Factors Influencing Solid Waste Management Practices: A Case of Masala Market, Ndola District Zambia

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ABSTRACT

Solid waste management remains a major environmental and public health challenge in many developing countries due to rapid urbanisation and inadequate waste management infrastructure. This study assessed factors influencing solid waste management practices among residents and traders at Masala Market in Ndola District, Zambia. A cross-sectional quantitative study design was used, and data were collected from 384 respondents using structured questionnaires. The data were analysed using IBM SPSS version 20, employing descriptive statistics such as frequencies and percentages.

The findings showed that 66% of respondents were female, reflecting the dominant role of women in market trading activities. Most respondents disposed waste daily (68.2%), and organic waste constituted the largest proportion (79.2%) of the waste generated. The most common disposal method was land-fill disposal (61.5%), while recycling and composting were practiced by relatively few respondents. Nearly half of the respondents (49.5%) did not separate waste, despite over 81% acknowledging the importance of proper waste management. The main barriers to effective waste management were insufficient waste management facilities (77.1%), lack of awareness, and economic constraints.

The study concludes that although awareness of proper waste management is relatively high, effective practices remain limited due to inadequate infrastructure and institutional support. Strengthening waste collection systems, promoting recycling and composting, and increasing community awareness are essential for improving waste management in urban markets.

Keywords: Solid waste management, waste disposal, urban markets, Ndola, Zambia.

INTRODUCTION

Waste management refers to the systematic process of collecting, transporting, processing, recycling, and disposing of waste materials in a manner that is environmentally friendly, socially responsible, and economically viable (Creswell, 2011). Efficient waste handling has emerged as a significant challenge in urban areas of developing countries and represents a widespread environmental and public health concern globally, threatening the well-being of many urban communities (Kaso et al., 2022). Globally, the volume of solid waste is increasing at a rate faster than urbanisation. In 2012, cities generated approximately 1.3 billion tonnes of solid waste annually, with projections indicating an increase to 2.2 billion tonnes by 2025 (Teferi, 2022). More recent estimates show that urban areas currently generate about 2.3 billion tonnes of solid waste per year, with forecasts suggesting a rise to 3.4 billion tonnes by 2050 (Donacho et al., 2023). In sub-Saharan Africa, approximately 62 million tonnes of solid waste are generated annually; however, waste collection rates in many developing countries remain below 70% (Hirpe & Yeom, 2021).

Solid waste management therefore presents a major environmental challenge in contemporary society. The rapid increase in waste generation, combined with inadequate disposal and treatment methods, has detrimental effects on public health and the environment, including contamination of water, soil, and air (Gu et al., 2024; Kannankai & Devipriya, 2024; Seif et al., 2024; Sharma et al., 2024). Despite existing regulations intended to mitigate these impacts, waste decomposition generates leachate that contaminates soil and water resources, posing risks to ecosystems and human health. These leachates often contain persistent contaminants that can enter the food chain and exert long-term ecological and health effects (Iravanian & Ravari, 2020).

At the global level, solid waste management has increasingly shifted from a focus on waste disposal to resource management, with emphasis on upstream interventions such as waste reduction, product design, and the adoption of circular economy approaches (Bartl, 2023; Wilson et al., 2024). However, implementing this paradigm shift has proven challenging in developing countries, Zambia included, where many municipalities continue to struggle with fundamental service provision aspects such as waste collection coverage, service quality, and environmentally controlled disposal (Brunner & Fellner, 2024; Guerrero et al., 2024).

In Zambia, the problem of solid waste disposal has reached critical proportions, particularly in high-density urban settlements. Rapid population growth has contributed to increased waste generation, while inadequate waste management systems have resulted in widespread improper disposal practices. Solid waste is frequently dumped in unauthorised locations such as roadside ditches, drainage channels, and open spaces, leading to environmental pollution and increased risk of disease outbreaks in urban areas (Girma et al., 2022).

Solid waste management in Ndola presents significant challenges with far-reaching implications for public health, environmental sustainability, and economic development. Rapid urbanisation and population growth have intensified waste management pressures, resulting in increased waste volumes and complexity. As the city expands, existing waste collection systems have struggled to keep pace, particularly outside the central business district, leading to widespread improper disposal practices.

In Masala Township, poor solid waste management has become a serious public health and environmental concern. Accumulation of waste at Masala Market creates favourable conditions for the proliferation of disease vectors such as rodents and insects, which are known carriers of diseases including cholera, malaria, and typhoid fever. In addition to health risks, improper waste disposal contributes to environmental degradation through air, soil, and water pollution. Such degradation threatens biodiversity and disrupts ecological systems that are essential for maintaining environmental balance.

Despite the magnitude of these challenges, there remains a lack of comprehensive, context-specific research on solid waste management practices in Ndola, particularly within informal and high-activity areas such as Masala Township. Addressing this gap is essential, as evidence-based understanding of local waste management practices can inform targeted interventions and policy responses. Conducting this study therefore contributes valuable empirical data to the existing body of knowledge and provides a reference point for future research aimed at improving solid waste management practices in Ndola and across Zambia.

LITERATURE REVIEW

Overview

The significance of waste management is rooted in interconnected environmental, public health, and resource conservation concerns. Improper waste disposal contributes to pollution of land, water, and air, while poorly managed landfills emit greenhouse gases such as methane, a major contributor to climate change. Similarly, uncontrolled incineration releases harmful pollutants into the atmosphere. Effective waste management therefore aims to minimise environmental degradation and protect ecosystems.

