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Household participation and the sustainability of solid waste management in Dar es Salaam City, Tanzania

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Abstract

Dar es Salaam City in Tanzania has incorporated household stakeholders in managing a vast generation of solid waste. However, the impact of household participation on the sustainability of solid waste management remains unclear. This study examines how households' participation in solid waste management activities influences the sustainability of solid waste management in Dar es Salaam City. The study applied a cross-sectional research design with a sample of 377 households. It employed a mixed-methods approach to gain a comprehensive understanding of how household participation influences sustainability in solid waste management, thereby enhancing the validity and reliability of the findings. Data collection used surveys, focus group discussions, key informants' interviews, and documentary review methods. Data were collected from six wards with diverse income levels, including low-income, mixed-income, and high-income areas. Data was analysed using descriptive statistics and the Binary Logistic Regression Model. Findings revealed that households' participation in decision-making significantly influences the sustainability of solid waste management (OR 2.300, p = 0.0073). Similarly, households' skills significantly influence the sustainability of solid waste management (OR 4.017, p = 0.0088). The study concludes that the participation of households in decision-making and households' skills create a conducive environment through which sustainable practices are merged into solid waste management systems. Although the study could not cover all municipalities in Dar es Salaam due to financial limitations, it recommends that the City Council and its Municipalities enhance community engagement initiatives to promote households' participation in sustainable solid waste management practices.

Keywords: *households' participation, sustainability, solid waste, waste management*

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1. Introduction

Globally, the rapid increase in the urbanisation process, particularly in large cities, has led to vast solid waste (SW) generation, presenting solid waste management (SWM) as the most significant urban environmental challenge (Abir et al., 2023; Mapunda et al., 2023). Solid waste includes discarded solid materials, which, when managed effectively, could hold economic value through reintegration into the technological cycle to be reused or used as raw materials for industrial production (Saleh & Hassan, 2021; Mwanza et al., 2019). If SW is not managed sustainably, it leads to environmental, social, and health challenges, including methane emissions, ecosystem degradation, air and water pollution, floods, disruption of cities' images, and outbreaks of diseases like cholera (Abubakar et al., 2022), thus calling worldwide attention to sustainable waste management.

Sustainable SWM, as outlined by Abubakar et al. (2022) and Godfrey et al. (2020), is a process aimed at diverting waste resources that still have useful value from landfills, thereby mitigating environmental impacts such as greenhouse gas emissions. Utilising waste as a resource before disposal reduces the need to extract new raw materials for manufacturing and industrial production (Yazdani & Lakzian, 2023). This approach promotes a circular economy model where resources are efficiently utilised and continuously recycled, thereby contributing to long-term environmental sustainability.

The SWM poses more significant challenges in developing nations, where up to two-thirds of daily generated SW remains uncollected and is instead indiscriminately disposed of on streets and other unauthorised locations despite its potential for renewal as a resource (Debrah et al., 2021; Mapunda et al., 2023). The prevailing waste management practices in many developing cities often lean towards unsustainable methods, primarily focusing on collection for disposal in landfills and disregarding the hidden value of useful waste, which is often due to inadequate resources (Debnath et al., 2023; Fernando & Zutshi, 2023). Addressing SWM challenges requires a concerted effort by key stakeholders, such as households, to implement sustainable waste management practices that include recycling, waste-to-energy initiatives, and composting. As Chisanga et al. (2024) noted, community members, including households, must be involved in the planning, decision-making, and implementation of SWM projects.

Households are the fundamental stakeholders in solid waste management, as they are the primary generators of waste; thus, they can handle waste before it is taken over by other

stakeholders at higher levels (Saeedi et al., 2023). Their crucial role in SWM cannot be overstated at the grassroots level, particularly for SW separation, which fundamentally lays the groundwork for other sustainable waste practices, including reuse and recycling (Datta, 2022; Goel et al., 2022). According to Noufal et al. (2021), households play a crucial role in the effectiveness of waste management strategies.

In Europe, a study by Woodard and Rossouw (2021) revealed that household involvement across 24 sites in England resulted in improved SW recycling. Likewise, Fahy and Davies (2007) has shown that in European countries, contextual factors such as accessibility to recycling facilities and stakeholders' commitment play crucial roles in shaping household waste management behaviours. In Asia, Yuelu, Changsha – China, households are willing to participate in waste sorting and join charging schemes (Hu et al., 2025). In India, Kadam (2025) conducted an in-depth analysis of community involvement in SWM within rural Maharashtra, emphasising the critical role of community participation in formulating waste management strategies. In the East Africa context, a study by Agwe et al. (2025) in Kabale Municipality, Uganda, explicated the variations in recycling capabilities and energy recovery potential between the wet and dry seasons. Another study in Uganda by Kyambade and Namatovu (2025) assessed the psychological consequences of the Kiteezi landfill collapse, documenting anxiety and depressive disorders among the displaced population because of the loss of their homes and means of subsistence. This highlights the importance of involving community and household members in planning and implementing SWM projects as a precaution against potential SWM disasters.

Dar es Salaam City, with 5,383,728 inhabitants as of the 2022 population census, faces intensified SW generation compared to other rapidly expanding cities in Tanzania (United Republic of Tanzania, 2022). For instance, while Arusha generates 390 tons per day, Mbeya produces 362.3 tons per day, Dodoma produces 350 tons per day, and Dar es Salaam City Council produces a staggering 1,100 tons per day (Omar & Bullu, 2022). The SWM challenges in Dar es Salaam encompass excessive collection costs, illegal dumping, and underutilisation of SW resources. Despite the potential to recycle and compost 98% of the daily solid waste generated, current recycling rates stand at 10%. In comparison, the remaining 90% is transferred to landfills (Idris et al., 2021).

