

**COMPONENT DETERMINANTS OF HANDLING PLASTIC POLLUTION IN
LODWAR TOWN, TURKANA COUNTY, KENYA**

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THE DEGREE OF MASTER OF PUBLIC HEALTH DEGREE OF THE SCHOOL OF
HEALTH SCIENCES, KISII UNIVERSITY**

JULY 2026

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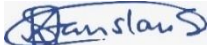
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DEDICATION

This piece is dedicated to my beloved wife Betty, as well as my two children, Mercy and Crispus.

Who supported me during this entire journey, I also remember my fellow students who motivated me to strive diligently to achieve my aspirations.

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ABSTRACT

The problem of throwing away plastic has become a significant concern for the environment and people's health. This is especially true in many developing countries (Adeniran et al., 2022). Due to rapidly growing populations and recent economic growth in these places, there is increased use of natural resources and more plastic waste being created. According to a report from the OECD in October 2024, plastic production, usage, and disposal are expected to rise by 70 percent every 12 years until 2040 (Policy Scenarios for Eliminating Plastic Pollution by 2040, n.d.). In Africa and several other developing countries, the handling of plastic waste is inadequate, primarily because there isn't enough funding or personnel to address the problem (Alabi et al., 2019). This issue continues to be a significant challenge in the town of Lodwar. This study investigated various factors that affect how people in Lodwar town, Turkana County, manage plastic waste. The research aimed for four primary goals: initially, to learn how community involvement in managing plastic waste makes a difference; second, to assess how well the "polluter pays principle" works; third, to examine how planning and collaboration among different groups help; and fourth, to evaluate how recycling techniques assist in managing plastic waste. A descriptive study with a cross-sectional design was utilized, including a sample of residents, local workers, NEMA staff, and county health officials. Fisher's formula was applied to choose 384 residents for participation. The information was verified to ensure it was accurate, consistent, complete, and uniform before analysis. The data was analyzed employing both descriptive and inferential statistics in SPSS version 26. Summary metrics included averages, rates, proportions, and standard deviations. Regarding the inferential statistics, multiple regression analysis and correlation tests were conducted. The results were presented using pie charts, frequency tables, and bar graphs. All four factors were discovered to have a positive correlation with managing plastic waste, and the results were statistically significant. Community participation exhibited a coefficient of 0.295 and a p-value of 0.013. For the "polluter pays principle," the coefficient was 0.285 with a p-value of 0.023. Planning and coordination had a coefficient of 0.118 with a p-value of 0.002, and the coefficient for recycling techniques was 0.280 with a p-value of 0.030. All four factors had a substantial positive effect. The study shows that participation in activities like sorting, reusing, and paying for collection fees is crucial. The "polluter pays" principle can significantly influence how plastic waste is managed in Lodwar town.

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LIST OF ABBREVIATIONS

EMCA- Environmental Management and Coordination Act

IREC- Institutional Research and Ethics Committee

MSW - Municipal Solid Waste

NEMA - National Environmental Management Authority

PPP- public private partnership

PSP - private sector Participation.

PWM- Plastic Waste Management

WMP- Waste Management Plan

CHAPTER ONE

1.0 Introduction

The section establishes essential structures for the research through showcasing the Context, issue description, objective, research aims, inquiries, hypotheses, justification, limitations, assumptions, and key definitions that guided the investigation into the determinants of effective plastic waste handling in Lodwar Town, Turkana County.

1.1 Study Background

Throughout history, the way human communities have addressed solid waste has been a key indicator of societal progress. This connection exists because improper waste disposal has direct, Negative effects Regarding public health and the ecosystems (Abu-Bakr et al., 2022). The worldwide yearly output of plastic garbage is estimated to reach between 400 million and 460 million metric tons (Aden Iran et al., 2022). Only a fraction of this enormous volume, approximately nine percent, undergoes recycling (Alibi et al., 2019). By contrast, almost half of all plastic trash ends up in a dumpsite, and a further 22 percent is either incinerated or released into the wider environment. The resulting plastic contamination presents a serious threat to aquatic life, has adverse effects on human well-being, and is expected to double in volume by 2040 if no effective prevention strategies are implemented (UNEP, July 2025). At the start of the century, 234 million tonnes of plastic waste was produced and used globally. By 2020, this figure had climbed to 435 million tons. Projections indicate that without additional policy interventions, by 2040 the production, use, and disposal of plastics will have increased by seventy percent above 2020 levels (OECD, 2024). This upward trend is expected to continue, outpacing global population growth, as demand for plastic products remains strong, particularly in OECD member countries. Rapid expansion is also expected in emerging nations throughout Asia, Sub-Saharan Africa, and