From a public health perspective, poor waste management practices pose substantial risks, as open dumping attracts disease vectors such as rodents and insects, increasing the transmission of communicable diseases (Creswell, 2011). In addition, contamination of water sources resulting from improper disposal leads to waterborne diseases. Waste management also plays a critical role in resource conservation, as recyclable

materials such as metals, plastics, and paper can be recovered and reused. Recycling and material recovery reduce pressure on raw material extraction, lower energy consumption, and decrease greenhouse gas emissions associated with manufacturing processes (Wingovist et al., 2022).

Prevalence of waste management challenges in developing countries

Literature consistently indicates that solid waste management remains a major challenge in most developing countries, particularly with regard to waste collection (Roberts, 2021). Although municipal authorities are legally responsible for solid waste management, large quantities of waste remain uncollected due to financial limitations and administrative capacity constraints. As a result, waste collection and disposal responsibilities are often transferred informally to households and communities, leading to the accumulation of waste in townships, urban centres, and along roadsides (Heeramum, 2023).

Heeramum (2023) further reports that less than 50% of solid waste generated in developing countries is collected, with open dumping being the most common disposal method. In contexts characterised by severe capacity constraints, the cost of waste collection is disproportionately high relative to income levels when compared to developed countries. Supporting this, studies indicate that only 30%–50% of waste generated in developing countries is properly collected and managed (Teferi, 2022). The remainder is either incinerated, left to decompose in open environments, or disposed of in uncontrolled landfills, posing serious environmental risks.

In Africa, only a small fraction of generated waste is recovered, while up to 95% is disposed of near urban peripheries or in temporary dumping sites, often vacant spaces within urban areas (Uncha & Wolde, 2018). As waste volumes increase, the effectiveness of collection and disposal systems has declined. Inadequate solid waste management has therefore become one of the most critical environmental challenges facing African cities, affecting both ecosystems and human health. Existing waste management systems are generally insufficient and too slow to meet the growing demand for effective waste services (Bjerkli, 2024).

At household level, negative solid waste management practices such as backyard burning and illegal dumping remain prevalent in many developing cities (Karija & Lukaw, 2013; Tadesse et al., 2008). These practices negatively affect environmental quality and public health and generate additional costs for municipal authorities (Estrellan & Iino, 2010; Reyna-Bensusan et al., 2018). Estimates of backyard burning prevalence range from 5% to 70% across urban and peri-urban settings (Adzawla et al., 2019; Akpinar-Elci et al., 2015), while illegal dumping has been estimated to range between 4% and 46% (Sekito et al., 2013). These figures may underestimate the true scale of the problem, as households often combine multiple disposal practices.

Conversely, positive practices such as source separation and recycling have increased in several developing countries, largely due to recycling programmes and the growth of informal waste recovery sectors that generate income (Majeed et al., 2017; Wilson et al., 2019). Studies indicate that household participation in source separation ranges between 17% and 76% across different cities (Babayemi et al., 2018).

Current challenges and trends in waste management

Local authorities face numerous challenges in managing solid waste effectively. Rapid population growth and urbanisation have led to increasing waste generation, placing significant pressure on existing systems. Many low- and middle-income countries lack adequate infrastructure such as engineered landfills, recycling facilities, and waste-to-energy plants. Plastic pollution remains a major concern due to low recycling rates and environmental persistence. Hazardous waste management, including electronic, medical, and chemical waste, poses additional environmental and health risks. Illegal dumping and informal waste sectors further undermine formal systems, contributing to environmental degradation and public health threats (DCS, 2021). Resource depletion is also a concern, as valuable materials are lost when waste is not recovered, while open burning contributes to greenhouse gas emissions and climate change.

In response, several global trends have emerged. Circular economy initiatives emphasise resource efficiency, waste reduction, and product design for reuse and recycling. Waste-to-energy technologies, such as incineration and anaerobic digestion, are increasingly promoted to reduce landfill volumes while generating renewable

energy (Aliaradin, 2024). Extended Producer Responsibility schemes are gaining prominence, placing end-of-life responsibility on producers and encouraging sustainable product design. Advances in recycling technologies, community engagement initiatives, public education campaigns, and the use of digital technologies for waste system optimisation are also becoming more common (Hogan, 2020). However, addressing these challenges requires coordinated efforts among governments, private sector actors, communities, and individuals.

Waste generation patterns

Waste generation patterns vary globally and regionally, including in Zambia, due to differences in population density, economic development, industrialisation, urbanisation, infrastructure availability, and cultural practices. Globally, waste generation has increased steadily as a result of population growth, urban expansion, and rising consumption levels. Waste composition has also shifted, with increasing proportions of plastics, packaging materials, and electronic waste. E-waste has become a growing concern due to rapid technological turnover, while plastic waste continues to pose serious ecological risks (Letder & Vallero, 2011).

Regionally, North America records high per capita waste generation driven by consumption-intensive economies, supported by relatively advanced waste management infrastructure. Europe has achieved higher recycling rates through strong regulatory frameworks and ambitious waste diversion targets (Anand, 2010). In Asia, rapid urbanisation and economic growth have increased waste generation, often outpacing infrastructure development and resulting in open dumping and burning. In Africa, including Zambia, waste management practices vary widely, but many cities continue to experience limited collection coverage and weak disposal systems. Informal recycling sectors are common and contribute to livelihoods, though often under unsafe conditions. Nonetheless, efforts to improve infrastructure and promote sustainable waste management are increasing across the continent (Bandara & Hettiaratechi, 2010).