In pursuit of sustainability, Dar es Salaam adopted a strategy of involving households in decision-making on SWM matters (Idris et al., 2021), recognising them as the main

generators of the Municipal SW. Munro (2023) affirms that household involvement is crucial for sustainable waste management. Through decision-making processes, households' expertise in SWM can be effectively utilised, fostering a collaborative approach towards achieving sustainable waste management practices (Dung & Huynh, 2022). However, Dar es Salaam City continues to experience uncollected and unattended SW on its streets and waterways, perpetuating air and water pollution, foul odours, and seasonal flooding, particularly during rainfall (Omar & Bullu, 2022; Mapunda et al., 2023). Given the continuing SWM challenges, the precise impact of household participation on SWM sustainability in Dar es Salaam remains uncertain. Empirically, several studies have been conducted on the issue of SWM, household participation, and sustainability. For example, Kalwani (2017) studied community participation in municipal solid waste, mainly focusing on Morogoro City; Ngware (2015) studied levels of community participation in Kinondoni with a limited focus on sustainability issues; Nyampundu et al. (2020) based on characterising the waste produced in Dar es Salaam; and Dimoso (2024) focused on community adoption of modern technology in Ilala, Da es Salaam. However, studies in Dar es Salaam City that focus on the impact of households on the sustainability of SWM are limited. Thus, the city continues to face challenges related to waste management. Accordingly, the general objective of this study was to investigate the influence of household participation on SWM sustainability in Dar es Salaam City, Tanzania. Specific objectives include evaluating the influence of household participation in decision-making on sustainable SWM and the influence of household waste management skills on the sustainability of SWM. The findings of this study are expected to add new insights to the existing body of knowledge on SWM and provide guidelines to decision-makers and policymakers for formulating relevant decisions and policies that enhance sustainable SWM practices at the grassroots level, including households.

2. Literature Review

2.1. Theoretical Framework

This study applied the Theory of Collective Action. The theory posits that stakeholders cooperate in providing a public good because they anticipate better and more sustainable outcomes than they would achieve by acting independently (Olson, 1965). Furthermore, the desire to work collectively depends on the net benefits stakeholders foresee from participating

in a joint project. The theory posits that humans are more inclined to engage collectively in social development activities that benefit them.

The Collective Action Theory is applied in this study to provide a theoretical justification for households to participate in SWM if they believe it can benefit them and lead to sustainable outcomes. The theory is used as a framework for the independent variable (stakeholders' cooperation) used in this study as "households' participation" and the dependent variable "sustainability of SWM" reflected as sustainable results in the theory.

2.2. Empirical Literature Review

The call for sustainable waste management was primarily advocated in Agenda 21, a document developed at the United Nations Conference on Environment and Development in Rio de Janeiro, Brazil, in 1992 (Kirkby et al., 1995; Vinti & Vaccari, 2022). International initiatives promoting SWM include the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 and the Kyoto Protocol on Climate Change in 1997 (Anderson, 1998; Kaiser & Drennen, 2022; Trenberth, 2022). With all these initiatives, many cities worldwide have been striving towards sustainable SWM (Nyika et al., 2023). However, none of these initiatives have detailed how sustainable SWM should be implemented in varying socio-economic environments of developed and developing countries.

Sustainable solid waste management requires diversifying SW resources beyond landfills (Saurabh & Khan, 2022). This process requires main waste generators such as households, to participate in waste management, particularly in decision-making (Mwanza et al., 2019; Ahmed & Van Dijk, 2022). Households are significant stakeholders, as their participation can facilitate a willingness to pay for SWM programs and encourage waste reduction and segregation (Dung & Huyh, 2022). However, these studies have not identified the motivations that can encourage households to engage effectively in sustainable waste management. It is inferred by Kihila et al. (2021) and Muheirwe et al. (2024) that actors in SWM can become uninterested if they are not entirely motivated and may lose interest in supporting SWM initiatives. Likewise, if households do not participate well in SWM programs, they become unclear about their roles. Henceforth, for households to successfully participate in SWM, they need to be empowered about the benefits of their participation and the roles they play.

Studies indicate that, when households are uncertain about their roles, implementing the reuse and sorting of SW at the source can be challenging. Accordingly, in most cities in developing countries, households often fail to participate effectively because SWM is perceived as the sole responsibility of city authorities (Bikash & Ichihashi, 2022; Ahmed & Van Dijk, 2023). It is worth noting that even in developed nations, communities are equipped with facilities that enable them to participate in SW sorting and recycling (Fahy & Davies, 2007). The same approach can be adopted in cities of developing countries. This concern needs to be addressed by SWM authorities. On the other hand, other scholars, such as Draçi and Laska (2023), have noted that in many developing countries, decisions made by local communities are often disregarded in formal processes, thereby impacting the efficiency of services provided, including SWM services. According to Kalwami (2021) and Ma et al. (2023), household participation yields positive results, which in this study imply sustainable SWM. However, a gap remains in understanding how households can engage in decision-making processes within specific localities, particularly in developing regions.

Another way to involve stakeholders in SWM is through skills contribution. The study by Sabarinah (2017) demonstrates that households' knowledge and skills in managing waste are significantly associated with waste-sorting behaviours in Indonesia. According to Yustas et al. (2022), households apply their knowledge and skills to produce briquettes from SW, thereby utilising it as a resource for energy production rather than directing it to landfills. Nasir et al. (2023) noted that knowledge of SWM is crucial in transforming waste management behaviours and enhancing the utilisation of SW resources, such as reusing, separating, and recycling. Likewise, Heldal et al. (2024) noted that a significant level of skills and knowledge among stakeholders is vital for achieving sustainable SWM in developing countries (AkiNtunde & AkiNtunde, 2023). Other scholars, such as Castin et al. (2022), observed that it is essential to understand the application of skills by households in SWM in promoting sustainability. For instance, Idris et al. (2021) emphasise that SWM with high recycling programs can be easily achieved through the active participation of households. It is also essential to note that the impacts of households' participation on the sustainability of SWM may vary from one society to another. This highlights the necessity for cities in developing countries to examine how household participation in their local context influences the sustainability of SWM.

The reviewed literature has emphasised the significance of household involvement in SWM; a research gap exists in understanding the influence of households' participation in SWM sustainability within the specific socio-economic context of Dar es Salaam City and similar urban settings in developing countries. Specifically, there is limited empirical investigation into how households' participation in decision-making and skills contributions influence sustainable SWM practices in local contexts such as Dar es Salaam. To address this gap, there is a compelling need to explore the influence of household participation in decision-making and skills contributions on sustainable SWM within the Dar es Salaam City context. Thus, this study's objectives include evaluating the influence of household participation in decision-making on sustainable SWM and assessing the impact of household waste management skills on the sustainability of SWM.