Latin America. Although many forms of plastic waste harm the environment, the rapidly increasing production and use of virgin plastics raise particular concerns due to their contribution to climate change. If business-as-usual conditions persist without major policy changes, the entire lifecycle of plastics would account for at least five percent (equivalent to 2.8 gigatonnes of carbon dioxide) of the worldwide carbon footprint. The primary drivers of this climate impact are the manufacturing of raw plastic materials and the subsequent conversion into plastic products. Across Africa, the discarding of plastic refuse remains a pressing problem. According to the records, “the continent produced 19 million tons of plastic waste, of which 17 million tons, approximately ninety percent, were not properly managed. Notably, while an estimated 70-80 percent of all waste generated in Africa is technically recyclable, only about four percent is actually recycled. Meanwhile, 50 percent of waste is disposed of inappropriately, through either open dumping or burning in the open air” (African Climate Insights, 2024). In Lodwar town, plastic trash poses a huge risk to both the environment and the health of the local inhabitants. This issue is fuelled by the increased consumption of single-use plastic products, a lack of proper trash disposal infrastructure, and the absence of sufficient recycling facilities. “Improper plastic waste disposal leads to clogged drainage systems, creates unsightly waste accumulations, and gradually releases toxic substances, all of which pose serious risks to community health and local water sources” (Nation Media Group, 14 December 2024). To address these challenges, the Turkana County Government is working with partners such as the Danish Refugee Council (DRC) to develop a Waste Management Bill for Lodwar, establish a plastic reuse facility in Lokaparae, and provide training for waste pickers. “Despite these interventions, research indicates that waste management in the municipality continues to face difficulties, including limited formal collection services and

weak enforcement of existing disposal regulations” (Lodwar Municipality Annual Review Report, October 2024).

1.2 The problem statement

Currently, plastic waste constitutes the most significant pollutant of our environment. It degrades only with great difficulty and, as a result, can cause severe and extremely harmful pollution. As it naturally breaks down, it can infiltrate the soil and contaminate water. If plastic waste is not handled properly, they also pollute food sources. This has resulted in an increase in the frequency of infectious diseases within many communities (Banga, 2013). When the responsibility of trash management was passed from the national to the county government, Turkana County has had issues in preserving cleanliness in Lodwar town. According to 2019 census data, Lower’s population increased from 48,316 residents in 2009 to 82,970 a decade later. This rapid growth has increased the amount of plastic waste produced, exceeding the outpacing the ability of the containment strategies put in place by local municipal authorities. The open burning of waste exposes the public to respiratory illnesses. Piles of discarded plastic water bottles, soda bottles, and polythene bags accumulate in front of shops, on main streets, and in any available open space, attracting scavengers such as dogs, livestock, humans, and rodents. During the rainy season, these sites become breeding sites for mosquitoes and other insects, including cockroaches. The study will address the existing research vacuum by researching the elements that affect the adoption of appropriate plastic waste handling techniques among the residents of Lodwar town, County Turkana, located in Kenya.

1.3 Justification of Research

Poor handling of plastic waste causes a severe hazard to human health and ecology, affecting both rural and urban communities. A clean environment promotes good health, which in turn enhances human productivity. Consequently, environmental cleanliness directly influences a nation's wealth and economic status (Adeboye, 2001). For over fifty years, global plastic production and consumption have steadily increased. In 2013, Approximately 299 million tons of plastic were manufactured - a 4% increase from 2012 - maintaining an upward trend seen in earlier years (Worldwatch Institute, January 2015).

In 2008, Global Industry Analysts projected that plastic usage would attain 297.5 million tons by the close of 2015, having earlier estimated it at 260 million tons, as stated in a 2012 research on worldwide plastic consumption. Plastic is adaptable, lightweight, pliable, moisture-resistant, durable, and comparatively inexpensive. These appealing attributes have fuelled a voracious global appetite and overindulgence in plastic products. Nonetheless, because plastic is robust and degrades very slowly, the materials used to produce countless items ultimately become persistent waste. Our strong attraction to plastic, combined with an undeniable behavioral tendency toward overconsumption, indiscriminate disposal, littering, and subsequent pollution, has created a deadly mix.

In Kenya, the disposal of plastic waste is still a big problem (Gawking, 2011). The storage, collection, and transport systems are not effective. From a researcher's perspective, this likely has major health effects on the people of Lodwar Township. Although the public knows about the problems of plastic waste management, they have not been involved in solution activities. A person's participation is dependent on a number of factors: Increasing levels of awareness, household income, level of education, and gender (Banga, 2011). This research is expected to help

increase public participation in plastic waste management in Lodwar town. The results will help the county have a better plastic waste policy that is expected from the government. However, importantly, the research is meant to serve as a foundation. For upcoming research addressing gaps not covered here -such as the health impacts of poor waste management in Lodwar.