Waste collection and transportation systems

Waste collection methods differ in efficiency, cost, environmental impact, and convenience. Curbside collection offers convenience and encourages recycling participation but requires substantial infrastructure and is costly to maintain, particularly in low-density areas (WESS, 2013). Drop-off centres provide flexibility and accommodate diverse waste streams, though limited accessibility and poor management may encourage illegal dumping (UNEP, 2010). Pay-As-You-Throw programmes promote waste reduction by linking fees to waste quantities but may face public resistance and disproportionately affect low-income households (Ritzre & Ryan, 2010). Composting programmes reduce landfill methane emissions and produce organic fertiliser but require sustained education, regulation, and maintenance (UNEP, 2013). Waste-to-energy plants reduce landfill volumes and generate energy, though concerns over air pollution, high costs, and potential disincentives to recycling remain (Vartanian, 2010). Integrated systems combining multiple approaches are generally most effective.

Policy frameworks and public awareness

Waste management policies are essential for environmental protection, resource conservation, and sustainable development. At national level, policies typically include regulatory frameworks defining responsibilities, standards, and enforcement mechanisms. Many countries adopt the waste hierarchy, prioritising prevention, reuse, recycling, energy recovery, and disposal as a last option (Anand, 2010). Extended Producer Responsibility schemes are increasingly used to promote recyclable product design and responsible end-of-life management. Public awareness and education campaigns are also widely employed to encourage waste reduction and proper disposal. Cross-sector collaboration and technological innovation are recognised as critical components of effective policy implementation (DCS, 2021).

At international level, agreements such as the Basel, Stockholm, and Rotterdam Conventions regulate hazardous waste and chemicals, while Sustainable Development Goal 12 promotes sustainable consumption and production, including effective waste management (Hogan, 2010). International cooperation further supports technology transfer and capacity building in developing countries.

In Zambia, several initiatives have been implemented, including the Sustainable Cities Programme (SCP), which operated in Lusaka and Kitwe between 1994 and 2007 (UN-Habitat/UNEP, 2009). The programme aimed to address weaknesses in environmental planning and stakeholder participation. Under the Sustainable Lusaka Programme, community-based interventions were piloted in settlements such as Chibolya, Chinika, and Mandevu/Marapodi, supported by donor funding (Nchito & Myers, 2020). Despite these efforts, solid waste management challenges have persisted due to institutional and responsiveness constraints (Hampwaye, 2021).

Theoretical framework: Socio-ecological theory

Socio-ecological theory explains human behaviour as the result of interactions between individuals and their social, physical, and policy environments. The theory posits that environmental health behaviours, including proper waste disposal, improve when supportive environments and policies coexist with individual knowledge and motivation (World Health Organization, 1986). Behaviour change is unlikely to occur through education alone if environmental conditions do not enable action.

The model emphasises four interrelated levels: individual factors such as knowledge and attitudes; social environments including cultural norms and institutions; physical environments such as access to waste facilities; and policy-level influences including legislation and regulations. Addressing multiple levels simultaneously increases the likelihood of sustainable behaviour change (Sallis et al., 1998).

Conceptual framework

The conceptual framework illustrates the independent factors contributing to effective solid waste management.

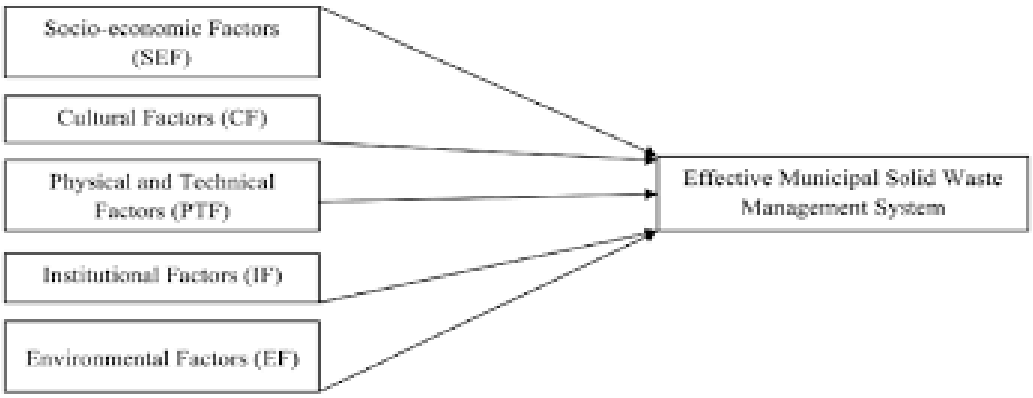

Figure 1: Conceptual framework of factors associated with poor waste management

Figure 1 presents a conceptual framework illustrating that the effectiveness of a municipal solid waste management system is shaped by the combined influence of socio-economic, cultural, physical and technical, institutional, and environmental factors. Socio-economic and cultural factors affect waste generation patterns, public awareness, attitudes, and community participation in proper waste disposal practices. Physical and technical factors determine the adequacy and efficiency of waste management infrastructure and technologies, while institutional factors relate to governance structures, policy enforcement, coordination, and availability of resources. Environmental factors define the natural conditions under which waste management operations take place and influence environmental and public health risks. Together, these interrelated factors determine the efficiency, sustainability, and overall performance of municipal solid waste management systems.