3. Research Methodology

3.1. Study Area

This research was conducted in Dar es Salaam City, Tanzania, with a population of 1,550,066 households (URT, 2022). Dar es Salaam comprises five districts: Kinondoni is located in the North, Ilala is at the centre, Ubungo and Temeke are in the South, and Kigamboni is located in the East. Dar es Salaam was chosen due to its status as Tanzania's largest and most populous city, serving as the country's commercial hub (United Republic of Tanzania, 2022). Moreover, it exhibits a substantial SW output, generating 1,100 tons per day, surpassing other cities in the country (Omar & Bullu, 2022). The study was conducted in six wards: Mbezi, Sinza, Tandale, Manzese, Masaki, and Bunju.

3.2. Research Approach and Design

Due to the nature of the research objectives, the study applied a mixed-method approach. This required the use of both quantitative and qualitative data to produce meaningful research findings. A cross-sectional design was chosen for its ability to capture the dynamics of SWM within Dar es Salaam City at a specific point in time. The design facilitates a comprehensive assessment of factors influencing sustainable SWM, including household participation, waste management practices, and environmental impacts. By collecting data from multiple households across diverse wards simultaneously, the cross-sectional design

enables efficient data collection, allowing for a comprehensive understanding of SWM dynamics within the city.

The study used both primary and secondary data. Primary data was used to obtain facts about what was happening in the field, and secondary data was used to enrich the study findings.

3.3. Techniques for Determining Respondents

A combination of probability and non-probability sampling techniques was utilised for sample selection. Probability sampling involved a random selection of six wards using a lottery technique, ensuring unbiased representation. Systematic sampling was then employed to select 377 households from these wards, ensuring equitable representation and minimising sampling bias. Using this technique, every 10th household was selected from the sampling frame. Additionally, purposive sampling was employed to select key informants (KIs) responsible for SWM within the chosen wards. These KIs were selected based on their expertise and willingness to participate in the study, providing important insights and detailed information about SWM practices within the community.

This study determined the sample size using a Yamane (1967) formula, as indicated in Israel's (2013) review.

$$n = \frac{N}{1 + N(e)^2} \dots\dots\dots\dots\dots\dots 1$$

where n = sample size, N = population size with specific characteristics (households = 1,550,066), and e = Precision factor coefficient (5%). This formula was applied because it gives a high degree of accuracy in sample size.

$$n = \frac{1{,}550{,}066}{1 + 1{,}550{,}066\ (0.05)^2}$$

By using this formula, the sample constituted 400 households. However, practical constraints and further refinement during the systematic sampling process resulted in a final sample size of 377 households. To get a sample size of households in each ward, the proportionate stratification formula (Cochran, 1977) was applied:

$$n_h = \left(\frac{N_h}{N}\right) \times n \dots\dots\dots\dots\dots\dots 2$$

Where $n_{h=}$ the sample size in stratum h; h = Ward 1, 2, 3 up to 6; N_h = the household's size in stratum h; N = the total household size of all strata (118,959) and n= the total sample size of the study (400). From the Cochran formula, the following sample was obtained from each ward;

Mbezi: $\frac{37,740}{118,959} \times 400 = 126.9 \ (= 127 \ households)$

Sinza: $\frac{10,874}{118,959} \times 400 = 36.6 \ (= 37 \ households)$

Tandale: $\frac{14,126}{118,959} \times 400 = 47.5 \ (= 48 \ households)$

Manzese: $\frac{21,507}{118,959} \times 400 = 72.3 \ (72 \ households)$

Masaki: $\frac{7,212}{118,959} \times 400 = 24.3 \ (24 \ households)$

Bunju: $\frac{27,500}{118,959} \times 40 = 92.4 \ (92 \ households)$

3.4. Data Collection Methods and Research Instruments

The research employed a questionnaire survey method to collect quantitative data. Questionnaire tools with both closed- and open-ended questions were used to gather large quantities of data from a larger population within a shorter period. Key informants' interviews were used to collect in-depth data using the pre-prepared interview guide. Fifteen key informants were purposively selected and interviewed, comprising two from each ward: A Ward Executive Officer (WEO) and an Environmental Committee Member, as well as one Solid Waste Management Expert from Dar es Salaam City Council.

With the help of a checklist, Focus Group Discussions (FGDs) were used to collect data that complemented information gathered through other methods. A total of three FGDs were conducted, comprising household representatives. The first FGD was conducted in Manzese, representing a high-density area with predominantly low-income households; the second one was in Sinza, representing a location with a combined population of low, middle, and high-income households; and the third one was in Masaki, representing a low-density area with predominantly high-income households. These interviews were conducted to obtain insights into the participation of households of different income levels in SWM practices. To collect qualitative data, the researcher used a notebook and sought consent from participants to record them using a smartphone. The researcher also employed direct observation to collect

data cross-checking the information collected through other methods and recorded data in a notebook. The researcher obtained secondary data through a documentary review.

3.5. Data Analysis Techniques

Qualitative data were analysed using content analysis in which recurring themes were identified, categorised, coded and interpreted to obtain meaningful insights concerning specific objectives. Quantitative data used the Binary Logistic Regression Model to determine the influence of household participation on the sustainability of SWM. The model used is presented under the following equation:

$$logit\,[\pi(Y)] = ln\left(\frac{\pi(Y)}{1-\pi(Y)}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$$

Where: Y is the dependent variable - Occurrence of sustainability in SWM (1= Sustainable; 0 = Not sustainable); X_1 is the participation in decision making (1 = Participates; 0 = Does not participate); X_2 is households' skills in SWM (1 = Has skills; 0 = Does not have skills); β_δ are the coefficients estimated from the model; ε is the error of the term; and ln is the natural logarithm.

