

PLASTIC WASTE MANAGEMENT IN URBAN DISTRICT, ZANZIBAR

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Abstract

This study examined plastic waste management in the Urban District of Zanzibar, focusing on the types of plastic waste generated, household storage practices, and existing waste management practices. A mixed-methods design was employed, in which quantitative data were collected from 696 households across Stone Town and areas outside Stone Town, while qualitative data were obtained from 20 key informants from government institutions, business enterprises, and non-governmental organizations. Data were collected using questionnaires and interviews. Quantitative data were analyzed using descriptive statistics, while qualitative data were analyzed through thematic analysis. Validity, reliability, and ethical requirements were observed throughout the study. The findings revealed that plastic waste generation is dominated by single-use plastic products, particularly plastic bottles, cups, and plates, although their distribution varies across locations. The increase in plastic waste was associated with urban economic growth, tourism, trade, construction activities, and changing consumption patterns. Households commonly store plastic waste in containers of different sizes, and waste is generally stored without source segregation. Disposal through municipal collection points was identified as the dominant management practice, although burning, illegal dumping, and burying of plastic waste persist. Reuse of plastic materials was found to be moderate, while recycling practices remain limited. The study concludes that, despite the existence of formal municipal waste collection systems, plastic waste management in Urban District Zanzibar remains constrained by inadequate waste segregation, limited public awareness, and weak recycling mechanisms. The study recommends strengthening source segregation, expanding recycling initiatives, promoting reusable alternatives to single-use plastics, and implementing Extended Producer Responsibility schemes to support sustainable plastic waste management.

Keywords: Plastic waste management, source segregation, recycling, Extended Producer Responsibility, Urban District Zanzibar.

INTRODUCTION

Plastics have been used widely in different human life activities such as food packaging, domestic appliances, and portable drinking water due to their natural properties such as

inertness and low bulk densities, which make them suitable mover materials and pose little risk of contamination. Globally, the rapid increase in plastic consumption has not been matched with adequate waste management systems, particularly in developing countries.

For example, Siddiqui and Pandey (2013) observed that plastic bottles and other plastic materials have become highly prevalent in Urban India, where weak policy enforcement has resulted in widespread littering and environmental health concerns. Similar experiences have been reported in other low- and middle-income countries, where rapid urbanization and changing consumption patterns have increased plastic and overall waste generation, while waste collection and recycling infrastructure have not kept pace, leading to high rates of mismanaged waste (Kaza et al., 2018).

Furthermore, rapid population growth and urbanization, combined with industrial growth, have together led to critical waste management issues around the world. Developments such as the rising number of additives used to modify the strength, texture, flexibility, color, resistance to microbes, and other features of plastics make plastics less recyclable. However, Okot-Okumu and Nyenje (2011) revealed that, between the 1950s and the 1960s, there were efficient waste management strategies, including regular municipal waste collection, controlled disposal at designated dumping sites, widespread reuse of materials such as glass and metals, and strong regulatory enforcement supported which enabled effective waste handling. However, it was reported that such strategies have been rendered insufficient in the contemporary era due to rapid urbanization and industrial growth.

Various approaches have been proposed to address the growing challenge of plastic waste management. Incineration has been described as one of the simplest methods for reducing the volume of solid waste (Trivedi et al., 2022). However, the burning of plastics is widely criticized due to the associated environmental and health risks, making it an unsustainable long-term waste management strategy.

Alternatively, recycling has been identified as a more environmentally sound option, as most plastic materials can be reprocessed and reintroduced into production cycles (Pathak et al., 2023).

Despite its potential, effective recycling remains difficult to achieve in many developing countries. Challenges related to waste accumulation, inadequate sorting systems, weak institutional capacity, and limited infrastructure significantly constrain recycling efforts. In several developing contexts, including Tanzania, insufficient waste management provisions often result in plastics being improperly disposed of in open spaces, rivers, and other water bodies (Ayeleru et al., 2020; Liyala, 2011). Furthermore, the success of recycling initiatives depends heavily on public awareness, financial capacity, and the availability of appropriate collection and processing facilities.

Since the year 2010, Tanzania has experienced a rapid expansion of cities, which has been accompanied by an increase in economic activities and population. The major towns, such as Dar es Salaam, Arusha, Mwanza, and Mbeya, have increased activities such as education, health, trade, business, and manufacturing, all of which have the potential to generate plastic waste (Liyala, 2011). In addition, Urban local government in Tanzania faces challenges in solid waste collection, including limited community and stakeholder participation in solid waste management, and a shortage of funding, infrastructure, collection trucks, bins, and waste-separation facilities.

Staehr et al. (2018) noted that since 1990, the rapid growth of tourism in Zanzibar has been associated with significant environmental degradation, particularly affecting coral reefs, mangrove forests, and seagrass beds. This degradation has occurred both directly through

physical damage and indirectly through increased sewage discharge. Other sources of plastics come from food distribution points, cafés, shops, and households in urban districts. Checking this pattern in relation to Stone Town, a town that hosts a high concentration of tourism facilities and food-related businesses that substantially increase local waste generation, the issue of plastic management and its strategies raised interesting discussions among citizens.