RESEARCH METHODOLOGY

Study Site and Setting

The study was conducted in Masala Township, a residential suburb of Ndola City in the Copperbelt Province of Zambia. Ndola is the third largest city in Zambia and serves as a major industrial, commercial, and administrative centre within the Copperbelt region (Central Statistical Office, 2022). Masala Township is located approximately 3.5 km from the central business district of Ndola and is bordered by neighbouring residential areas such as

Itawa and Ndeke. The township is characterised by mixed land use, including residential settlements, local markets, educational institutions, and places of worship, all of which contribute to daily solid waste generation.

Ndola has experienced rapid urbanisation and population growth over recent decades, which has intensified pressure on municipal services, including solid waste management (UN-Habitat, 2020). Masala Township reflects these broader urban dynamics and presents typical challenges associated with waste generation, collection, and disposal in high-density urban residential areas. The township was therefore considered an appropriate study site for examining factors influencing solid waste management practices in an urban Zambian context.

Study Design

This study employed a cross-sectional research design to assess waste management practices among respondents in Masala Market. The design was appropriate for collecting data at a single point in time in order to describe patterns of awareness, attitudes, and disposal practices. It enabled the researcher to analyse relationships between key variables within the study population efficiently. However, the cross-sectional design provides only a snapshot of the situation and therefore limits the ability to establish causal relationships between awareness, behaviour, and waste management outcomes.

Study Population

The study population comprised residents of Masala Township, including households and individuals who generate solid waste on a daily basis. In addition, local business operators within the township were included due to their contribution to waste generation through packaging materials, food waste, and other commercial refuse. Officials from Ndola City Council responsible for waste collection and management were also included to provide insights into institutional practices, infrastructure limitations, and policy-related challenges affecting solid waste management. According to the 2022 Zambia Population and Housing Census, Ndola District had an estimated population of approximately 543,000 people, making it one of the most densely populated urban districts in the country (CSO, 2022). Masala Township constitutes a significant proportion of Ndola's urban population, characterised by high residential density and active commercial activities. The size and composition of this population make it suitable for assessing community-level waste management practices and institutional service delivery.

Sample Size Determination

The sample size was determined using a single population proportion formula. In the absence of documented prevalence estimates for solid waste management practices in the study area, a prevalence of 50% was assumed. A confidence level of 95% and a margin of error of 5% were applied.

$$n = \frac{Z^2\, p(1-p)}{E^2}$$

Where: n = sample size, Z = standard normal deviate (1.96 at 95% confidence level), p = estimated population, proportion (0.50), E = margin of error (0.05)

$$n = \frac{(1.96)^2 \times 0.50 \times (1-0.50)}{(0.05)^2}$$

$$n = \frac{0.9604}{0.0025} = 384$$

Accordingly, a total sample size of 384 respondents was used for the study.

Sampling Technique

Simple random sampling was employed to select study participants from households, businesses, and relevant public institutions within Masala Township. This technique ensured that each eligible participant had an equal probability of selection, thereby enhancing representativeness and reducing selection bias. The method was also cost-effective and appropriate for quantitative cross-sectional analysis.

Data Collection Methods

Primary data were collected using structured questionnaires administered to respondents within the market. The questionnaires were designed to capture information on awareness levels, waste disposal practices, and challenges associated with waste management. This method allowed for the collection of standardized data from a relatively large sample, facilitating quantitative analysis. However, the use of self-reported questionnaires may have introduced response bias, as respondents could over-report socially desirable behaviours such as proper waste disposal practices or awareness of recommended waste management procedures.

Data Analysis

Completed questionnaires were checked for completeness and consistency prior to data entry. Data were entered and analysed using IBM SPSS Statistical Software (Version 16). Descriptive statistics, including frequencies, means, proportions, and graphical presentations, were used to summarise and present the data.

Reliability and Validity

Reliability was ensured through expert consultation, pre-testing of the questionnaire, and cross-checking of completed questionnaires for accuracy and consistency. Necessary revisions were made following pre-testing to improve clarity and reliability.

Validity was established through expert review of the data collection instrument to ensure face and content validity, with poorly phrased or ambiguous items revised or removed prior to final data collection.

Ethical Considerations

Ethical approval was obtained from the relevant authorities, including the District Medical Office and the Copperbelt University Research Ethics Committee (CUREC), prior to commencement of the study. Participation was voluntary, and respondents were informed of their right to withdraw at any stage without penalty. The objectives and procedures of the study were clearly explained, and written informed consent was obtained from all participants. Confidentiality and anonymity were strictly maintained, and no personal identifiers were recorded on the questionnaires.

RESULTS AND DISCUSSION

Introduction

This chapter presents and discusses the findings of the study on factors influencing solid waste management practices among residents and traders at Masala Market in Ndola District, Zambia. Data were collected from 384 respondents using structured questionnaires and analysed using descriptive statistics including frequencies and percentages. The results are presented according to the specific objectives of the study and interpreted in relation to existing literature on municipal solid waste management.

Presenting results alongside discussion allows for deeper interpretation of the findings and enables comparisons with previous studies conducted in similar contexts. The chapter therefore integrates empirical results with scholarly literature to explain the patterns observed in waste generation, disposal practices, attitudes, and perceived barriers to effective waste management in Masala Market.

Socio-Demographic Characteristics of Respondents

Understanding the socio-demographic characteristics of respondents is important in studies of environmental behaviour because factors such as gender, age, education level, and employment status often influence environmental awareness, consumption patterns, and waste disposal practices. This section therefore presents the background characteristics of respondents participating in the study.