Data obtained from the household survey were as follows: 290 (76.92%) participated in decision-making for SWM out of 377, while 87 (23.08%) did not participate. Among those who participated, 101(34.83%) participated in sustainable SWM, while 13(14.94%) did not. Regarding household skills, 18 (4.77%) possessed SWM skills, of which 8 (44.44%) engaged in sustainable waste management (SWM). On the contrary, of the 359 (95.2%) who did not have SWM skills, only 72 (20.06%) did not participate in sustainable waste management. Thus, applying these data to the model implies the following;

$$\ln(Sustainability\ in\ SWM) = \beta_0 + \beta_1(76.92) + \beta_2(3.77) + \varepsilon$$

The Binary Logistic Regression Model was suitable for this research due to the binary nature of the dependent variable (Occurrence of Sustainability in SWM: 1 = Sustainable, 0 = Not Sustainable). To validate the model, the linearity assumption was checked using the Box-Tidwell test, and all continuous predictor variables showed a non-significant interaction term ($p > 0.05$). Likewise, the model's appropriateness was evaluated by conducting the Hosmer and Lemeshow Goodness-of-Fit Test. The test results indicated a good fit between the model and the data ($\chi^2 = 1.5503$, $p = 0.9072$).

Qualitatively, the data obtained through interviews were carefully read, transcribed, coded, and thematically analysed to identify key themes incorporated in the discussion of the findings.

3.6. Data Credibility

Several strategies were implemented to ensure the credibility of data in this study. Reliability was enhanced by conducting pilot tests of the survey instruments and training data collectors to follow consistent protocols during data collection. Construct and content validity were established by crafting survey questions grounded in established theoretical frameworks and validated through consultations with experts and reviews of existing literature. To enhance external validity, a diverse range of households was selected. Credibility was strengthened through member checking and triangulation for qualitative data, utilising multiple data sources and viewpoints. Comprehensive contextual descriptions were provided to enhance transferability and ensure that the findings accurately reflect the respondents' perspectives, remaining free from researcher bias.

3.7. Ethical Considerations

This study adhered to ethical considerations in data collection, analysis, and report writing. A data collection permit was obtained from the Regional Commissions Office in Dar es Salaam, as well as from Kinondoni and Ubungo Municipalities. The researcher sought informed consent from all participants and assured them of the confidentiality of the information they provided. This research did not cause any distress to participants.

4. Results and Discussion

This section presents the study's findings and discusses the findings of other studies.

4.1. The Association between Households' Participation and the Sustainability of Solid Waste Management

To examine the influence of household participation on the sustainability of SWM, the study first analysed the association between the independent variable (household participation) and the dependent variable (sustainability of SWM). The households' participation in decision-making and the application of their skills were identified as components of the independent

variables. Participation in decision-making was assessed based on whether household members were actively engaged in decision-making processes concerning SWM matters within their localities, specifically their respective wards and local government authorities. Households' skills, on the other side, implied the knowledge, expertise, or abilities to utilise waste as a resource. Sustainable management includes segregating recyclables or reusable materials for sale, reuse, or distribution to scavengers or any other buyers before collection for disposal. It also includes any act of recycling it and recovery for energy production.

Table 1 presents the findings regarding the association between households' participation (through the decision-making process and by applying their skills to utilise SW) and SWM sustainability.

Table 1

Association between households' participation and SWM sustainability

Variable	Frequency of Participating in Decision-Making and having SWM Skills (%)	Frequency of participating in sustainable SWM (%)	Chi-square (P-value)
Decision making			
Participates in making decisions	290 (76.92)	101 (34.83)	5.4437(0.0196)
Do not participate	87 (23.08)	13 (14.94)	
Households' skills			
Have Skills	18 (4.77)	8 (44.44)	6.0987(0.0135)
Do not have skills	359 (95.2)	72 (20.06)	

***Source**:* Survey Data Analysis, 2024.

The findings presented in table 1 demonstrate a significant association between the independent variables "households' participation in decision-making" (p-value=0.0196) and "households' skills" (p-value=0.0135) and the dependent variable "sustainability of SWM". This means there is a connection between households' participation and SWM sustainability, necessitating the need to determine how best to integrate households into SWM. This is also emphasised by Chisanga et al. (2024) that households must be involved in SWM. Given the statistical significance of these variables to SWM sustainability, further analysis was conducted to explore their respective influences.

4.2. Influence of Households' Participation in Sustainability of Solid Waste Management

The influence of households' participation in sustainable SWM was assessed using a Binary Logistic Regression Model. Table 2 presents the key findings from the model, highlighting the influence of households' participation on the sustainability of SWM.

Table 2

The influence of households' participation in decision-making and their skills on the sustainability of SWM

Variable	Adjusted OR	95% CI	P-Value
Participation in decision-making			
Participate	2.300	[1.251, 4.227]	0.0073
Do not participate	Reference		
Households' skills'			
Skilled	4.017	[1.419, 11.366]	0.0088
Not skilled	Reference		

Source: Survey Data Analysis, 2024.

The results (QUANT) presented in table 2 reveal a significant influence of household participation in decision-making on SWM sustainability, as evidenced by an Odds Ratio (OR) of 2.3 and a p-value of 0.0073. This implies that households participating in decision-making are 2.3 times more likely to adopt sustainable SWM practices such as waste separation or segregation, reuse, recycling and recovery. Therefore, as households participate in decision-making meetings, they adopt and influence one another to sort reusable and recyclable waste materials that are either disposed of or collected for disposal. Reusing SW is beneficial to households in terms of saving costs on purchasing new products, thus aligning with the CAT's assumption that stakeholders participate in collective actions that benefit them.

This finding aligns with the proposition by Mwanza et al. (2019) and Vanni (2014), highlighting the crucial role of integrating stakeholders' knowledge into the decision-making process for successful cooperative approaches. This cooperative approach is regarded as the adoption of sustainable SWM practices by households. Contrary to this finding, Fahy and Davies (2007) show that in Europe, it is the contextual factors, such as accessibility to recycling facilities, that motivate households to participate, highlighting the need to create a conducive environment for households to engage in sustainable waste management.

In line with the quantitative findings, a theme of selling plastic bottles was identified from interviews with Key Informants in connection with households' participation in decision-making. The Ward Executive Officer from Msasani noted: *"Due to household participation in decision-making, nowadays, household members sell plastic bottles to private companies contracted to collect waste in their areas. This reduces plastic bottle waste on streets"*. Another Ward Executive Officer from Manzese said, *"Some households separate plastic waste so that pickers from recycling centres pick them. We even have one recycling centre established nearby."*

Despite the findings that household participation in decision-making has a positive influence on the sustainability of SWM, a percentage of households who do not participate is still considerably big (23.02%) as indicated in table 1, implying the need for wards environmental committees to enhance awareness on the importance of SWM to the entire community. Nevertheless, these findings (QUAL - "re-use, recycling of plastic bottles") underscore the importance of households' involvement in decision-making processes, enabling them to influence SWM practices and contribute to sustainability. This implies that some households sell plastic waste to scavengers and contracted private companies, while others give it away for free, thereby reducing the waste required for disposal. It also minimises plastic waste, which would have been dumped haphazardly on the streets. This observation aligns with the findings of Kalwami (2021) and Ma et al. (2023), who noted positive outcomes when households engage in SWM decision-making processes. Similarly, Mwanza et al. (2019) observed that household participation in decision-making is crusial for sustainable SWM.