Based on the foregoing discussion, Stone Town and the surrounding areas of the Urban District in Zanzibar present a critical case for examining plastic waste management. Stone Town, as a major tourism hub with concentrated commercial activities and growing consumption of single-use plastics, while the Out-Stone Town, the new developing area, generates substantial volumes of waste through different types of plastic waste, including building materials, which increases pressure on existing management systems. Therefore, this study seeks to assess how plastic waste is managed both within Stone Town and in the surrounding urban areas, to identify gaps and propose context-specific strategies to improve waste management performance.

The Main Research Question of the Study

What is the status of plastic waste management in Urban District Zanzibar?

Specifically, the study was governed by the following three research questions: -

1. What are the main types of plastic waste generated in Urban District Zanzibar?
2. How is plastic waste stored at household levels in Urban District Zanzibar?
3. What are the existing practices of plastic waste management in Urban District Zanzibar?

In the first research question, the focus was to identify and understand the types of plastic waste generated across the Urban District, both in Stone Town and outside Stone Town. This includes examining the different categories of plastic waste materials commonly produced in these areas. The second research question was designed to understand household storage practices and methods of temporary containment, storage facilities used, and associated challenges before collection or disposal. Finally, the third research question was structured to examine household practices in managing plastic waste. It aims to explore how households and other stakeholders handle plastic waste, including how it is managed, who is responsible for its collection and disposal, and where the waste ultimately ends up.

LITERATURE REVIEW

Plastic pollution is one of the major global environmental challenges and is, therefore, increasingly attracting societal attention. This has resulted in the adoption of a long array of national and international policies targeting reducing plastic pollution as well as management (Syberg et al., 2021). Plastic waste generation and pollution are associated with population density and the expansion of urbanization. For instance, Jambeck et al. (2015) reported that cities with higher populations and advanced economies typically generate larger quantities of plastic waste due to higher consumption rates. In several African cities, including Cairo, rapid population growth has overwhelmed waste collection systems, resulting in inadequate service provision and environmental problems due to insufficient infrastructure and collection capacity (Nyathi, 2025).

Household-level waste handling practices play a critical role in determining the effectiveness of urban waste management systems. Studies

have shown that the absence of source separation significantly reduces the efficiency of recycling and resource recovery efforts (Wilson et al., 2013). Krishnan et al. (2026) noted that in many low- and middle-income countries, households typically do not separate solid waste, instead placing it out for collection in a mixed state due to poor classification systems, limited infrastructure, and prevalent behavioral issues. This mixed waste diminishes chances for material recovery and increases the burden on municipal waste management systems. Kaza et al. (2018) further note that inadequate segregation at source remains one of the primary constraints to sustainable waste management in developing urban contexts. Following this review, it highlights the importance of understanding household storage and management practices, particularly in rapidly urbanizing areas such as Zanzibar.

In addition to storage and collection systems, behavioral factors such as environmental awareness, education, and economic motivation strongly influence plastic waste management practices. Vicente and Reis (2008) argue that environmental knowledge significantly increases household participation in waste reduction and reuse activities. Similarly, Ayeleru et al. (2020) emphasize that in sub-Saharan Africa, plastic waste management challenges are not only infrastructural but also behavioral, as limited public awareness constrains the adoption of sustainable practices such as reuse and recycling. This study suggests that improving environmental literacy and strengthening institutional support mechanisms are essential components of effective plastic waste management strategies.

METHODOLOGY

Study Design

This study was conducted through a mixed-methods approach where both qualitative and

quantitative data were collected. This approach was selected based on the argument pointed out by Clark (2017) that the use of a single methodology often fails to explore all of the intended aspects of plastic waste management; thus, the use of a mixed-methods approach is suggested to counteract the weakness of each approach and thus enhance the quality of the information.

Creswell (2017) categorized mixed-methods research approaches into four designs: Convergent parallel, embedded, and Explanatory sequential. In this study, an explanatory sequential design was applied, whereby a quantitative study and data were collected from the households, analyzed first, and then followed by qualitative data from the key informants.

This design was applied to support explaining and understanding why something works. The stakeholders use certain strategies of plastic waste management in the way they do. The design enabled the researcher to begin with a single piece of quantitative data and then go to a deeper insight into their practices.

Study Area

The study was conducted in Zanzibar at the urban region of Unguja Island with a specific focus on the Urban district, where ten out of 56 Shehia in the district were involved in the study. Of the ten Shehia involved, four are located in Stone Town, Malindi, Shangani, Mkunazini, and Mnazi Mmoja, while six (6) were drawn from outside Stone Town, the area that is denser in residential buildings: Mlandege, Mpendae, Muembe Makumbi, Kwahani, Miembeni, and Kwa Wazee (Figure 3.1).

The areas were selected due to their characteristic nature of waste generation and economic activities that represent a broader spectrum of the total social and economic activities taking place in Zanzibar. Stone Town

is the central tourism hub in Zanzibar that contributes significantly to the economy of the country while generating an abundance of solid waste, including plastic waste. The Outside of Stone Town is a residential area where much of the waste is generated through households, construction, and commercial activities.

Study Population

The population of this study comprises all households living in the urban district of Zanzibar, together with business entrepreneurs, government officers responsible for waste management, including the Zanzibar Municipal Council and the Department of Environment, working in the urban district of Zanzibar. The Urban District is made up of 56 Shehias, of which five (5) are located in the Stone Town area and 51 Shehias located Outside Stone Town.