Gender Distribution of Respondents

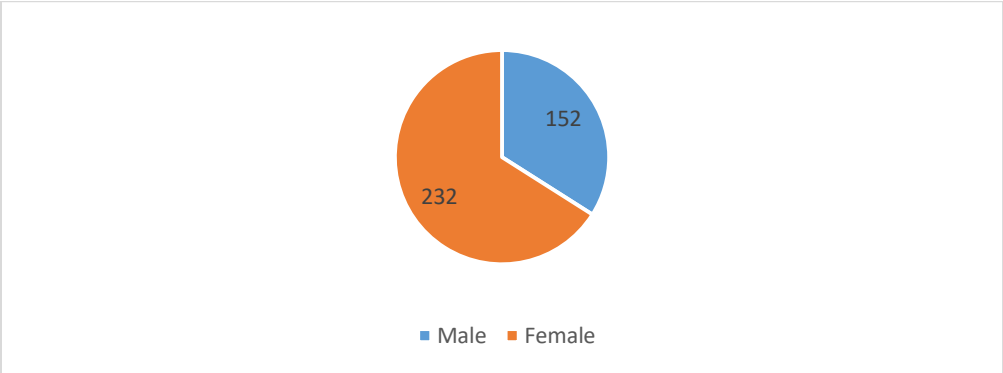

Figure 2: Gender distribution of respondents

Figure 2 shows the gender distribution of respondents who participated in the study. The results indicate that female respondents constituted the majority of participants (60%), while male respondents accounted for 40% of the sample population. The higher representation of women reflects the prominent role women play in market trading activities, particularly in the sale of fruits, vegetables, and prepared food items.

Women are often directly involved in activities that generate organic waste, such as food preparation and produce handling. Consequently, they frequently participate in waste generation, temporary storage, and disposal decisions within market environments. The dominance of women in trading activities at Masala Market therefore has important implications for waste management strategies, particularly those that involve community participation, sanitation initiatives, and awareness programs.

These findings are consistent with Oteng-Ababio (2014), who reported that women often play central roles in sanitation and waste management practices in African urban communities. Similarly, Miezah et al. (2015) found that women are frequently responsible for waste handling both in households and market environments. Ferronato and Torretta (2019) further emphasized that gender dynamics influence environmental behaviour and should therefore be considered when designing effective waste management interventions.

Age Distribution of Respondents

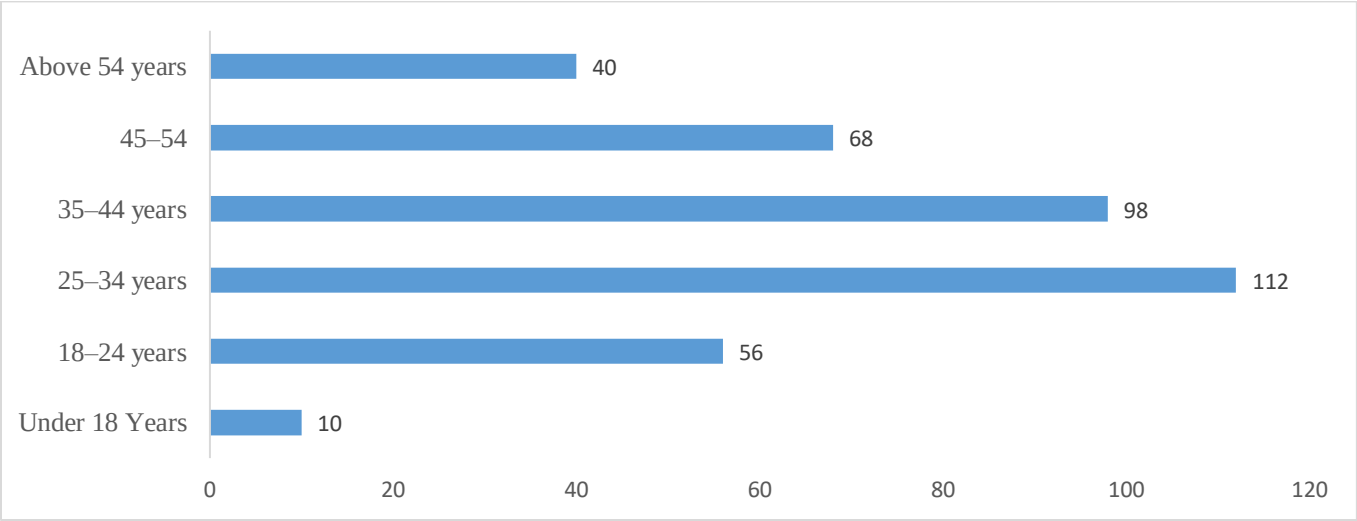

Figure 3: Age distribution of respondents

The results in figure 3 indicate that the majority of respondents were within economically active age groups. The largest proportion of respondents were aged 25–34 years (29.2%), followed by those aged 35–44 years (25.5%). Respondents aged 18–24 years accounted for 14.6%, while those aged under 18 years constituted only 2.6% of the study population.

These findings indicate that waste generation in Masala Market is largely driven by individuals actively engaged in economic activities such as trading, vending, and food preparation. Market environments are typically characterised by intensive commercial activities, and individuals in the working-age population contribute significantly to waste generation through packaging materials, organic waste, and general refuse.