Furthermore, FGDs with household members in Manzese Ward revealed that their participation in decision-making yielded positive outcomes, reducing the scattering of plastic bottles on streets despite implementation challenges. The challenges are connected to the contracts issued to private companies responsible for collecting SW from households, which directed them to transport all the waste they collected to the official dumpsite at Pugu Kinyerezi for final disposal. Even if some households separate plastics from the rest of the waste, the contracted private companies will pick up all the waste collectively without discriminating against them. The implication is that households have limited influence on the implementation of their decisions to separate recyclable and reusable waste, as some waste collectors were collecting them indiscriminately. This can also be connected to the tasks given to contracted private companies and other private entities for the collection and disposal of SW, regardless

of its value. Likewise, an observation made by the researcher on a waste collection truck by a private company supports this finding, as the waste pickers gather all the waste collectively from the picking points.

These findings suggest that households' contributions to decisions made by their respective local authorities responsible for SWM are somewhat undermined. Draçi and Laska (2023) similarly reported that in many developing countries, decisions made by local communities are often disregarded in formal processes, highlighting a critical gap in achieving sustainable SWM that requires attention from SWM authorities. Fadhullah et al. (2022) recommend that accurate decision-making on SWM issues incorporate the practices and skills of households, which is possible if they also participate in decision-making processes. Consistent with this observation, Thomas et al. (2022) and Muheirwe et al. (2024) suggested that collective action should aim to understand and formalise the roles of formal and informal organisations that support beneficial actions in SWM initiatives. This finding further underscores the need for stakeholder collaboration that begins at the decision-making level to achieve sustainable social service provision, in line with the principles of collective action theory.

Regarding households' skills, the findings in table 2 reveal a significant influence on the sustainability of SWM, as indicated by OR = 4.017, p-value = 0.0088. The study shows that the likelihood of SWM sustainability was four times higher for household members who had skills in managing SW compared to those who did not possess any such skills. This finding was supported by qualitative findings that underscored themes such as food waste fertilisation during FGDs conducted at Manzese and Bunju Wards, as well as the reuse of biodegradable waste by households. Biodegradable waste can decompose completely through biological processes, either with or without the presence of air (Popoola, 2023). Despite the findings on the positive influence of household skills on sustainable SWM, majority of households were not aware that by decomposing waste they were actively participating in managing SW, implying the need for awareness programs that can enhance more active participation of households in SWM once they fully understand the associated benefits.

In line with the quantitative findings on the positive influence of households' skills on sustainable SWM, one respondent from Bunju Ward said, *"In my family, we have a vegetable garden where we bury food waste that in turn becomes fertiliser to my garden".* Another FGD participant from Bunju Ward said, *"For my household and some of my neighbours, we use*

green waste and some of the food leftovers to feed our goats and chickens." These findings continue to reveal that some of the households have skills that can be utilised to manage waste sustainably. However, this finding contradicts Debnath et al. (2023) and Fernando and Zutshi (2023), who observed that waste management practices in many developing cities lean towards unsustainable methods focusing on collection for disposal in landfills; thus, households in developing countries are still not fully aware on the need to manage SW sustainably. The differences in these findings are attributed to society's SWM policies, community awareness and implementation strategies.

Furthermore, FGD participants shared their experiences on discussing SWM issues in ward meetings, exchanging ideas, and exploring ways to minimise the environmental impact of waste accumulation due to delays in waste collection. All respondents with relevant skills who participated in SWM reported using traditional skills and experiences to utilise biodegradable waste by mixing it with other materials to feed chickens and applying it as fertiliser to their home gardens; a few used it to generate gas for domestic use. The reuse of biodegradable waste by households offers dual benefits: reducing the volume of waste destined for disposal and harnessing waste as a resource. These findings suggest that households possess specific skills and knowledge that can be applied to managing water sustainably. This depends on whether they are aware that what they are doing is part of waste management or if they are doing it through experience; it contributes to sustainable waste management. Additionally, these findings highlight the potential for households with diverse SWM skills to effectively manage waste, particularly in Dar es Salaam City, where a significant proportion of municipal waste is biodegradable. The findings are similar to those observed by AkiNtunde and AkiNtunde (2023), who noted that households utilise skills in reusing and recycling SW. Additionally, Kyere et al. (2019) reported that households in Brong Ahafo, Ghana, with SWM skills, commonly utilised food waste to feed livestock and sold used plastics and cans to informal buyers or scavengers. Likewise, Afroz et al. (2017) found that households' knowledge and skills influenced their engagement in the reuse, recovery, and recycling of waste in Malaysia. All this literature affirms the contribution of household skills to sustainable SWM.

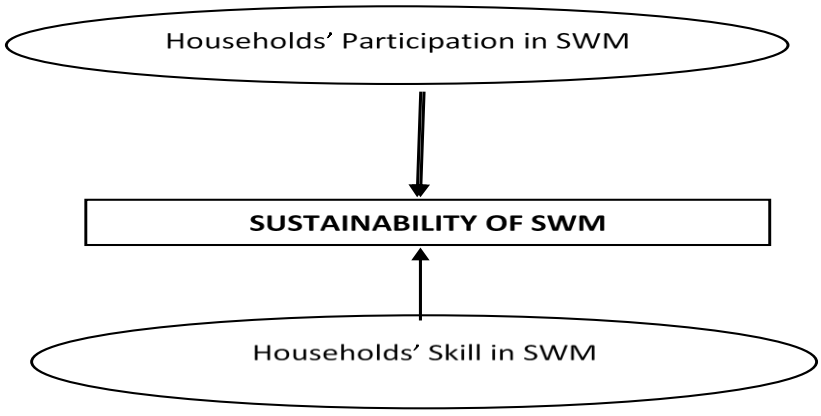
Further findings from FGD in Sinza Ward revealed that households possessed the skills to produce briquettes (an alternative energy source in the form of charcoal) using solar water. In other words, SW is used as a resource in briquette production and can be discarded or disposed of without specialised skills. One participant reported, *"We collect leftover charcoal powders,*

wood, paper, and tree leaves, and we mix them with other materials to produce briquettes for sale." This finding highlights the importance of skilled household members in repurposing SW as raw materials for further production, which can yield economic benefits for the community.