1.4 Goals

1.4.1 Overall goal.

To evaluate the elements affecting the efficiency of disposing of plastic waste in Lodwar town, Turkana County, Kenya.

1.4.2 Specific Objectives.

- i. To find out how community participation influences plastic waste disposal in the town of Lodwar, Turkana County, Kenya.
- ii. To assess the impact of the "polluter pays" principle on reducing environmental contamination resulting from plastic debris in the town of Lodwar, Turkana County, Kenya.
- iii. To assesses the efficiency of recycling methods in transforming plastic waste into practical items in Lodwar town, Turkana County, Kenya.
- iv. Veto assesses the strategies employed by the county government in plastic waste collection, transportation, and disposal in the town of Lodwar, Turkana County, Kenya.

1.5 Research Questions

- i. Does community involvement affect how plastic waste is disposed of in Turkana County's Lodwar town?
- ii. Does the “polluter pays” principle have an impact on how Lodwar town handles the cleanup of plastic waste?
- iii. Do recycling methods convert plastic waste to usable products in Lodwar town, Turkana County?
- iv. How does the strategy in place influence plastic management in Turkana County's Lodwar town?

1.6 Assumptions of the Research

The subsequent assumptions acted as the basis for the research.

- i. Every respondent was aware of how to manage plastic waste.
- ii. Every respondent was cooperative and honest and gave the appropriate answers.

1.7 Study Limitations

The respondents were initially reluctant to provide their answers, which could have introduced bias. To address this, the researcher ensured that consent was secured from all participants and assured them that any of their information would be handled in the strictest confidence.

1.9 Theoretical Framework

Sustainable development is defined as a model of human advancement where the utilization of resources aims to fulfill the requirements of the present society without jeopardizing the health of natural systems or the environment, thus allowing future generations to satisfy their own necessities (Harris, 2003). This idea connects the inherent limitations of ecological systems to the

diverse social challenges that human populations must address. Traditionally, sustainable development has been categorized into three dimensions: environmental, economic, and socio-political sustainability. The idea of sustainability is derived from systems theory, which views systems as collections of interrelated and flexible systems and procedures that collectively yield effective results. Systems are characterized by their ability to keep these results within acceptable boundaries while adapting to changes in their inputs. Feedback systems modify processes and structures based on changes in inputs to maintain outputs and outcomes. Change is a fundamental characteristic of systems. While systems can modify to variations in inputs and maintain a certain level of sustainability, failure to adapt results in disruption until a new equilibrium is established or an inability to adjust results in turmoil until a new equilibrium is established or the system fails altogether. Researchers have frequently applied systems theory to study how social organizations function (UNEP, 2002). Within human service contexts, programs can be understood as sets of structured inputs-such as personnel, physical infrastructure, and equipment-that carry out specific strategies or processes with the goal of producing defined outputs and eventual outcomes. The sustainability of any such program depends on three essential elements: the long-term benefits it provides to individuals and communities, the underlying conditions that enable those benefits to materialize, and the financial and material resources required to keep the program running. A program may be deemed unsustainable if it does not deliver enough benefit, if the necessary conditions for achieving results cannot be determined or sustained, or if the expense of resources needed to understanding the advantages is overblown (Swerissen, 2007). Incorporating the concepts of sustainability development is largely essential for the administration of waste and various environmental initiatives. Plastic waste management (PWM) constitutes a vital environmental health service and is a vital component of waste management, functioning as a

fundamental part of crucial urban services. Research on PWM in developing countries are ongoing, with studies on urban PWM continuing in many such nations. Key issues that have led to the emergence of this research include public sector reform (including privatization), questions of sustainable development in urban settings (UNEP, 2002), and the concept of sustainable development within the city. The first term relates to the neoliberal message of state contraction and the expansion of market control. The second focuses on the contribution of the private sector to service provision, with an emphasis on raising questions about public interest and acceptance (UNEP, 2002). These considerations help to demonstrate the need for effective management systems. An efficient waste management system provides a valid path to economic development. In Nigeria, Lagos State possesses become a leader in environmental sanitation through effective waste management. After international media labeled Lagos one of the dirtiest states following FESTAC '77, the state improved by establishing a public-private partnership between the Lagos State Waste Management Authority (LAWMA) and the private sector Participants (PSPs). LAWMA is responsible for overseeing, coordinating, and assessing the activities of PSPs involved in collection of municipal solid waste. Analyzing the opportunities and challenges linked to the fair distribution of benefits resulting from environmental service provision within the context of PSP operations in Lagos State is essential. For long-term success of interventions, it is crucial that their goals and activities are consistently achieved. The assessment of the state's privately-driven waste management program needs to emphasize the service quality provided to users and the obstacles affecting its viability.

