due to unauthorized waste disposal, which contributes to environmental degradation and poses health risks (Nzediegwu *et al.*, 2020). Local authorities are responsible for ensuring effective and efficient solid waste management, with a strong focus on minimizing waste at the household level (Malik *et al.*, 2015). Keramitsoglou and Tsagarakis (2013) argue, however, that residents, as the primary producers of waste, play a crucial role in the waste management process. Proper infrastructure for solid waste management within communities is essential to reduce health risks, such as disease outbreaks, and prevent environmental pollution. Despite numerous strategies developed, such as environmental education and training campaigns, challenges persist in waste management, requiring increased efforts to mobilize community participation (Azevedo *et al.*, 2021; Moh, 2017; Yukalang *et al.*, 2018).

Effective solid waste management relies on proper practices for waste collection, transportation, and disposal, including methods such as dumping, reuse, recycling, and composting (Das *et al.*, 2019; Moh *et al.*, 2017). Poor implementation of these practices negatively impacts the environment and public health. Key factors for effective waste management include private sector involvement, timely waste collection, and community awareness, along with the support of community-based organizations (CBOs) and private companies (Fadhullah *et al.*, 2022). However, in developing countries, progress is often hindered by challenges like inadequate infrastructure, limited technology, insufficient expertise, poor planning, and financial constraints (Kumar *et al.*, 2017; Nzediegwu *et al.*, 2020; Zohoori & Ghani, 2017). Inadequate environmental education and awareness contribute to improper solid waste management in developing countries (Debrah *et al.*, 2021; Chengula *et al.*, 2015). The lack of active engagement and awareness among households, who are crucial stakeholders in waste management, further hinders proper waste disposal. Delays in household payments for collection fees and unfavourable relationships with waste collectors exacerbate these challenges (Yukalang *et al.*, 2017; Azevedo *et al.*, 2021).

Community perception plays a significant role in shaping the success and effectiveness of solid waste management efforts (Haider *et al.*, 2015; Fadhullah *et al.*, 2022). The way community members perceive and engage with waste management practices can have both positive and negative impacts on the overall waste management process (Kumar & Anand, 2017). Positive perceptions lead to increased cooperation, compliance, and environmental consciousness, contributing to more effective and sustainable waste management practices (Olukanni *et al.*, 2020). Conversely, negative perceptions have detrimental effects on waste management efforts, increasing the challenges associated with waste disposal (Olukanni *et al.*, 2020).

In many developing countries, such as Tanzania, inadequate education, and awareness about the importance of proper waste disposal significantly impact community engagement in solid waste management (Chengula *et al.*, 2015). Negative perceptions often lead to non-compliance with waste management practices, resulting in improper waste disposal, increased environmental pollution, and heightened public health risks (Chebet *et al.*, 2020). Cultural beliefs, economic constraints, and limited community involvement further complicate these perceptions, making it crucial to understand how residents view waste management initiatives. Research indicates that positive community perceptions can enhance cooperation, compliance, and environmental consciousness, thereby improving the effectiveness of waste

management strategies (Eshete *et al.*, 2023). Conversely, negative perceptions can create barriers that hinder the success of these efforts. Therefore, addressing community perceptions through targeted education, communication, and involvement strategies is essential for developing sustainable waste management practices. This underscores the need for a comprehensive understanding of the factors influencing public attitudes to improve waste management outcomes and promote a cleaner, healthier environment.

Effective solid waste management is crucial for maintaining public health and environmental sustainability; however, the success of these initiatives largely depends on community perception and engagement (Sahu & Mishra, 2023). In many developing regions, including Morogoro Municipality in Tanzania, inadequate community awareness and negative perceptions of waste management practices hinder effective waste disposal and recycling efforts. Despite the implementation of waste management services, residents often view these services as inefficient or ineffective, leading to non-compliance and a lack of participation in waste reduction strategies. Factors such as limited education, cultural beliefs, economic constraints, and insufficient community involvement exacerbate these negative perceptions, resulting in increased environmental pollution and health risks (Nyampundu *et al.*, 2020). Therefore, understanding and addressing community perceptions regarding solid waste management is essential for developing effective strategies that foster cooperation, enhance compliance, and ultimately improve waste management outcomes in the community.