This finding aligns with Yustas et al. (2022), who reported that households in Tanzania utilize solid waste to produce briquettes. Likewise, the study found that briquette production skill exists in Tanzania and is practised by formal and informal practitioners. However, it is not backed up by policies; thus, if well promoted, briquette production skills can be excellent in handling municipal SW. According to Fadhullah et al. (2022), observations suggest that the knowledge and practices of households should be incorporated into relevant decisions to promote SWM. Generally, these findings highlight the potential influence of household participation in SWM, primarily through involvement in decision-making and the sharing of knowledge and skills. Furthermore, the findings contribute to the theoretical insights that sustainability in public service provision through collective action, apart from foreseeing benefits, can be achieved if stakeholders possess relevant skills and participate in decision-making processes. The conceptual model of the study findings is presented as follows;

Figure 1

The conceptual mode of the study findings



Source: Researchers' Conceptualization of the Study Findings, 2024.

Based on the conceptual mode indicated in figure 1, household participation in decision-making represents the involvement of household members in the decision-making processes related to SWM. It includes their engagement in planning, discussions, and the implementation of waste management strategies. Household waste management skills encompass a household's knowledge, expertise, and practical abilities to manage waste effectively. Skills may include waste separation, recycling, composting, and producing valuable by-products like briquettes. The dependent variable is the sustainability of SWM, reflecting the sustainable outcomes of SWM practices. This involves reducing waste destined for landfills, enhancing recycling and reuse, and minimising environmental impacts.

The model suggests a direct positive influence of household participation in decision-making on the sustainability of SWM. When actively involved in decision-making, households are more likely to adopt sustainable practices such as waste separation, reuse, and recycling. The model also posits a direct positive influence of household skills on the sustainability of SWM. Households with better waste management skills can more effectively separate, recycle, and reuse waste, contributing to overall sustainability. The conceptual model visually represents how household participation and skills contribute to achieving sustainable SWM practices. It points out the importance of engaging households in decision-making processes and utilising their skills to enhance the effectiveness of waste management systems.

5. Conclusion

This study aimed to examine how households' participation in solid waste management (SWM) activities influences the sustainability of SWM in Dar es Salaam City. The outcome reveals that households' participation in decision-making significantly influences the sustainability of SWM. Similarly, households' skills significantly influence the sustainability of SWM.

The theoretical implications drawn from the findings suggest that sustainability in SWM cannot be attained solely through collective participation, despite foreseen benefits, but rather by having stakeholders, such as households, participate in decision-making and possess relevant waste management skills. Beyond highlighting the role of household participation in decision-making and skills in fostering sustainable SWM, these findings generally underscore the need for targeted capacity-building programs to enhance households' participation in the separation, reuse, and recycling of SW, particularly that produced in their homes. It implies

the need for policymakers to integrate participatory waste management approaches that empower households with decision-making roles and relevant skills, ensuring long-term sustainability.

Based on these findings, this study recommends that the Vice President's Office, the Dar es Salaam City Solid Waste Management Department, and the SWM Committees at the ward level should enact a solid waste management (SWM) policy and develop rules and regulations that promote household participation in SWM decision-making processes to their respective localities. Additionally, the study advises the government of Tanzania through the Vice Presidents' Office to collaborate with the private sector such as private companies, non-governmental organisations, and international communities to innovate simple technologies that can empower and enable households to participate more in SW separation at source.

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Institutional Review Board Statement

This study was conducted in accordance with the ethical guidelines set by the College of Business Education, Tanzania. The conduct of this study has been approved and given relative clearance(s) by the Dar es Salaam Regional Commission Office.

AI Declaration

The author declares the use of Artificial Intelligence (AI) in writing this paper. In particular, the author used ChatGPT in finding literature and other materials. The author takes full responsibility in ensuring that research idea, analysis and interpretations are original work.

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References

Abir, T. M., Datta, M., & Saha, S. R. (2023). Assessing the factors influencing effective municipal solid waste management system in Barishal Metropolitan Areas. *Journal of Geoscience and Environment Protection*, 11(01), 49–66. https://doi.org/10.4236/gep.2023.111004

Abubakar, I. R., Maniruzzaman, K. M., Dano, U. L., AlShihri, F. S., AlShammari, M. S., Ahmed, S. M. S., Alrawaf, T. I. (2022). Environmental sustainability impacts of solid waste management practices in the Global South. *International Journal of Environmental Research and Public Health*, 19(19), 12717. https://doi.org/10.3390/ijerph191912717

Afroz, R., Rahman, A., Masud, M. M., & Akhtar, R. (2017). The knowledge, awareness, attitude and motivational analysis of plastic waste and household perspective in Malaysia. *Environmental Science and Pollution Research*, 24(3), 2304–2315. https://doi.org/10.1007/s11356-016-7942-0

Agwe, T. M., Twesigye-Omwe, M. N., Ukundimana, Z., Rotimi, D., & Gupta, S. (2025). Effects of seasonal variations of the physio-chemical properties of municipal solid waste on effective materials and resources recovery. *Scientific Reports*, *15*(1), 4548. https://doi.org/10.1038/s41598-025-87780-4

Ahmed, A., & Van Dijk, M. P, M. (2023). Waste separation and 3R's principles for sustainable SWM: Practice of households, private companies and municipalities in five Ethiopian Cities. In S. Zailani & S. Sarvajayakesavalu (Eds.), *Solid Waste and Landfills Management—Recent Advances*. IntechOpen. https://doi.org/10.5772/intechopen.108327

AkiNtunde, E., & AkiNtunde, C. (2023). Acquisition and use of environmental education in solid waste management practices. *Journal of STEAM Education*, 6(2), 143–160. https://doi.org/10.55290/steam.1149800

Anderson, J. W. (1998). *The Kyoto protocol on climate change*. Resources for the Future.