Sample Size

The sample size of this study was 716, of which 696 were from the households, and 20 key informants from the municipal council, the Department of Environment, business entrepreneurs, and NGOs responsible for waste management issues. To get the sample size from the household group, the 10% rule approach was applied, whereby 526 respondents were taken from six Shehia outside Stone Town, and 170 respondents were drawn from four Shehia of Stone Town. Mohanasundaram et al. (2024) suggested that using 10% of the population as the sample size provides a quick and reliable estimation that enables a diverse range of opinions and characteristics within the study population. The actual sample size for the study for the household is shown in Table 3.2.

Table 1: The actual sample size for each Shehia Stone Town & outside Stone Town

S/No			Ward/Shehiaa	Number of Households	Actual sample size
1.	Outside the Stone Town area		Mlandege	397	40
2.			Mpendae	943	94
3.			MuembeMakumbi	941	94
4.			Kwahani	1188	119
5.			Miembeni	874	87
6.			Kwawazee	919	92
Total				5262	526
1	Stone Town area		Malindi	583	58
2			Shangani	403	40
3			Mkunazini	355	36
4			Mnazimmoja	362	36
Total				1703	170

For the qualitative strand, 20 key informants that directly involved in the waste management activities and those who know plastic solid waste management were purposely selected. The selection was done based on their roles and responsibilities from their respective organization. Six (6) respondents were from the Zanzibar Municipal Council, five (5) from the

Department of Environment, five (5) respondents from macro and micro business enterprises, and four (4) respondents from NGOs that deal with environmental issues within the study district.

Sampling Technique

This study employed a stratified random sampling technique based on geographic

location to ensure balanced representation from different areas. The population was first divided into two main strata: Stone Town and Outside Stone Town. The use of stratified random sampling helped to ensure that the sample was representative of both Stone Town and outside Stone Town.

Within each stratum, a random sampling method was applied to select both the Shehias and the households to be surveyed. Random sampling, as supported by Noor et al. (2022), increases the likelihood of equal representation and contributes to greater accuracy and impartiality in the findings.

The selection of Shehias began with obtaining a complete list of all Shehias from local administrative records. Stone Town contains 5 Shehias, whereas the area outside Stone Town

comprises 51 Shehias. Each Shehia was assigned a unique identification number. A simple random sampling approach was then used to select Shehias from each stratum. This was achieved using a basket to roll the number, which ensured that each Shehia had an equal chance of being selected.

Key informants were purposefully selected based on their knowledge, administrative position, and responsibility in their respective organizations. This is in line with Obilor (2023), who urged that purposeful sampling is often used in qualitative research, where the researcher wants to gain detailed knowledge about a specific phenomenon rather than make statistical inferences, or where the population is very small and specific.

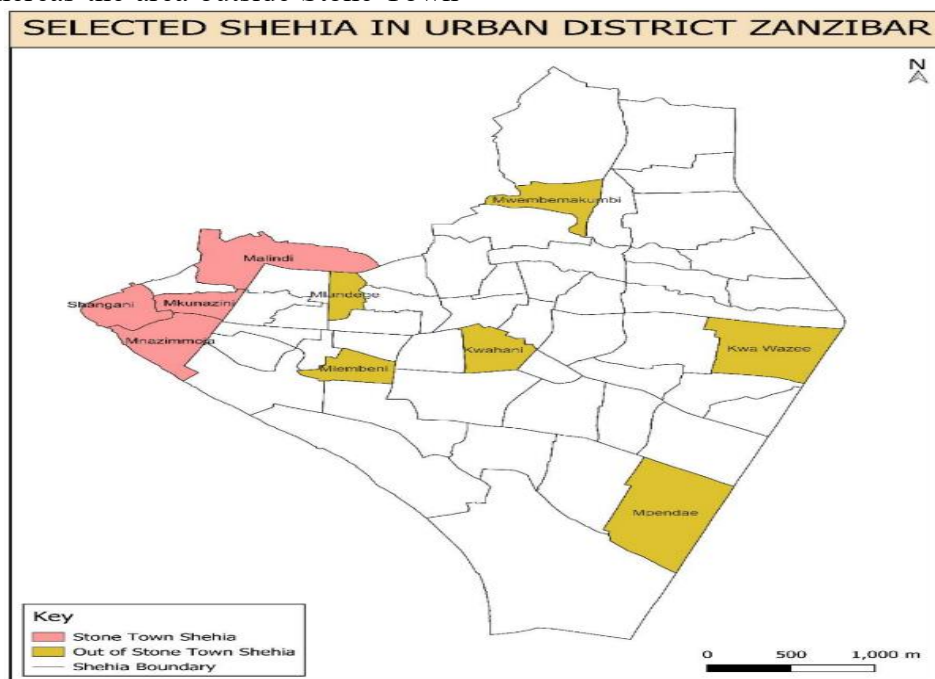


Figure 1: Urban District Shown Location of Study Shehias
Source: Population census statistic report, 2022

Data Collection

Data for this study were collected using two main instruments: questionnaires and interviews. An open-ended and structured

questionnaire was administered to 696 of the head households to understand the current practices and the strategies applied to plastic solid waste management. Further, a one-on-one

interview was conducted face-to-face with the 20 key participants drawn from the four key institutions: the Zanzibar Municipal Council (ZMC), the Department of environment and, NGOs, and business entities.