This observation is consistent with Guerrero et al. (2013), who found that municipal solid waste generation in developing countries is closely associated with economically active populations concentrated in commercial centres. Similarly, Kaza et al. (2018) reported that waste generation tends to increase in environments dominated by working-age adults engaged in consumption and trade activities. Ferronato and Torretta (2019) also noted that urban market centres with high concentrations of economically active populations generate continuous streams of waste.

Education Level of Respondents

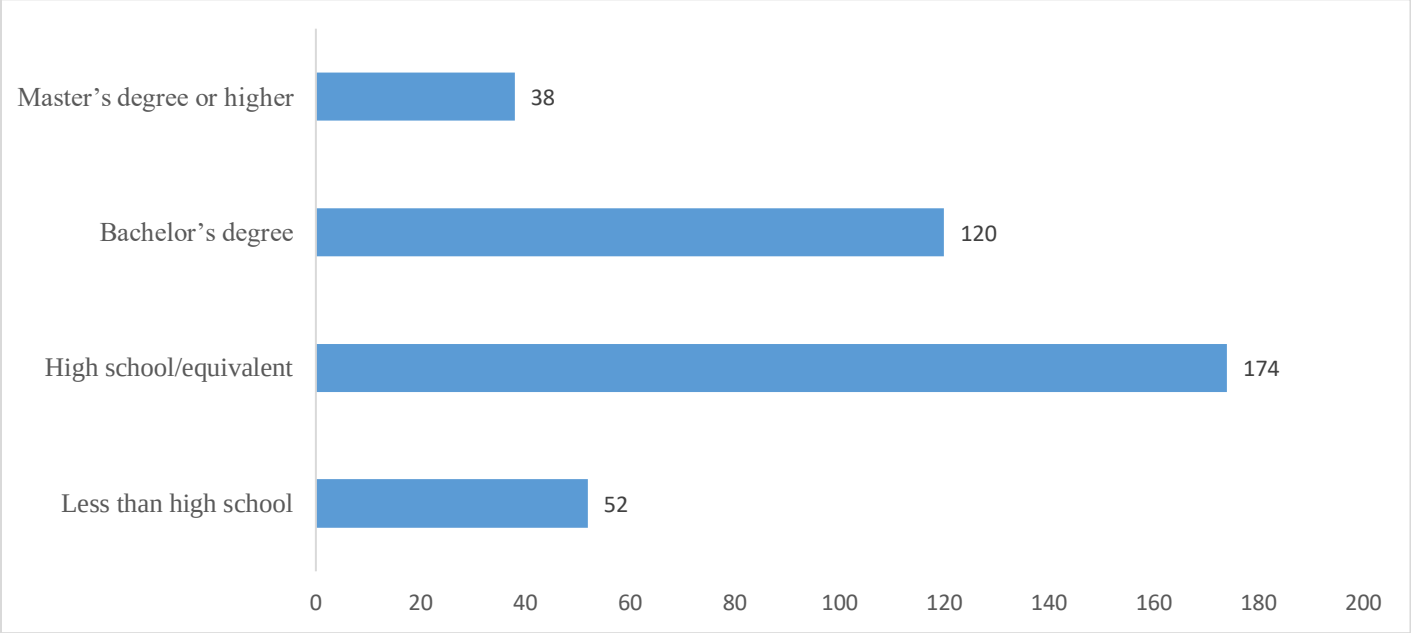

Figure 4: Respondents' level of education

Figure 4 demonstrate that 45.3% of respondents had attained secondary education, while 31.3% possessed bachelor's degrees. Respondents with education levels below secondary school constituted a smaller proportion of the sample. Higher levels of education are often associated with increased awareness of environmental sanitation and public health concerns. Individuals with formal education are generally expected to demonstrate improved understanding of environmental conservation practices, including waste management.

However, despite the relatively high educational attainment observed among respondents, poor waste management practices such as limited waste separation and low recycling participation were still evident in the study area. This suggests that environmental awareness alone may not be sufficient to promote proper waste management behaviour when waste management infrastructure and services are inadequate.

These findings are consistent with Babayemi and Dauda (2010), who reported that awareness of environmental issues does not necessarily translate into improved waste disposal practices where structural constraints such as inadequate waste collection systems exist. Similarly, Wilson et al. (2015) argue that education must be supported by access to appropriate waste management infrastructure and institutional support to influence environmental behaviour effectively. Guerrero et al. (2013) further emphasise that institutional capacity often plays a more decisive role than knowledge alone in shaping waste management behaviour.