Castin, C. P., Dalmacio, R. D., Flores, C. D., Lamug, B. M., & Manuevo, J. A. (2022). Household Solid Waste Management (HSWM) awareness and applications: A comparative study on urban and rural sustainable practices. *International Journal of*

Environment, Engineering and Education, 4(3), 93-99. https://doi.org/10.55151/ijeedu.v4i3.79

Chisanga, A., Saul, S. T., Daka, S., Masebe, E., Mulenga, R., Banda, D., & Mwansa, P. (2024). Community engagement in solid waste management: An in-depth analysis of household participation and practices in Chelstone Township in Lusaka, Zambia. *International Journal of Research and Innovation in Social Science*, 8(4), 2168-2194. https://dx.doi.org/10.47772/IJRISS.2024.804147

Bikash, B., & Ichihashi, M. (2022). Household preferences for improved solid waste management (SWM) services: A randomized conjoint analysis in Kathmandu Metropolitan Ward No. 10. *Sustainability*, 14(4), 2251. https://doi.org/10.3390/su14042251

Datta, M. G. (2022). Household solid waste management in a developing world: An overview. *Asian Journal of Water, Environment and Pollution*, 19(3), 97–102. https://doi.org/10.3233/AJW220045

Debnath, B., Bari, A. B. M. M., Ali, S. M., Ahmed, T., Ali, I., & Kabir, G. (2023). Modelling the barriers to sustainable waste management in the plastic-manufacturing industry: An emerging economy perspective. *Sustainability Analytics and Modeling*, 3, 100017. https://doi.org/10.1016/j.samod.2023.100017

Debrah, J. K., Vidal, D. G., & Dinis, M. A. P. (2021). Raising awareness on solid waste management through formal education for sustainability: A developing countries evidence review. *Recycling*, 6(1), 6. https://doi.org/10.3390/recycling6010006

Dimoso, R. (2024). Household adoption of modern waste management technologies in Ilala Municipal Council, Dar es Salaam, Tanzania. *NG Journal of Social Development*, *13*(2), 218-231. http://doi.org/10.4314/ngjsd.v13i2.14

Draçi, P., & Laska, A. (2023). Public services, community, and its involvement in decision-making for local development. *Interdisciplinary Journal of Research and Development*, 10(1), 11. https://doi.org/10.56345/ijrdv10n102

Dung Tien Khong & Xuan Thi Dan Huynh. (2022). Households participation in waste management program in Mekong River Delta Vietnam: Parametric and non-parametric approaches. *Journal of Social, Humanity, and Education*, 2(2), 101–113. https://doi/https://doi.org/10.35912/jshe.v2i2.809

Fadhullah, W., Imran, N. I. N., Ismail, S. N. S., Jaafar, M. H., & Abdullah, H. (2022). Household solid waste management practices and perceptions among residents in the East Coast of Malaysia. *BMC Public Health*, 22(1), 1. https://doi.org/10.1186/s12889-021-12274-7

Fernando, S. J., & Zutshi, A. (2023). Municipal solid waste management in developing economies: A way forward. *Cleaner Waste Systems*, 5, 100103. https://doi.org/10.1016/j.clwas.2023.100103

Godfrey, L., Ahmed, M. T, Gebremedhin, K G, Katima, J. H. Y, Oelofse, S., Osibanjo, O, Yonli, A. H, A. (2020). Solid waste management in Africa: Governance failure or development opportunity? In N. Edomah (Ed.), *Regional Development in Africa*. https://doi.org/10.5772/intechopen.86974

Goel, A., Awasthi, M., Sajwan, V., Sharma, P., Kumar, R., Memoria, M., & Pandey, S. D. (2022). Adoption of Solid Waste Management (SWM) practices: Empirical study of households in Meerut City, UP, India. 2022 *International Conference on Advances in Computing, Communication and Materials (ICACCM*), pp. 1–5. Dehradun, India: IEEE. https://doi.org/10.1109/ICACCM56405.2022.10009091

Heldal, R., Nguyen, N.-T., Moreira, A., Lago, P., Duboc, L., Betz, S., Venters, C. C. (2024). Sustainability competencies and skills in software engineering: An industry perspective. *Journal of Systems and Software*, 211, 111978. https://doi.org/10.1016/j.jss.2024.111978

Hu, J. R., Hui, T. Y., & Chan, J. K. (2025). The governance mechanism of household waste sorting in China: insights from residential communities in Yuelu, Changsha. *Environment, Development and Sustainability*, 1-19.

Hussein Mohamed Omar & Saphy Lal Bullu. (2022). Assessment of solid waste management practices in Tanzania's cities. *Global Journal of Engineering and Technology Advances*, 13(1), 108–119. http://doi.org/10.30574/gjeta.2022.13.1.0180

Idris, I., Putri, D. Z., Azhar, Z., Martha, J., & Yeni, I. (2021). Willingness to participate in the analysis of urban waste management in West Sumatra, Indonesia. *Journal Perspektif Pembiayaan Dan Pembangunan Daerah*, 9(2), 115–126.

Kadam, D. D. (2025). Community Participation in Solid Waste Management in Rural Maharashtra. In *Solid Waste Management for Rural Regions* (pp. 69–100). IGI Global Scientific Publishing. http://doi.org/10.22437/ppd.v9i2.12119

Kaiser, H. M., & Drennen, T. E. (Eds.). (2022). *Agricultural dimensions of global climate change (First edition)*. Routledge.

Kalwani, J. D. (2017). Community participation in solid waste management in rapid urbanizing market oriented countries: Morogoro Experience, Tanzania. *Journal of The Geographical Association of Tanzania*, 35, 38–52.

Kihila, J. M., Wernsted, K., & Kaseva, M. (2021). Waste segregation and potential for recycling -A case study in Dar es Salaam City, Tanzania. *Sustainable Environment*, 7(1), 1935532. https://doi.org/10.1080/27658511.2021.1935532

Kirkby, J., O'Keefe, P., & Timberlake, L. (Eds.). (1995). *The Earthscan reader in sustainable development*. New York: Earthscan.