Validity and Reliability

To ensure that the results were valid and reliable, the researcher continuously cross-checked and verified the collected data to ensure it addressed the stated research questions. The study involved the use of multiple stakeholders involved in plastic waste generation, users, and management to get balanced opinions and positions on the issues relating to plastic waste management in Urban District Zanzibar. Moreover, to ensure the instrument applied captured what was intended to capture, a pilot exercise was administered before the real data collection exercise.

Data analysis

As the study employed a mixed-method approach, the data were analyzed using two different techniques. The quantitative data were analyzed through descriptive statistics using the Statistical Package for the Social Sciences (SPSS). The statistical charts and frequency distribution were generated to provide robust descriptions of the findings. On the other hand, a thematic analysis was applied. The interview data were coded, and the themes were formulated. For each theme, some respondents' quotations were taken as evidence of the participants' responses.

Ethical Considerations

Ethical considerations were carefully observed during the data collection process. The researcher sought permission from respondents and ensured that their participation was voluntary and free from any form of pressure or fear. The privacy and confidentiality of the information provided were strictly protected. In addition, respectful and courteous language was

used throughout the interviews and discussions to maintain a professional and comfortable environment for all participants.

FINDINGS AND DISCUSSION

Findings

This section presents the findings of the study on the status of plastic waste in Urban District Zanzibar. The findings are organized according to the study objectives, which focused on identifying the types of plastic waste generated, examining the storage of plastic waste at the household level, and examining the current practices of plastic waste management among households and other stakeholders.

The Types of Plastic Waste in Urban District Zanzibar

The focus was on identifying the types of plastic waste generated in the Urban District. The findings of this study indicated that there were different types of plastic waste generated across the urban district, but with notable differences between Stone Town and Outside Stone Town. This might be associated with the social and economic activities of these two areas. While plastic water bottles dominated in Stone Town, plastic utensils, plastic cups, and plastic plates were huge Outside Stone Town. Interestingly, plastic bags were found in low numbers across both areas, and this might be a result of the enforcement of plastic bag bans in the country. Figure 1 summarizes the response from the households across both areas, Shehia outside Stone Town.

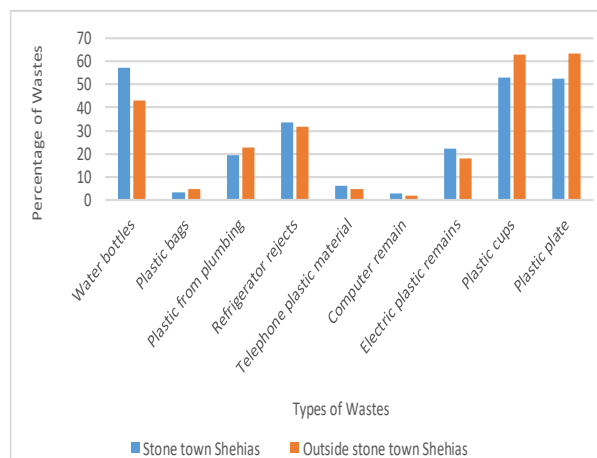


Figure 2 provides the types of plastic waste in Stone Town and Outside Stone Town

The figure indicates that, in Stone Town, the highest proportion of plastic waste came from water bottles (57.1%), followed by plastic cups (52.9%) and plastic plates (52.4%). In contrast, households outside Stone Town generated more plastic plates of about 63.5% and plastic cups of about 63.1%, while water bottles accounted for a lower proportion of 43% as compared to Stone Town, as shown above.

The higher percentage of plastic bottle waste in Stone Town suggests greater consumption of bottled water, which may be associated with increased tourism activities and a more modernized urban lifestyle. Meanwhile, the higher levels of plastic cups and plates outside Stone Town indicate a strong reliance on single-use food-serving materials. This pattern may be influenced by affordability and convenience, as plastic utensils are generally cheaper and more accessible than glass, iron, or other reusable alternatives.

The quantitative findings were corroborated by the qualitative findings that the plastic waste across the district originated from various sources, including plastic bottles, plastic packaging, damaged plastic products from second-hand businesses, and electronic devices. During the interview with the

Municipal officer, a responsible officer for collecting Municipal waste had this to say:

Interview with municipal officer:

The municipal officer explained that various types of plastic waste are commonly found in urban areas. These include plastic bottles, packaging materials, and household plastic containers. Plastic wrapping from food containers and plastic bags are also prevalent. Although plastic bags have been banned by the government, they are still found within households and business premises.

Interview with environmental officer:

It is evident that various types of plastic waste are generated in the urban districts of Zanzibar, particularly domestic plastic materials. Plastic bottles and plastic packaging are among the most commonly observed types of waste in both Stone Town and areas outside Stone Town.

The business officer also had this to say:

According to the business officer, Urban districts in Zanzibar generate diverse forms of plastic waste, including beverage containers, plastic bottles, household plastic materials, and packaging from electronic devices. Additionally, electronic waste such as computers, switch sockets, and mobile phones is also present.

NGO officers noted as follows:

NGO officers similarly reported the presence of various types of plastic waste in both Stone Town and areas outside Stone Town. These include plastic bottle packaging, construction-related plastic materials, plastic bags, food containers, plastic cups, and plastic plates.

Based on the aforementioned responses, the qualitative findings concur with the quantitative results, showing that a wide variety of plastic

waste is generated across Urban districts in Zanzibar.