Despite the growing body of research on solid waste management (SWM), there is a significant gap in understanding community perception, particularly in developing countries. While existing studies have examined various aspects of waste management, such as technological advancements, policy frameworks, and operational challenges, fewer investigations have specifically focused on how community attitudes and beliefs influence the effectiveness of these systems. Many studies overlook the nuanced factors that shape community perception, including cultural beliefs, socioeconomic status, and local traditions, which can greatly affect public engagement and compliance with waste management practices. Additionally, the role of education and awareness programs in fostering positive community perceptions is often inadequately addressed. Although some research highlights the importance of community involvement, there is a lack of empirical studies that systematically evaluate the impact of targeted educational initiatives on public attitudes toward solid waste management. Furthermore, there is a need for interdisciplinary approaches that combine insights from sociology, psychology, and environmental studies to provide a holistic understanding of community perception in solid waste management. Bridging these gaps is essential for developing effective waste management strategies that not only tackle technical and logistical challenges but also engage and empower communities, ultimately leading to improved waste management outcomes and enhanced environmental sustainability.

Addressing community perceptions through education, communication, and involvement could lead to more sustainable waste management practices and better environmental outcomes. The overall objective of this study was to assess community perception of solid waste management, specifically exploring types of solid waste, community awareness of the importance of proper solid waste management, and the obstacles hindering effective waste management. The study aimed to assess community perception of solid waste management in Morogoro Municipality, Tanzania, focusing on the types of solid waste, community awareness, and obstacles to proper waste management. By understanding and addressing community perceptions, this research seeks to contribute to more sustainable waste management practices and improved environmental outcomes.

1.2 Literature Review

Community perception is vital for the effectiveness of solid waste management (SWM) systems, significantly influencing how communities engage with and view waste management

practices. Factors such as cultural beliefs, socioeconomic status, and levels of environmental education shape these perceptions, with positive views often leading to increased participation in waste management initiatives, while negative views can hinder effective waste disposal (Odeyemi *et al.*, 2023; Yuen *et al.*, 2022). Educational programs are essential for fostering community awareness and engagement in waste reduction, as higher environmental awareness correlates with sustainable practices (Alabed *et al.*, 2022; Ezeah *et al.*, 2021), while a lack of education may result in poor compliance and disposal habits (Olowofela *et al.*, 2023). Local authorities play a crucial role in influencing these perceptions through their communication, transparency, and service delivery; inadequate services can lead to negative views, increasing illegal dumping and environmental degradation (Vishwakarma *et al.*, 2023; Panda *et al.*, 2022). Additionally, cultural attitudes and economic constraints complicate community engagement in SWM, as high costs can deter proper waste disposal practices (Yukalang *et al.*, 2018; Ojo *et al.*, 2023). Despite extensive research on community perceptions, challenges such as limited involvement in decision-making and negative experiences with waste management services persist, exacerbating disconnects between local authorities and residents (Troy *et al.*, 2021; Adeleke *et al.*, 2023). To improve SWM outcomes, it is essential to address these challenges, focusing on education, local authority engagement, and cultural factors while exploring nuanced influences on community perceptions for more effective interventions.

1.3. Theoretical Framework

The Value-Belief-Norm (VBN) theory guided this study, initially developed by Stern *et al.* in 1999 to explain how individuals' personal values, beliefs, and norms influence their attitudes and behaviours toward environmental issues. When applied to community perceptions of solid waste management, the theory proposes that individuals' environmental behaviours are influenced by their personal values, beliefs, and perceived norms. The VBN framework explains that awareness of consequences continually affects the ascription of responsibility. This awareness contributes to the belief in taking personal responsibility for waste management. The VBN theory suggests that when individuals' values align with their beliefs about the consequences of waste management and are consistent with perceived norms, they are more likely to engage in positive waste management behaviours. Moreover, individuals' beliefs about the consequences of waste management practices can inform their perceptions of the environmental, social, and economic impacts of proper waste management, such as fees for waste collection.