Employment Status of Respondents

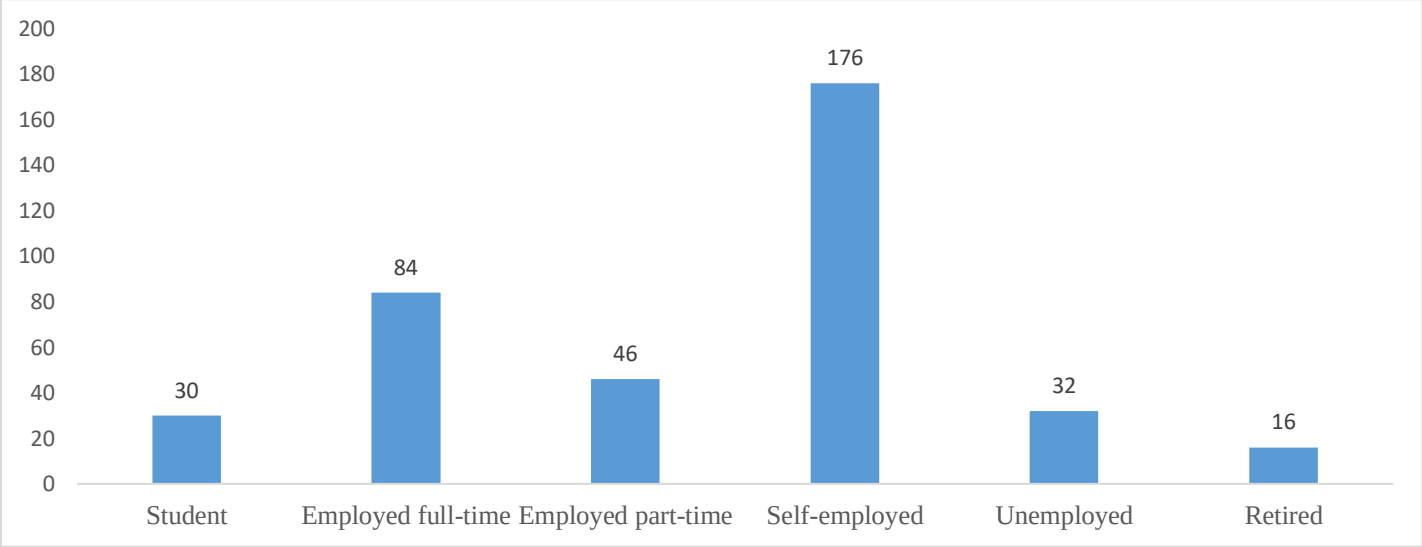

Figure 5: Employment status of respondents

The findings in figure 5 indicates that majority of respondents were self-employed (45.8%), reflecting the informal commercial nature of Masala Market. Smaller proportions of respondents were formally employed, students, unemployed, or retired. The predominance of self-employment is characteristic of many urban markets in developing countries where informal trading constitutes a major source of livelihood. Activities such as selling fresh produce, packaged goods, and prepared food generate substantial quantities of waste, particularly organic residues and packaging materials.

These findings are consistent with Bandara and Hettiarachchi (2010), who reported that informal commercial environments contribute significantly to municipal solid waste generation. Similarly, Hoornweg and Bhada-Tata (2012) observed that commercial centres in developing countries generate large volumes of waste due to high turnover of goods and limited waste recovery systems. Kaza et al. (2018) further identified economic activity as one of the strongest predictors of urban waste generation.

Waste Generation and Disposal Practices

This section presents findings on waste generation patterns and disposal practices among respondents at Masala Market. Understanding how frequently waste is generated and the methods used for disposal is important for assessing the effectiveness of existing waste management systems.

Frequency of Waste Disposal

Table 1: Frequency of waste disposal among respondents

Category	Frequency (n)	Percentage (%)
Daily	262	68.2
Weekly	84	21.9
Bi-weekly	26	6.8
Monthly	12	3.1
Total	384	100

In the table, above, results show that 262 respondents (68.2%) disposed waste daily, while 84 respondents (21.9%) disposed waste weekly. Smaller proportions disposed waste bi-weekly (6.8%) and monthly (3.1%). The high frequency of daily waste disposal reflects the nature of activities conducted in Masala Market. Markets dealing with perishable commodities such as fruits, vegetables, and food items generate waste continuously due to spoilage, packaging removal, and food preparation activities. These findings are consistent with Bandara and Hettiaratchi (2010), who reported that food markets generate waste on a daily basis due to the rapid turnover of perishable goods. Similarly, Ferronato and Torretta (2019) observed that waste accumulation in urban markets occurs rapidly, placing pressure on municipal waste collection systems. Kaza et al. (2018) also emphasised that commercial zones typically require more frequent waste collection services than residential areas.

Types of Waste Generated

Table 2: Types of waste generated among respondents

Type of Waste Generated	Frequency (n)	Percentage (%)
Organic waste	304	79.2
General refuse	198	51.6
Recyclable materials	198	51.6
Hazardous waste	52	13.5

The results show that organic waste constituted the largest proportion (79.2%), followed by general refuse and recyclable materials (51.6%) respectively, and hazardous waste (13.5%). The dominance of organic waste reflects the nature of activities in Masala Market where fruits, vegetables, and other food products are commonly traded. Organic waste from food residues and produce spoilage therefore forms a substantial portion of the waste stream.

These findings are consistent with Babayemi and Dauda (2010), who reported that biodegradable waste forms the largest component of municipal waste in many African cities. Similarly, Kaza et al. (2018) found that organic waste dominates municipal waste streams in low-income countries. Wilson et al. (2015) further emphasised that the dominance of biodegradable waste in developing countries presents opportunities for composting and biological waste treatment.

Primary Waste Disposal Methods

Table 3: Primary waste disposal methods

Category	Frequency (n)	Percentage (%)
Landfill disposal	**236**	**61.5**
Recycling	**62**	**16.1**
Composting	**44**	**11.5**
Incineration	**42**	**10.9**
Total	**384**	**100**

Table 3 indicate that 61.5% of respondents relied on landfill disposal, while 16.1% practiced recycling, 11.5% practiced composting, and 10.9% practiced incineration. The strong reliance on landfill disposal indicates that waste management practices in the study area remain oriented toward final disposal rather than resource

recovery. Recycling and composting were practiced by relatively small proportions of respondents despite the high proportion of recyclable and biodegradable waste observed. These findings are consistent with Hoornweg and Bhada-Tata (2012), who observed that landfill disposal remains the dominant waste management method in many developing countries due to weak recycling infrastructure. Similarly, Guerrero et al. (2013) reported that limited institutional capacity often constrains recycling and composting practices in developing cities. Wilson et al. (2015) also emphasised that landfilling continues to dominate in areas where waste separation systems are poorly developed.