The Storage of Plastic Waste in Urban District Zanzibar

This section examined how plastic waste is being stored before being disposed of at the collection point. The findings from the Stone Town area indicated that 24.1% of respondents used containers of 10 liters, 34.1% of respondents used containers of 20 liters, 27.6% used plastic containers of 50 liters for handling

collected waste, while 14.2% claimed to use containers of 100 liters for storing collected waste. The study also revealed that outside Stone Town, 31.2% of respondents used containers of 10 liters, 58.3% of respondents used containers of 20 liters, 11.2% commented on using containers of 50 liters, and 3.8% used containers of 100 liters, and others used plastic sacks for temporary storage. Figure 3 illustrates the distribution of solid waste container volumes identified in the study areas.

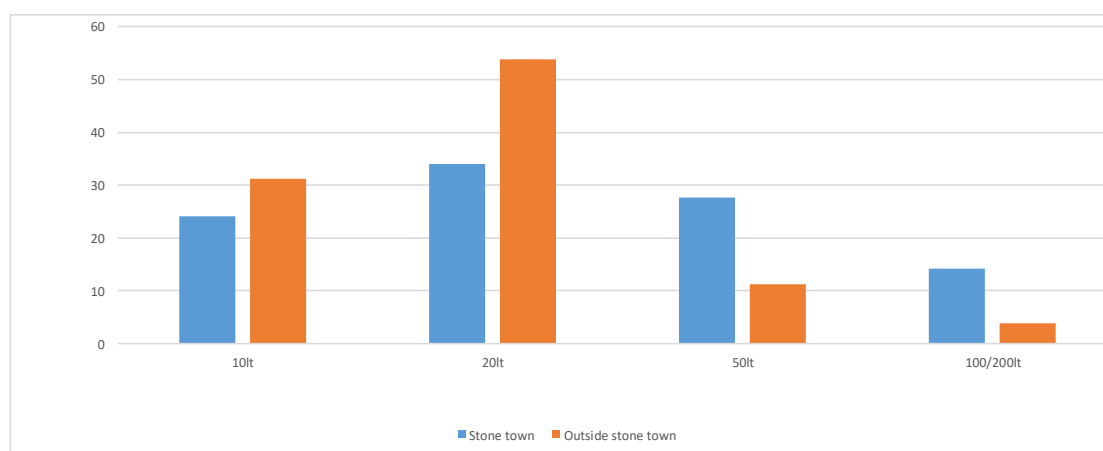


Figure 3: Volume of the Solid Waste Container at Stone Town and Outside Stone Town

Corroborating the quantitative data with the qualitative data was done, whereby the interviewee had more information regarding the intended subject. For instance, during the interview with the key informants, the following was revealed;

Interview with Environmental Officer,

Most of the households use various containers, such as plastic buckets and sacks, to store their mixed solid waste, including plastic waste. Most of these containers are kept outside the home to reduce odors and facilitate easy transfer to collection points.

Interview with municipal officer:

There are different types of storage containers, including plastic buckets, plastic

sacks, and containers of different sizes, which are placed outside the houses for waste storage. Using different types of containers for handling plastic waste minimizes the spread of waste, hence preventing environmental hazards and keeping the surrounding environment neat and clean.

Business officer:

In most business areas, big containers such as 100 liters are commonly used for handling large amounts of waste, which is mostly from packaging materials like garments, shirts, and trousers, and even covering plastic packages from electronic devices. Decent storage containers for waste management are necessary for the proper collection of waste

and to provide a clean, good environment for customers.

NGO officer:

In most cases, plastic containers and plastic sacks are used for the storage of mixed solid waste without sorting or segregation, which increases the volume of solid waste collected. Most householders use storage waste containers for efficient waste management and environmental protection, and to avoid spreading waste to the surrounding environment.

Interviewees broadly highlighted the environmental benefits of container use, noting that waste storage in buckets, sacks, and containers helps minimize littering, reduces environmental hazards, and promotes cleanliness.

The Current Practices of Plastic Waste Management in Urban District

This section presents the current practices of plastic waste management in the Urban

District. The study revealed two key practices of plastic waste management: the plastic waste disposal methods and the reuse of plastic waste. Understanding these practices is essential for assessing the effectiveness and sustainability of existing plastic waste management in the study area.

Method of Plastic Waste Disposal

The study also seeks to understand the practices exercised by the households on the disposal of plastic solid waste across Stone Town and Outside Stone. The quantitative findings revealed that among the respondents outside the stone town, 463 (88%) transfer their plastic waste to the municipal collection point, while 14 (2.7%) indicated that they used to burn their plastic waste, 18 (3.4%) dispose of it in the nearby environment such as illegal open spaces or ruins, and 31 (5.9%) use other methods like burying and other putting their garbage in open piles waiting decomposition to take place and then used it as organic fertilizer.