The VBN theory elucidates how values, beliefs, norms, and behaviours impact community perceptions of solid waste management. Values and Motivations: The VBN theory suggests that underlying personal values, such as environmental concern, community well-being, and ethical responsibility, shape how individuals perceive solid waste management practices. A community that places high value on environmental protection and sustainability is likely to view proper waste management more favourably, leading to positive perceptions and behaviours. Beliefs: Beliefs about the effectiveness of solid waste management practices, the potential consequences of improper waste disposal, and the benefits of waste reduction shape community attitudes. By emphasizing accurate information and communicating the positive impact of proper waste management on health, aesthetics, and the environment, communities can foster more positive perceptions and attitudes. Social Norms: Social norms, or perceived societal expectations regarding waste management behaviour, can significantly influence how individuals dispose of their waste. By establishing and promoting norms that prioritize responsible waste disposal and recycling, communities can create an environment where proper waste management becomes the accepted standard. This study found that social norms and beliefs are among the factors contributing to community perceptions of solid waste management, highlighting the significance of addressing values, beliefs, and social norms in promoting positive attitudes and behaviours for sustainable waste management practices.

2.0 Methodology

This study employed a cross-sectional design with a sample size of 70 respondents. Three wards were randomly selected Mazimbu (26 respondents), Mji Mkuu (22 respondents), and Mji Mpya (22 respondents) to capture a comprehensive view of solid waste management practices, taking into account variations across different areas of Morogoro Municipality. The number of respondents from Mazimbu was higher than that of the other wards, primarily due to the larger population in Mazimbu compared to Mji Mkuu and Mji Mpya.

Additionally, a purposive sampling approach was used to select five key informants, including one Environmental Officer, three Ward Executive Officers (one from each ward), and two waste collectors known for their expertise in solid waste management. This strategic selection aimed to enrich the study with nuanced perspectives from individuals deeply immersed in the field.

Data were systematically collected using the Kobo Collect survey tool, incorporating a structured questionnaire designed to gather both quantitative and qualitative insights. The qualitative data, derived from open-ended questions and key informant interviews, underwent rigorous content analysis to extract meaningful patterns and themes. On the other hand, IBM-SPSS version 26 was used for quantitative data analysis.

For quantitative data analysis, descriptive statistics were the primary tool. Frequencies and percentages were calculated, providing a comprehensive quantitative summary of the data, and offering insights into the proportion of solid waste produced at the household level. In assessing community awareness of the importance of solid waste management, descriptive statistics specifically frequencies and percentages were employed to generate quantitative summaries.

The Pearson Chi-Square test was utilized to analyse the perceived obstacles hindering proper Solid waste management. This statistical test allowed for the examination of relationships between variables and the identification of significant associations, playing a crucial role in understanding the impact of various factors on the community's ability to manage waste effectively.

To evaluate community perception of solid waste management, a composite mean score was used in descriptive statistics. A composite mean score higher than 2.00 indicated a positive perception, while a score lower than 2.00 suggested a negative perception. This method enabled a nuanced understanding of how the community perceives and responds to different aspects of solid waste management.

The comprehensive approach to data collection and analysis ensured a multifaceted understanding of community perception, awareness, and the challenges faced in solid waste management at the household level in Morogoro Municipality. The combination of qualitative and quantitative methods offered a holistic view, enriching the findings and enhancing the study's validity.

3.0 Result and Discussion

3.1 Proportion of solid waste produced at the household level in three wards (Mji mkuu, Mji mpya and Mazimbu)

The investigation into the proportion of solid waste generated at the household level in three wards, namely Mji Mkuu, Mji Mpya, and Mazimbu, revealed intriguing patterns, as shown in Table 3.1. Among the 70 households surveyed, a predominant share of 38.6% acknowledged that vegetable and food remnants constitute the highest proportion of solid waste. Notably, residents of Mji Mpya reported the highest incidence at 59.1%, followed by Mji Mkuu at 31.8%.

This trend suggests a concentration of domestic activities, particularly cooking, in these areas, leading to the generation of food-related waste.

Similarly, 28.6% of respondents, equivalent to 20 households, identified leaves and grasses as the most prevalent solid waste. The data indicated that this waste type was prominently observed in Mji Mkuu (45.5%), followed by Mazimbu (26.9%). This finding aligns with those of Yoda *et al.* (2014) in Accra and Southern Ghana, where a majority of solid waste at the household level comprised, food remains, leaves, and vegetables, accounting for 93.1% of the waste. Such consistencies in findings underline the universality of domestic activities generating specific types of waste.