Waste Separation Practices

Table 4: Waste separation practices among respondents

Category	Frequency (n)	Percentage (%)
Separate recyclables	**76**	**19.8**
Separate organic waste	**118**	**30.7**
No separation	**190**	**49.5**
Total	**384**	**100**

The results indicate that 49.5% of respondents did not separate waste, while 30.7% separated organic waste and 19.8% separated recyclable materials. The lack of waste separation significantly reduces opportunities for recycling and composting. Mixing different waste categories results in contamination, making it difficult to recover useful materials from the waste stream. These findings are consistent with Miezah et al. (2015), who reported that waste separation practices remain weak in many African cities due to inadequate infrastructure and weak institutional support. Similarly, Oteng-Ababio (2014) found that individuals are less likely to separate waste where appropriate collection systems are unavailable. Wilson et al. (2019) also emphasised that recycling programmes cannot succeed without effective waste separation at source.

Table 5: Attitudes of Respondents Towards Waste Management

Category	Frequency (n)	Percentage (%)
Not important at all	8	2.1
Slightly important	18	4.7
Moderately important	46	12.0
Very important	112	29.2
Extremely important	200	52.1
Total	**384**	**100**

The findings indicate that a large proportion of respondents considered proper waste management to be important. Over 81% of respondents rated waste management as either very important or extremely important, demonstrating high awareness of environmental sanitation issues. However, despite this high level of awareness, participation in community waste management initiatives remained relatively low. This suggests that positive attitudes toward waste management do not always translate into active environmental behaviour. This disconnect between awareness and actual waste management practices may also be influenced by underlying socioeconomic and contextual factors that were not fully disaggregated in this study. Variables such as income level, type of business activity, and level of education may affect an individual's ability and willingness to adopt proper waste

disposal practices. For instance, traders operating under financial constraints may prioritise cost-saving and convenience over recommended waste handling practices, while certain disposal behaviours may be shaped by prevailing cultural norms within the market environment. This suggests that waste management behaviour is multidimensional and influenced by both individual awareness and broader socioeconomic conditions.

These findings are consistent with Guerrero et al. (2013), who reported that urban residents often recognise the importance of environmental sanitation even when waste management services are inadequate. Ferronato and Torretta (2019) also noted that awareness alone cannot improve waste management outcomes without adequate infrastructure and institutional support.

Table 6: Perceived Barriers to Effective Waste Management

Category	Frequency (n)	Percentage (%)
Lack of awareness	210	54.7
Insufficient facilities	296	77.1
Cultural beliefs	86	22.4

The study identified several barriers to effective waste management. The most frequently reported barrier was insufficient waste management facilities (77.1%), followed by lack of awareness (54.7%), economic factors (46.9%), and cultural beliefs (22.4%). The dominance of infrastructure-related barriers indicates that inadequate waste management systems remain the primary constraint affecting proper waste disposal practices in Masala Market. Even where individuals demonstrate awareness and willingness to participate in sanitation initiatives, the absence of adequate waste collection infrastructure limits effective waste management. These findings are consistent with Guerrero et al. (2013), who identified inadequate infrastructure and weak institutional capacity as major barriers to effective waste management in developing countries. Similarly, Kaza et al. (2018) reported that financial constraints and insufficient infrastructure often limit municipal waste management performance. Ferronato and Torretta (2019) also emphasised that rapid urbanisation frequently overwhelms waste management infrastructure in developing cities.

Summary of Key Findings

Overall, the results indicate that respondents in Masala Market demonstrated a relatively high level of awareness regarding the importance of proper waste management and the health risks associated with poor waste disposal. However, actual waste management practices remained weak, characterised by high daily waste generation, low recycling participation, and limited waste separation.

The findings suggest that the gap between awareness and practice is largely driven by structural barriers, particularly the lack of adequate waste management infrastructure and recycling facilities. Addressing these challenges will require an integrated approach involving improved waste collection systems, increased recycling opportunities, enhanced environmental education, and stronger institutional support for waste management initiatives.

Limitations of the Study

This study has several limitations that should be considered when interpreting the findings. First, the study relied on self-reported questionnaire data, which may have introduced response bias, as respondents could overstate their awareness of proper waste management practices or their adherence to recommended disposal behaviours. Second, the cross-sectional design captured data at a single point in time and therefore limits the ability to establish causal relationships between awareness, behaviour, and waste management outcomes.

In addition, the study did not stratify respondents based on key socioeconomic variables such as income level, type of business, or detailed educational categories, which could have provided deeper insights into the

determinants of waste management behaviour. Furthermore, the study employed a purely quantitative approach, which limited the ability to explore underlying cultural attitudes, motivations, and behavioural barriers influencing waste disposal practices.

RECOMMENDATIONS

1. Strengthen waste management infrastructure and collection systems.

2. Enhance awareness campaigns supported by accessible disposal facilities.

3. Address socioeconomic and structural barriers to proper waste practices.

4. Use stratified analysis (income, education, business type) in future studies.

5. Apply mixed-methods approaches to capture behavioural and cultural factors.

6. Conduct comparative studies across markets or districts.

7. Consider longitudinal or quasi-experimental designs in future research.

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