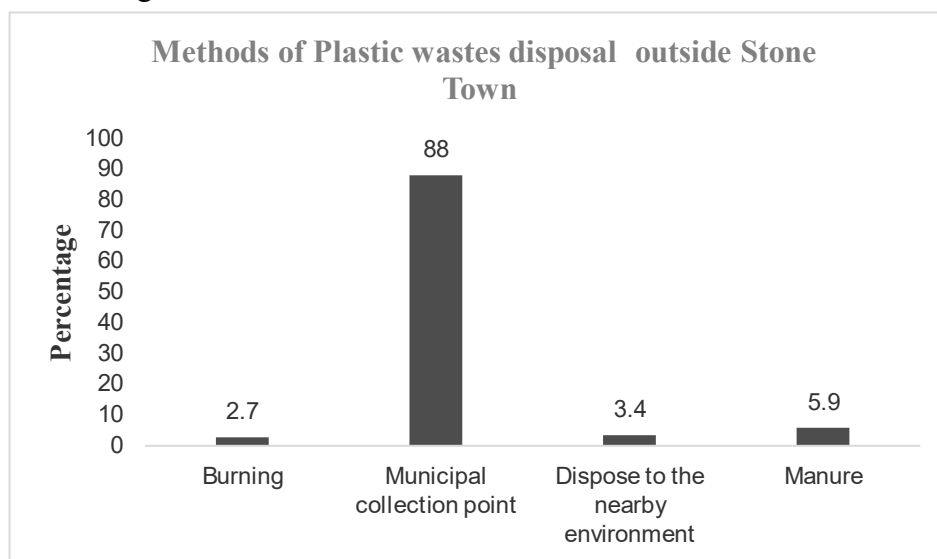


Figure 4. Methods of plastic waste disposal Outside Stone Town

In Stone Town, results show that 2 (1.2%) of respondents burn their plastic waste, 162 (95.2%) of respondents transfer their waste to a

collection point, 4 (2.4%) dispose of it in the nearby environment, and 2 (1.2%) reported hiring people to collect and dispose of their

waste at the collection point.

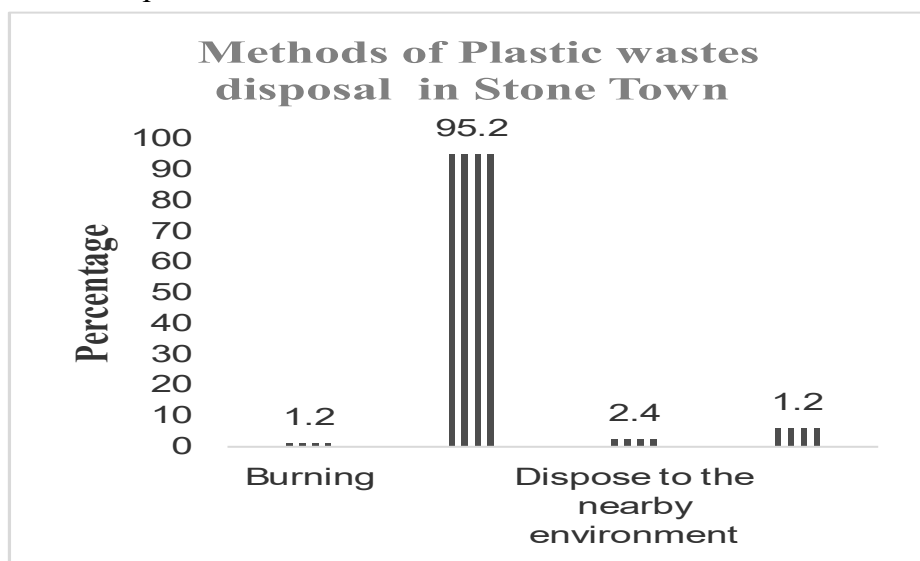


Figure: Methods of plastic waste disposal in Stone Town

The findings indicate that the majority of households in both Stone Town (95.3%) and areas outside Stone Town (88%) dispose of plastic waste through municipal collection points. This suggests relatively strong reliance on formal waste collection systems within the Urban District, particularly in Stone Town, where participation is notably higher.

To depict more relevant information regarding the disposal of plastic in the household, the question was asked, what strategies should be implemented by citizens to control plastic waste and prevent it from harming the environment?" The responses were as follows:

Interview with an environmental officer

The householders should be given knowledge of sorting waste to distinguish plastic and other types of waste to prevent the hazardous effects of plastic waste in the environment and ensure proper disposal of plastic waste. Informal waste pickers should be recognized and supported to improve waste management and resource efficiency.

Interview with a municipal officer

Local leaders in all shehia, Stone Town, and outside Stone Town should highly supervise cleanliness activities in their respective areas and ensure the citizens do not spread plastic waste indiscriminately in their areas and the surrounding environment.

Interview with Business Officer:

Municipal councils should routinely collect waste from householders, shops, and supermarkets and take it to disposal sites, avoiding the flooding of plastic waste in the surrounding environment. In addition, co-provisioning of collection storage containers along various streets would encourage greater public participation in proper waste disposal practices.

NGO officers:

Community groups should be given knowledge and equipment for the collection and recycling of plastic waste materials; this will help to minimize pollution from plastic waste and maintain cleanliness in the city.

The findings highlight that public education is crucial for effective plastic waste management, as it raises awareness and promotes responsible disposal.

Reusing plastic materials in the household

The findings of this study revealed that some stakeholders, including households, engaged in reusing plastic waste as an informal waste management practice. The findings from the quantitative strands showed that outside Stone Town, 47.5% of respondents acknowledged reusing plastic bottles and other plastic containers to make other usable items, while 52.5% refused to reuse them. Table 1 presents the results on the reuse of plastic waste among households outside Stone Town.

Table 1: Reusing Plastic Materials outside Stone Town

Response	Frequency	Percent (%)
Yes	250	47.5
No	276	52.5
Total	526	100.0

Similarly, in the context of Stone Town, about 43.5% of respondents reported reusing plastic waste, such as plastic bottles and containers, into usable items, whereas 56.5% were not involved in reusing them. Table 2 gives the results on the reuse of plastic waste among households in Stone Town for more details.