1.10 conceptual Framework

Figure 1.1 depicts the theoretical framework that guides this study. The model shows how four independent variables - specifically, the degree of community involvement, the Execution of the

polluter-pays principle, the standard of planning and coordination activities, and the adoption of recycling approaches - relate to the main dependent variable, which is the effectiveness of plastic waste management practices.

Figure 1.1: Theoretical Framework

Independent variables Dependent variable

Intervening variable

- Political
good will.
- Environment
policy.
- Funding.
- Public
private partnership

1.11 The meaning of Terms

Community participation refers to how local people engage in projects aimed at resolving issues that affect their own community.

Polluter Pays Principle is a widely recognized rule stating those accountable for generating Pollution should assume the expenses related to its management to prevent harm to human health or the environment.

Planning and coordination involve the methods of evaluating an organization's goals and formulating a feasible, methodical plan to realize those goals.

Plastic waste means the accumulation of plastic products (including bottles and various other items) in the natural environment, which harms wildlife, damages habitats, and negatively impacts human beings.

Recycling involves the collection and reprocessing of items usually discarded as waste, converting them into fresh, valuable goods.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

The main goal of this literature review was to find and examine the research conducted by other scholars and investigators previously conducted regarding the factors that affect.

2.1 Community Participation and Plastic Waste Disposal

There exists a fundamental link between refuse and the advancement of human societies, affecting both technological development and social organization. Even though waste materials are of the same general class, the mix of materials has varied significantly over time and across geographic regions and is directly linked to industrial growth and innovation. Discarded materials contain several commodities that may be recovered as long as proper approaches are employed for recycling (Awunyo-Vitor et al., 2013). Plastic pollution is becoming one of the most pressing environmental challenges of our era. Global plastic production was approximately 368 million tons in 2019, and the consequences of severe disposal problems and a lack of management are increasingly visible. The situation is particularly dire in India, where each year, millions of tons of plastic waste are produced, with many of these items ending up in landfills, rivers, and seas. (Larisa, 2024). A waste management system that relies on community participation without advanced technology and complex machinery could be a sustainable method in the United Kingdom at the local level. This is because low-income communities can sustain income-generating waste management systems (Broader, 2017). This manual will highlight the scope of involvement of the community in managing plastic waste. For numerous local authorities, addressing plastic waste is viewed as a matter of equipment-that is, purchasing and operating technologically advanced compaction trucks, hydraulic compressor bins, and vehicles that can be

transported to various locations. In developing countries, advanced equipment breaks down and leads to total system failure caused by insufficient technical services, replacement parts, and maintenance budgets. Waste collection is often the most visibly underperforming municipal service, and the issue is frequently perceived as a lack of transportation. Community involvement is likely to lead to more lasting solutions than purely technical ones. Community-based practices for plastic waste management have emerged mainly as a response to rapid urbanization in developing countries, where urban growth has outpaced local governments' capacity to operate efficiently in the management of solid waste (Guerrero et al., 2013). In these nations, urban governments face administrative and operational problems when attempting to address plastic waste. A key factor in this situation is the failure of local governments to establish effective partnerships with communities, which would enhance their engagement in plastic waste management. This community participation helps residents become involved in collecting and transporting plastic waste from its source to disposal facilities. Public engagement is important here because plastic waste management is an ongoing process requiring continuous efforts, not just one-time interventions. A variety of studies indicate that community involvement in solid waste management is the most cost-effective way to address these issues. These scholars emphasize the lack of knowledge among many developing countries concerning ecology, the influence of urban waste on human health, along with the basics of eco-friendly urban growth and development. Methods such as composting, recycling, controlled sanitary land filling, incineration, and others have been found to be insufficient in solving environmental and public health issues (Kalgan, 2017). The insufficient plastic waste management skills and resources need to be complemented by community involvement. These poor handling practices of plastics lead to contamination of food products and consequently lead to an increase in infections and diseases

among the population. Very few studies have been conducted on effective plastic waste handling. This research intends to address the current knowledge deficit; thus, the study was conducted to investigate the effects of community involvement on plastic waste management in Lodwar town, Turkana County, Kenya.