The category of plastics, bottles, and cans constituted 20% of the reported solid waste. The distribution across wards indicated varying degrees of prevalence, with Mji Mpya at 9.1%, Mji Mkuu at 13.6%, and Mazimbu at 34.6%. This highlights the diversity in waste composition, with the prominence of plastic-related waste particularly notable in Mazimbu

Table 3.1: Solid waste produced at three wards

Nature of Solid waste	Wards			TOTAL
	Mji Mpya	Mji Mkuu	Mazimbu	
Vegetables and food remain	13 (59.1%)	7 (31.8%)	7 (26.9%)	27(38.6%)
Leaves/grass	3 (13.6%)	10 (45.5%)	7 (26.9%)	20(28.6%)
Plastics/bottles/cans	2 (9.1%)	3 (13.6%)	9 (34.6%)	14 (20%)
All	4 (18.2%)	2 (9.1%)	3 (11.5%)	9 (12.9%)
TOTAL	22(31.4%)	22(31.4%)	26(37.1%)	70 (100%)

The results signify the dominance of organic waste, especially vegetable and food, remains, in the solid waste generated at the household level. This finding aligns with studies in various settings, indicating a commonality in the types of waste produced from routine domestic activities (Yoda *et al.*, 2014; Noufal *et al.*, 2020). The prominence of leaves and grasses, particularly in Mji Mkuu, suggests a regional variation in green waste, possibly influenced by factors like landscaping practices or environmental awareness.

Comparisons with similar studies, such as Yoda *et al.* (2014), bolster the reliability of the findings, emphasizing the reproducibility of waste composition patterns across diverse geographical contexts. These insights into the composition of household-level solid waste provide a foundation for tailored waste management strategies, taking into account the unique characteristics of each ward. Furthermore, this understanding is crucial for municipal authorities to design effective waste collection, recycling, and disposal initiatives that align with the specific waste streams prevalent in each locality.

3.2 Community Awareness of the Advantages of Properly Managing Solid Waste

Based on the data from Table 3.2, which presents respondents' awareness of the advantages of proper solid waste management practices across different wards, the following interpretations were made

Table 3.2: Perception of respondents on the advantage of waste management practices across wards (n=70)

Indicators	Response	Wards			Chi-square test	P-value
		Mazimbu	Mji mkuu	Mji mpya		
Maintenance of environmental quality and cleanliness	No	11(42.30)	9 (40.90)	8 (36.40)	0.186	0.911
	Yes	15(57.70)	13(59.10)	14(63.60)		
Reduce air pollution rate	No	10(38.50)	11(50.00)	7(31.80)	1.556	0.459
	Yes	16(61.50)	11(50.00)	15(68.20)		
Decrease the eruption of diseases such as cholera	No	6(23.10)	16(72.70)	10(45.50)	11.838	.003*
	Yes	20 (76.90)	6 (27.30)	12(54.50)		

The Chi-square statistic is significant at the .05 level. Numbers in the bracket indicate percentage measure

3.2.1 Maintenance of Environmental Quality and Cleanliness

The survey revealed a strong awareness among respondents of the positive impact of proper solid waste management on environmental quality and cleanliness. Across all three wards (Mazimbu, Mji Mkuu, Mji Mpya), the majority of respondents (ranging from 57.70% to 63.60%) agreed that waste management practices, including reuse and dumping, contribute significantly to maintaining environmental quality and cleanliness. The Chi-square test indicated no significant difference in awareness among the wards ($\chi^2 = 0.186$, $p = 0.911$), underscoring the consistency in respondents' understanding of the environmental benefits of proper waste management. This aligns with the importance of environmental education, which has proven effective in raising awareness and promoting responsible waste disposal practices (Sarker *et al.*, 2012; Ike *et al.*, 2018). When communities recognize how practices such as reuse, dumping, and systematic waste disposal help maintain clean, healthy surroundings, they are more likely to actively participate in such practices. This heightened awareness can also lead to peer influence, where individuals encourage neighbours and others to adopt responsible disposal habits, creating a self-sustaining culture of environmental stewardship. Additionally, high awareness paves the way for municipalities to introduce more advanced waste management systems, such as recycling programs, since the foundational understanding and positive perception of these practices are already in place.