Table 2: Reusing Plastic Materials in Stone Town

Response	Frequency	Percent (%)
Yes	74	43.5
No	96	56.5
Total	170	100.0

Furthermore, following up on the results from the quantitative part, the responses of the key informant interviewees divulged the reason behind the relatively low number of householders who reuse plastic waste as a

mechanism for plastic waste management. It was noted that education is one of the important parameters in the management of plastic waste. Although reuse practices are present, they may require further support through awareness programs and community-based waste management initiatives. For instance, during the interview, the key informants pointed out as follows:

Environmental officer

“Education is vital in fostering the reuse of plastic waste by increasing awareness of its environmental consequences, informing about the advantages of recycling and reuse, and motivating changes in behavior. In reality, many of the households have limited knowledge of the reuse of plastic waste; maybe the government and other environmental stakeholders need to sensitize the community on this matter.”

Municipal Officers interviewed revealed that

“The community needs to be educated on the reuse of plastic waste to reduce the challenges of plastic pollution. The education should begin from the grassroots (kindergarten) on how to manage plastic waste. This can be done well by using different NGOs and other environmental stakeholders.

The business officer indicated that

“People reuse plastic bottles for food and beverage purposes. However, both community members and business operators need to be encouraged to reuse plastic containers under proper hygienic conditions, especially when they are used for consumable products.”

Interview results from an NGO officer revealed that

“Through public meetings on proper collection, disposal, reusing and reducing usage of products made of plastic materials, we encourage the community on the proper

reusage of plastic waste materials; however, the idea has not yet been fully taken by all community members”

In the context of this study, the re-use of plastic materials at the household level could serve as an important first step towards reducing single-use plastic leakage into the environment. However, reusing plastic items without observing proper hygiene can lead to health problems.

DISCUSSION

This section presents the discussion of the key findings derived from the study based on the status of plastic waste management in the Urban District of Zanzibar. The discussion is structured around the three main research objectives: identifying the major types of plastic waste encountered in the area, exploring household storage practices for plastic waste, and examining household plastic waste management practices. By addressing these areas, the discussion highlights the current state of plastic waste collection and handling within urban households, providing insights into the challenges and opportunities for improving waste management in Zanzibar.

Major Types of Plastic Waste in Urban District Zanzibar

The identification of diverse plastic waste streams in Zanzibar’s Urban District aligns with broader research indicating that rapid urbanization generates a heterogeneous mix of polymers, complicating municipal collection and sorting (Ayeleru et al., 2020; Jambeck et al., 2018). Without targeted interventions, this diverse waste profile places immense strain on existing infrastructure.

Crucially, this study reveals distinct micro-spatial heterogeneity in plastic waste generation within a single urban district, challenging the

conventional treatment of urban areas as homogenous entities. Specifically, plastic water bottles dominated in Stone Town (57.1%), corroborating the extensive use of lightweight polymers for packaging (Siddiqui & Pandey, 2013). This concentration is driven by multiple interrelated factors. Urban areas tend to have increased economic activity and greater availability of bottled beverages, particularly due to the presence of tourists and commercial activities. Conversely, areas outside Stone Town exhibited a predominance of plastic plates (63.5%) and cups (63.1%). This reflects a reliance on single-use food-serving materials driven by affordability and convenience in high-density residential zones, demonstrating that localized consumption habits dictate specific waste fractions (Maione, 2012).

Ultimately, the local differences and changing types of plastic waste prove that a single, general approach to waste management is ineffective. This is strongly supported by broader literature advocating for decentralized and context-specific waste governance (Kaza et al., 2018; Wilson et al., 2015). Addressing the persistent challenge of non-degradable polymers, therefore, requires localized, source-segregated strategies tailored to the distinct socio-economic realities of both historic centers and their residential peripheries (Zurbrügg et al., 2020).

Household Storage Practices for Plastic Waste in Urban District Zanzibar

The size and type of household storage containers fundamentally dictate urban waste management efficiency. Aligning with Hardoy et al. (2013) and Zurbrügg et al. (2020), who emphasize that appropriate household receptacles minimize environmental leakage, this study found the 20-liter container to be the most prevalent in both Stone Town (34.1%) and Outside Stone Town (58.3%). However, distinct spatial variations challenge uniform municipal

approaches. Stone Town exhibited a higher reliance on larger capacities (50L and 100L combined at 41.8%), reflecting the robust infrastructure needed for bulky commercial packaging (Kaza et al., 2018; Wilson et al., 2013). Conversely, Outside Stone Town's reliance on smaller containers and plastic sacks mirrors findings from Kampala and Dar es Salaam, where inadequate formal storage forces improvisation, often leading to indiscriminate disposal (Katusiimeh, 2012; Mnyanyi, 2014).

Beyond physical capacity, the material and usage of these receptacles reveal a critical oversight in current strategies. Households predominantly use plastic containers and sacks for mixed, unsorted solid waste. While affordable, these materials degrade rapidly outdoors, creating a "storage paradox" where the solution itself becomes a source of plastic waste (UNEP, 2024). More importantly, this lack of source segregation inflates collected volumes and contaminates recyclables, rendering the physical adequacy of the containers moot.