Khong, T. D., & Huynh, X. T. D. (2022). Households participation in waste management program in Mekong River Delta Vietnam: Parametric and non-parametric approaches. *Journal of Social, Humanity, and Education,* 2(2), 101-113.

Kyambade, M., & Namatovu, A. (2025). Navigating trauma: mental well-being after Kiteezi landfill collapse and residential displacement in Uganda. *Disaster Prevention and Management: An International Journal*. http://doi.org/10.35912/jshe.v2i2.809

Kyere, R, Addaney, M, & Akudugu, J. A. (2019). Decentralization and solid waste management in urbanizing Ghana: Moving beyond the status quo. *In Municipal Solid Waste Management. IntechOpen*. http://doi.org/10.5772/intechopen.81894

Ma, H., Li, M., Tong, X., & Dong, P. (2023). Community-level household waste disposal behavior simulation and visualization under multiple incentive policies—An agent-based modelling approach. *Sustainability*, 15(13), 10427. https://doi.org/10.3390/su151310427

Mapunda, A. S., Joseph, K. R., & Kasuwi, S. (2023). Impact of population dynamics on solid waste generation trends in Dar Es Salaam Metropolitan. *International Journal of Advanced Research*, 6(1), 75–87. https://doi.org/10.37284/ijar.6.1.1190

Muheirwe, F, Kombe, J. W, & Kihila, J. M. (2024). Solid waste collection in the informal settlements of African cities: A regulatory dilemma for actor's participation and collaboration in Kampala. *Urban Forum*, 35, 1–22. https://doi.org/10.1007/s12132-023-09482-2

Munro, K. (2023). *The production of everyday life in eco-conscious households: Compromise, conflict, complicity*. Policy Press.

Mwanza, B. G., Mbohwa, C., Telukdarie, A., & Medoh, C. (2019). Road to sustainable manufacturing: Why households are not participating in recycling programs in Ndola, Zambia? *Procedia Manufacturing*, pp. 33, 578–585. https://doi.org/10.1016/j.promfg.2019.04.072

Nasir, S. M., Shafii, H., & Yassin, A. M. (2023). Determining environmental ethics, personal norms, knowledge, and waste separation behaviour among households. *IOP Conference Series: Earth and Environmental Science*, 1205(1), 012002. https://doi.org/10.1088/1755-1315/1205/1/012002

Ngware, N. M. (2015). Solid Waste Management in Dar es Salaam City. *The Journal of Building and Land Development*, 18, 107–124. http://journals.aru.ac.tz/index.php/JBLD/article/view/210

Noufal, M., Maalla, Z., & Adipah, S. (2021). Households' participation in the solid waste management system of Homs City, Syria. *GeoJournal*, 86(3), 1441–1463. https://doi.org/10.1007/s10708-020-10139-x

Nyampundu, Mwegoha & Millanzi WC. (2020). Sustainable solid waste management Measures in Tanzania: an exploratory descriptive case study among vendors at Majengo market in Dodoma City. *BMC Public Health*. http://doi.org/10.1186/s12889-020-08670-0

Nyika, Joan & Dinka, M. (2023). Comparative urban waste management in developing countries—Case studies of Nairobi and Johannesburg Cities of Africa. In: *Urban Commons, Future Smart Cities and Sustainability* (pp. 625–644). Springer International Publishing. http://doi.org/10.1007/978-3-031-24767-5_27

Olson, M. (1965). *The logic of collective action: Public goods and the theory of groups*. Cambridge: Harvard University Press.

Sabarinah, Z. (2017). The importance of waste management knowledge to encourage household waste-sorting behaviour in Indonesia. *International Journal of Waste Resources*, 07(04). https://doi.org/10.4172/2252-5211.1000309

Saeedi, K., Visvizi, A., Alahmadi, D., & Babour, A. (2023). Smart cities and households' recyclable waste management: The case of Jeddah. *Sustainability*, 15(8), 6776. https://doi.org/10.3390/su15086776

Saleh, H., & Hassan, A. (2021). Introductory Chapter: Solid Waste. In H. M. Saleh (Ed.), *Strategies of Sustainable Solid Waste Management*. IntechOpen. https://doi.org/10.5772/intechopen.95327

Saurabh, S. & Khan, R. (2022). 23—Sustainable waste management approach: A paradigm shift towards zero waste into landfills. In: *Advanced Organic Waste Management* (pp. 381–395). Elsevier. http://doi.org/10.1016/B978-0-323-85792-5.00006-X

Thomas, E. F., Louis, W. R., & McGarty, C. (2022). Collective action for social change: Individual, group, and contextual factors shaping collective action and its outcomes. In: D. Osborne & C. G. Sibley (Eds.), *The Cambridge Handbook of Political Psychology* (1st ed., pp. 492–507). Cambridge University Press. https://doi.org/10.1017/9781108779104.034

Trenberth, K. E. (2022). *The changing flow of energy through the climate system* (1st ed.). Cambridge University Press. https://doi.org/10.1017/9781108979030

United Republic of Tanzania. (2022). Administrative Units Population Distribution Report.

Vanni, F. (2014). The role of collective action. In F. Vanni, *Agriculture and Public Goods* (pp. 21–37). Dordrecht: Springer Netherlands. https://doi.org/10.1007/978-94-007-7457-5_2

Vinti, G., & Vaccari, M. (2022). Solid waste management in rural communities of developing countries: An overview of challenges and opportunities. *Clean Technologies*, 4(4), 1138–1151. https://doi.org/10.3390/cleantechnol4040069

Woodard, R., & Rossouw, A. (2021). An evaluation of interventions for improving pro-environmental waste behaviour in social housing. *Sustainability*, 13(13), 7272. https://doi.org/10.3390/su13137272

Yazdani, S., & Lakzian, E. (2023). Conservation; waste reduction/zero waste. In: *Pragmatic engineering and lifestyle* (pp. 131-152). Emerald Publishing Limited. http://doi.org/10.1108/978-1-80262-997-220231007

Yustas, Y. M., Tarimo, W. M., Mbacho, S. A., Kiobia, D. O., Makange, N. R., Kashaija, A. T., Silungwe, F. R. (2022). Toward adaptation of briquettes making technology for green energy and youth employment in Tanzania: A review. *Journal of Power and Energy Engineering*, 10(04), 74–93. https://doi.org/10.4236/jpee.2022.104006