3.2.2 Reduction of Air Pollution

Respondents demonstrated a strong awareness of the role of proper solid waste management in reducing air pollution. The majority in each ward (ranging from 50.00% to 68.20%) agreed that appropriate waste management practices contribute to lowering air pollution levels. The Chi-square test indicated no significant difference in awareness among the wards ($\chi^2 = 1.556$, $p = 0.459$), suggesting a uniform understanding across communities. This finding resonates with Debrah *et al.* (2021) and Abubakar *et al.* (2022), highlighting a global awareness of the connection between proper waste management and reduced air pollution. It underscores the importance of community education in fostering environmental consciousness. When communities understand how waste-related emissions contribute to air pollution through burning, decomposition, or open dumping, they are more likely to adopt waste management practices that prevent air pollution. This informed perspective supports a collective approach to reducing environmental hazards and promotes public health by

minimizing air pollutants that can lead to respiratory and other health issues. This demonstrates that fostering a broad-based, shared understanding of environmental issues through education can encourage sustainable behavior across regions and cultures.

3.2.3 Decrease in the Incidence of Diseases such as Cholera

Awareness of the role of proper solid waste management in reducing the outbreak of diseases, particularly cholera, was evident among the respondents. Approximately 52.9% of the community agreed that proper waste management contributes to a reduction in diseases like cholera. However, a significant difference in awareness was observed among the wards ($\chi^2 = 11.838, p = 0.003^*$), indicating varying perceptions likely influenced by factors such as education, training, and participation in waste management practices. This finding highlights the need for localized interventions and community-specific awareness campaigns. It contrasts with the findings of Sultana et al. (2021) and Mor and Ravindra (2023), which showed that limited environmental education contributed to only low to moderate awareness of diseases caused by poor solid waste management. Therefore, providing environmental education is essential for effective solid waste management to prevent environmental degradation and protect public health by reducing the conditions that lead to the spread of diseases.

The consistent awareness across wards regarding the positive impacts of proper solid waste management on environmental quality and air pollution signifies a shared understanding among community members. This reflects the effectiveness of environmental education initiatives in Morogoro Municipality. However, the significant variation in awareness concerning the reduction of diseases like cholera highlights the need for targeted educational interventions. It underscores the role of education, training, and community participation in shaping perceptions and behaviours related to waste management.

These findings collectively emphasize the importance of multifaceted community engagement strategies to ensure a comprehensive understanding of the benefits of proper solid waste management. The need for localized approaches, which consider the unique characteristics of each ward, becomes evident, reinforcing the importance of tailored awareness campaigns and educational programs.

3.3 Obstacles to Proper Solid Waste Management

Based on the data from Table 3.3, which presents respondents' perceptions of obstacles hindering effective waste management practices across different wards, the following interpretations and critical discussions can be made:

Table 3.3: Perception of respondents on the obstacles hindering proper solid waste management across wards (n=70)

Indicators	Response	Wards			% mean
		Mazimbu	Mji mkuu	Mji mpya	
High cost for the collection fee	No	4(15.40)	5(22.7)	14(59.90)	45.86
	Yes	22(84.60)	17(77.30)	8(40.10)	67.3
Late waste collection	No	7(26.90)	9(40.90)	13(59.10)	42.3
	Yes	19(73.10)	13(59.10)	9(40.90)	57.7
Frequency for waste collection	No	13(50.00)	6(27.30)	4(18.20)	31.8
	Yes	13(50.00)	16(72.70)	18 (81.80)	68.16

The Chi-square statistic is significant at the .05 level. Numbers in the bracket indicate percentage measure

3.3.1 High Cost of Collection Fees

The data from Table 3.3 indicates that 67.3% of respondents perceive the high cost of waste collection as a significant obstacle to proper waste management. This high percentage suggests that the community views collection fees as a barrier to efficient waste management at the household level. The reluctance to pay these fees is linked to a lack of community involvement in decision-making about fees. Stakeholders, including households, were not part of this process, leading to resistance toward the high collection fees. This finding aligns with Kirama and Mayo's (2016) study, which noted that fees for waste collection can hinder effective waste management when awareness and education on the necessity of such fees are lacking. Kirama and Mayo argue that community engagement in setting fee structures, coupled with educational initiatives, can shift perceptions, and reduce resistance. By fostering an understanding that collection fees directly support waste services that benefit community health and environmental quality, residents are more likely to view these fees as an investment rather than a burden. Therefore, integrating community feedback into the fee-setting process and conducting awareness programs on the benefits of waste collection can play a vital role in overcoming financial obstacles.