By extending the analytical focus beyond mere container distribution, typically examined in sub-Saharan contexts (Katusiimeh, 2012; Mnyanyi, 2014), these findings demonstrate that volume alone is insufficient for effective plastic waste management. The identification of this localized storage paradox highlights that future municipal interventions must shift from merely providing physical receptacles to mandating source segregation and promoting durable, non-plastic alternatives.

Household Plastic Waste Management Practices in Urban District Zanzibar

Method of Plastic Waste Disposal

The findings indicate that most households in both Stone Town and areas outside Stone Town dispose of plastic waste through municipal collection points, with participation being

higher in Stone Town. This may reflect better access to waste collection services, stronger municipal oversight, and the greater importance of maintaining environmental cleanliness in a heritage and tourism-sensitive area. These findings contrast with studies from many low-income countries where open dumping and burning remain dominant due to inadequate collection systems (Kaza et al., 2018; Wilson et al., 2013). The results, therefore, suggest that the Urban District of Zanzibar has achieved a relatively higher level of integration into formal waste collection systems than is commonly reported in comparable urban settings.

However, the continued use of burning, illegal dumping, and burying of plastic waste, particularly outside Stone Town, indicates that gaps in service accessibility, environmental awareness, and enforcement still exist. Similar challenges have been reported by Hassan et al. (2021), who reported that Zanzibar lacks a formal solid waste management system; people collect waste in various receptacles like plastic bags, palm baskets, plastic buckets, and other plastic containers, which are then tossed around the neighborhood. The findings further show that while formal collection systems are available, their effectiveness depends on community participation, local supervision, and environmental awareness. This extends existing knowledge by demonstrating that accessible collection infrastructure combined with local governance support can encourage formal disposal practices, although additional efforts are needed to address residual improper disposal behaviors. Given Zanzibar's dependence on tourism and coastal resources, strengthening waste segregation, public education, and recycling initiatives remains essential for reducing environmental pollution and promoting resource recovery (Kibria et al., 2023; UNEP, 2021).

Re-using Plastic Materials in the Household

The findings reveal a moderate level of plastic reuse among households in both Stone Town and areas outside Stone Town, with little variation between the two locations. This suggests that reuse behaviour is influenced less by geographical location and more by factors such as environmental awareness, education, and attitudes towards waste management. The qualitative findings support this interpretation, as key informants consistently emphasized the need for community sensitization to promote reuse practices.

These results are consistent with Lal and Singh (2012), who observed that households in many developing countries commonly reuse plastic containers for domestic purposes, often for economic reasons. Similarly, Kherdekar and Ade (2024) note that reuse remains more common than formal recycling in many African cities due to limited recycling infrastructure. Nevertheless, the finding that more than half of the households do not reuse plastic materials indicates that the potential of reuse as a waste reduction strategy remains underutilized. This study contributes to the literature by showing that limited awareness and environmental education are important barriers to wider adoption of reuse practices in Zanzibar. Promoting safe and hygienic reuse could therefore support circular economy efforts by reducing plastic waste generation and extending the lifespan of plastic products. However, improper reuse, particularly of food and beverage containers, may pose health risks, highlighting the need for public education on safe reuse practices (Abraham et al., 2024).

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study examined plastic waste management in Urban District Zanzibar by focusing on the types of plastic waste generated, household

storage practices, and existing waste management practices. The findings revealed that plastic waste is dominated by single-use products, particularly plastic bottles, cups, and plates, although their distribution varies across locations, reflecting differences in socio-economic activities and consumption patterns. The relatively low occurrence of plastic bags suggests that the national plastic bag ban has contributed to reducing their prevalence.

The study further found that households commonly store plastic waste in containers of varying sizes. However, plastic waste is generally stored together with other household waste without source segregation, limiting opportunities for recycling and resource recovery. In terms of management practices, disposal through municipal collection points emerged as the dominant method, indicating substantial reliance on formal waste collection systems. Nevertheless, the persistence of burning, illegal dumping, and burying of plastic waste, together with the moderate level of plastic reuse, demonstrates that plastic waste management remains constrained by inadequate waste segregation, limited environmental awareness, and weak recycling practices.

Overall, the study concludes that while formal waste collection systems play a significant role in managing plastic waste in Urban District Zanzibar, improving waste segregation, promoting recycling and safe reuse practices, and strengthening public awareness are essential for achieving more sustainable plastic waste management outcomes.

Recommendations

Based on the findings, municipal authorities and other environmental stakeholders should strengthen plastic waste management through integrated interventions that address waste generation, storage, and disposal practices.

Priority should be given to promoting reusable alternatives to single-use plastic products, particularly plastic bottles, cups, and plates, which constitute the dominant waste streams in the study area. The Zanzibar Municipal Council (ZMC), in collaboration with the Ministry of Finance and the Ministry of Trade, should introduce and enforce Extended Producer Responsibility (EPR) schemes requiring manufacturers and importers of plastic products to contribute to dedicated funds for plastic waste management and to support the development of technical capacity for collection, recycling, and safe disposal of plastic waste. Efforts should also focus on enhancing household-level source segregation through public education and the provision of appropriate storage facilities for separating plastic waste from other waste streams before collection. Furthermore, recycling initiatives and community-based plastic waste recovery programmes should be expanded to improve resource recovery, reduce improper disposal practices, and encourage the safe reuse of plastic materials.

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