3.3.2 Late Waste Collection

Approximately 57.7% of respondents identified late waste collection as a significant obstacle to proper solid waste management. This issue is attributed to poor infrastructure, infrequent vehicle availability, and a lack of tools for waste transport. Timely waste collection is essential for effective management, and delays can lead to environmental pollution. This finding aligns with Ramos *et al.* (2012), who highlighted that inadequate waste collection vehicles and infrastructure contribute to delays in waste collection in developing countries. The study's findings reflect a systemic issue that requires investment in waste management infrastructure, such as additional collection vehicles and improved road access, to enable more frequent and reliable waste collection. Addressing these challenges would not only improve environmental health but also support a more sustainable and resilient waste management system. The results highlight the need to prioritize logistical and infrastructural development to support waste collection services and meet community needs effectively.

3.3.3 Waste Collection Frequency

The majority of respondents (68.16%) agreed that irregular waste collection frequency contributes to poor waste disposal. The absence of a specific interval for waste collection in households indicates a lack of consistent implementation by stakeholders. Irregular collection results in waste accumulation, which leads to environmental pollution and health risks. The findings emphasize the importance of involving the community in decision-making on waste collection intervals. Guerrero *et al.* (2012) also support the idea that community involvement in decision-making is essential for raising awareness and ensuring effective waste management strategies. When communities are actively included in these processes, they are more likely to adhere to proper waste practices and promote collective responsibility, creating a sustainable foundation for efficient waste management that can adapt to the evolving needs of the area.

The identified obstacles reveal critical challenges within the waste management system in Morogoro Municipality. High waste collection costs underscore the importance of transparent and inclusive decision-making processes that engage all stakeholders, especially the community. Education and awareness programs should clarify the necessity of collection fees for sustaining waste management services.

Late or irregular waste collection highlights infrastructure and logistical issues. Involving the community in setting waste collection intervals is essential for improving waste management

practices. When community members have input on collection schedules, services can better align with residents' routines and needs. This collaborative approach fosters a sense of ownership and responsibility, encouraging adherence to proper waste disposal practices. Additionally, community involvement can reveal specific local challenges that may be overlooked by waste management authorities, enabling more tailored solutions.

These findings echo the broader literature on waste management in developing countries. Researchers like Kirama and Mayo (2016), Ramos *et al.* (2012), and Guerrero *et al.* (2012) emphasize that effective waste management requires not only sufficient infrastructure but also robust community engagement. By addressing these interconnected issues, local governments can develop comprehensive strategies that improve waste management systems and promote healthier, cleaner environments for all residents.

3.4. Community Perception toward Solid Waste Management

Based on the data from Table 3.4, which presents the community perception of solid waste management practices across different wards, the following critical interpretations and discussions were made.

Table 3.4: Community perception of proper solid waste management across wards (n=70)

Indicator	Ward			Composite mean	Max.	Min.	Std.	Rank
	Mazimbu	Mji mkuu	Mji mpya					
1. Campaigns and trainings on environmental issues	2.10	1.98	2.30	2.13	4	1	0.90	4
2. Challenges related to technology	2.00	2.41	1.86	2.09	4	1	1.20	5
3. Municipal responsibilities	2.50	1.91	2.95	2.45	4	1	1.33	3
4. Collectors' services and municipal dump	4.42	4.50	4.50	4.47	5	1	1.06	1
5. Distance to the dumpsite	3.04	3.59	2.95	3.19	4	1	0.58	2
6. Influence of Community participation	1.04	1.05	1.00	1.03	2	1	0.17	6
Overall composite mean score	2.52	2.57	2.60	2.56			0.87	

Source: Research survey 2022

3.4.1 Campaigns and Training on Environmental Issues

The composite mean score (2.13) indicates that respondents across all three wards reported positive perceptions of campaigns and training on environmental issues related to proper solid waste management. The community expressed that these campaigns and training sessions help increase knowledge of best practices for waste disposal, contributing to reduced environmental pollution. To maintain a healthy and clean environment, campaigns and training are essential for effective waste management. This finding aligns with Sultana *et al.* (2021), who noted that campaigns, education, and training on environmental matters raise community awareness of proper waste management, while a lack of such strategies leads to poor waste disposal practices. Additionally, training helps the community become more

efficient and effective in implementing waste management practices. By fostering a collaborative environment where residents feel empowered to engage in solid waste management, these campaigns can significantly enhance environmental quality and public health. Ultimately, continuous education and community engagement are fundamental to successful waste management initiatives that promote sustainable practices and reduce pollution.

3.4.2 Challenge Related to Technology

The composite mean score (2.09) suggests that respondents viewed technology as a significant challenge to effective solid waste management. This perception stems from infrastructure-related issues, such as frequent breakdowns of waste collection vehicles and limited road access in slum areas, which hinder timely waste collection. Municipalities are encouraged to improve solid waste management technologies by adopting practices like recycling and composting. Stakeholders involved in household waste collection should also maintain their vehicles and ensure an adequate number of vehicles are available. According to Leaksmy *et al.* (2018) and UN-HABITAT (2010), technology challenges, such as inadequate vehicles and poor infrastructure, particularly in slum settlements, contribute to improper solid waste management by making certain areas inaccessible to waste collectors. This remains a significant issue in developing countries, where inadequate technology exacerbates poor waste disposal.

3.4.3 Municipal Responsibility

The composite mean score (2.45) suggests that respondents had a positive perception of municipal responsibilities toward proper solid waste management, noting that municipalities play an essential role in providing effective waste collection services and public dumps. This finding aligns with Alzamora *et al.* (2021), who noted that municipalities in developing countries are responsible for financing waste management services through general taxes and overseeing the collection, transportation, and disposal processes. However, some respondents felt that municipal efforts were insufficient due to the lack of dumps in certain wards. Municipalities should not only oversee waste management but also actively supervise contractors to ensure adherence to established standards. By enhancing collaboration between municipalities and the community, municipalities can foster a sustainable approach to solid waste management that meets residents' needs. Such collaboration can help address existing challenges and promote a healthier, cleaner environment for the community.

3.4.4 Collectors' Services and Municipal Dump

The composite mean score (4.47) suggests that respondents had a positive perception of collectors' services in solid waste management. Adequate and effective waste collection services contribute to proper waste disposal, whereas inadequate services contribute to poor disposal practices and disease outbreaks. The community recognizes the importance of readily available municipal dumpsites and regular waste collection services. However, some respondents noted issues with inconsistent waste collection schedules and occasional delays. These findings align with Olukanni *et al.* (2020), who noted that inadequate waste collection services contribute to poor waste disposal and increased health risks. Efficient and reliable waste collection services are critical to reducing waste accumulation, which can lead to disease outbreaks, such as cholera.

3.4.5 Distance to the Dumpsite

Respondents agreed that the distance between residences and dumpsites impacts solid waste management, with a composite mean score of 3.19. Longer distances to dumpsites contribute to improper disposal practices, whereas shorter distances encourage proper disposal. Distance influences the risk of environmental pollution, underscoring the need for

municipalities to strategically locate dumpsites. This finding is consistent with Addo *et al.* (2017), who noted that longer distances to dumpsites lead to improper waste disposal and associated health risks. While nearby dumpsites promote proper waste disposal, they can also create challenges, such as air pollution from odours if collection services are delayed. Municipalities should strive for a balanced approach by minimizing distance to dumpsites and implementing efficient collection services to protect public health and air quality.

3.4.6 Influence of Community Participation

Respondents across all three wards reported a relatively low composite mean score (1.03), indicating a low perception of community participation. The community perceives waste management as the responsibility of local government and stakeholders, and some feel their opinions are not considered in decisions about collection fees and schedules. This finding aligns with Malik *et al.* (2015), who noted that community involvement is critical to effective waste management. Engaging residents in discussions on waste management can increase awareness and encourage better disposal practices. Involving the community not only empowers residents but also helps mitigate health risks from poor waste disposal, ultimately improving public health.

3.5 Conclusion and Recommendation

This study provides insights into community perceptions of household-level solid waste management in Morogoro Municipality, Tanzania. Overall, the community showed a positive outlook on solid waste management, highlighting the importance of effective waste collection, transportation, and disposal. However, certain aspects, such as municipal responsibilities and community participation, revealed areas with negative perceptions.

The study identified significant obstacles to effective waste management, including high collection fees and collection delays. Despite the community's awareness of proper waste management, concerns remain regarding the implementation of stakeholder initiatives, especially in household waste collection. Positive community perceptions align with existing literature on the importance of community engagement in waste reduction (Kumar and Anand, 2017; Olukanni *et al.*, 2020). However, negative perceptions in specific areas indicate the need for improvement. Municipal roles in waste management should be clarified through effective communication to improve community understanding and cooperation.

Challenges, such as high collection fees and collection delays, are due to inadequate infrastructure, limited community involvement, and a need for transparent communication among stakeholders (Kirama and Mayo, 2016; Ramos *et al.*, 2012). Addressing these challenges is essential for enhancing waste management in Morogoro Municipality. By investing in infrastructure, improving collection processes, and involving the community in decision-making, local authorities can create a more sustainable waste management system. This approach will improve environmental quality, public health, and community well-being. The government should implement a comprehensive action plan that emphasizes education and campaigns to promote sustainable waste management practices. These initiatives should raise awareness of proper waste disposal, environmental impacts, and the importance of community participation. Additionally, stakeholders should involve the community in decisions about collection fees and intervals. A collaborative approach fosters ownership and responsibility, enhancing waste management effectiveness. Furthermore, advancements in recycling and waste-tracking technology can improve sustainability. Implementing these recommendations will support more sustainable waste management practices and benefit the environment in Morogoro Municipality.

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Policy Brief

Enhancing Solid Waste Management at the Household Level in Morogoro Municipality, Tanzania

Introduction

Effective solid waste management is crucial for environmental sustainability and public health. This policy brief summarizes the findings of a study assessing community perceptions of household-level solid waste management in Morogoro Municipality, Tanzania. The study highlights the community's positive outlook on waste management and identifies key obstacles and recommendations for improvement.

Key Findings

1. **Community Perception:**
 - The community generally holds a positive perception of solid waste management.
 - A composite mean score above 2.00 indicated a positive perception, while a score below 2.00 suggested a negative perception.
2. **Types of Waste Generated:**
 - Vegetable waste: 38.6%
 - Leaves/grass: 28.6%
 - Plastic waste: 20%
 - Other types of waste: 12.9%
3. **Obstacles Identified:**
 - High collection fees and collection delays.
 - Inadequate infrastructure and limited community involvement.
 - Need for transparent communication among stakeholders.
4. **Statistical Analysis:**
 - No significant differences in community awareness regarding the importance of proper waste management across wards, except for disease outbreak reduction.

Recommendations

1. **Enhance Infrastructure:**
 - Invest in waste collection and disposal infrastructure to reduce delays and improve efficiency.
2. **Community Involvement:**
 - Increase community participation in decision-making processes, particularly regarding collection fees and intervals.
 - Implement educational campaigns to raise awareness about proper waste disposal and its environmental impacts.
3. **Stakeholder Communication:**
 - Improve communication between municipal authorities and the community to clarify roles and responsibilities in waste management.
4. **Adopt Technology:**
 - Utilize advancements in recycling and waste-tracking technology to enhance sustainability.
5. **Comprehensive Action Plan:**
 - Develop and implement a comprehensive action plan that emphasizes education and community engagement to promote sustainable waste management practices.

Conclusion

Addressing the identified challenges through infrastructure investment, community involvement, and improved communication can significantly enhance solid waste management in Morogoro Municipality. These efforts will lead to better environmental quality, public health, and overall community well-being. By implementing these recommendations, local authorities can create a more sustainable and effective waste management system, benefiting both the environment and the residents of Morogoro Municipality.