2.2 “Polluter pays” principle and Plastic Waste on environmental pollution

According to (Bong et al, 2017), Environmental Performance Reviews have shown that financial backing from governments, provided through instruments such as grants, low-interest loans, tax relief, and similar incentive mechanisms, plays a fundamental role within the broader policy framework governing waste management. Furthermore, public authorities are actively seeking effective fiscal tools to facilitate the shift toward a circular economic model. Funding for waste management activities also originates from private and public waste management service providers, along with service operators, as well as from independent private enterprises. In a circular economy framework, investments from the business sector are anticipated to be crucial (Lichtenberger, 2020). The swift rise of urban populations, combined with ongoing economic development and heightened living standards, has resulted in the production of substantial quantities of waste in the urban areas of developing regions. When plastic waste from municipal sources is not handled appropriately, it leads to adverse environmental consequences and exacerbates flooding and water logging during severe weather events, such as periods of heavy rainfall (Bharadwaj et al., 2020). In terms of waste collection, the primary benefit of this service is the gathering of waste at its source (Matzembacher et al., 2020). People who use this service typically have the money to pay a fee to have their trash removed. Establishing a direct connection between the service and the payment can help provide a favorable economic environment for offering collection services and also create the possibility to progressively share or improve the

service over time. In a "Business as Usual" (BAU) scenario, without major policy or technological changes, the basic costs of waste management tend to rise as the amount of waste gathered grows and as legally mandated landfill management is maintained (Matzembacher et al., 2020). Enhanced cost control, in conjunction with improved revenue collection, strengthens overall financial management and facilitates the provision of cost-effective, high-quality services. Nevertheless, waste treatment and disposal are distinct from collection. In these situations, the service-payment relationship is indirect, meaning that the client does not directly experience or see the service they are paying for. This often causes these services to be inadequately valued and underprovided, unless adequate policy and legal measures are in place to ensure their provision (Elagroudy & El-Agfa, 2016). Inadequate funding for plastic waste generally results in degraded sanitation. Citizens' public attitudes toward waste management in Ghana do not align with perceptions found in many other countries. This mismatch is a major concern, as Ghanaians believe that all solid wastes will eventually end up in landfills (Cobia et al., 2017). Waste management companies, which are supposed to make money by turning valuable resources from the transformation of the waste solid waste flow into useful products has resulted in the rise of waste collection firms that solely gather and transport plastic waste to dumps. It encompasses the handling of waste creation, storage, gathering, transfer and transport, processing, and ultimate disposal, all grounded in optimal practices within public health, cost-effectiveness, engineering, environmental preservation, visual appeal, and management tends to rise as the ratio of waste collected rises and other factors relevant to waste management (Lisa et al., 2021). Regarding sanitation conditions in developing nations as opposed to developed nations, poor sanitation is a universal problem, and it is also the case in the local communities in the city of Lodwar, Kenya.

2.3 Three Approaches to The Collection, Transport, and Disposal of Plastic Waste

Refuse generation is determined by the extent of technological and social development of a society. Changes in the nature of waste streams have been influenced by historical trends and geographical disparities and have always followed periods of industrial expansion and imaginative invention. Municipal solid waste can be repurposed to create a valuable economic use for some of its components, provided adequate collection systems are developed (Awunyo-Vitor et al., 2013). In larger urban areas, counties are accountable for overseeing the management of non-hazardous waste from residential and public facilities. However, hazardous waste is generally left with the entity that generated it-either the generator or the waste producer. Traditionally, small, community-based organizations have focused on a minor fraction of the overall waste stream and have been limited in their scope of operations. These agreements can demotivate families and individual residents from taking responsibility for household waste management. This has consequently led to an increase in careless and unregulated dumping practices (Shebang, 2015). Plastic materials are now used in almost all aspects of daily life, making careful planning and consideration of management important. The advantages of plastic are undeniable; however, the drawbacks can be substantially decreased if systematic methods for plastic waste disposal are applied (Sousa, 2021). Good planning must focus on ensuring that plastic waste is removed from general household waste and that provision is made for transporting separated plastics to recycling centers. Incineration in facilities equipped for plastic recycling, located in remote sites away from urban populations, can be an effective method of decreasing the overall amount of plastic waste present in the environment particularly for handling very high volumes. Strategic plans should also encourage the promotion of reusable cloth shopping bags. It is good practice to promote paper alternatives and bags made from natural fibers such as jute and cotton when developing these types of initiatives for grocery and other retail products. These would help consumers minimize their reliance on single-use

plastic carriers (Patti et al., 2020). Nevertheless, a research gap still exists-and this study aims to fill it-regarding the actual practice of using paper bags and bags made from textile materials such as jute and cotton within the Kenyan context. Plastic waste is becoming an increasingly important environmental concern, requiring extensive collaboration and coordination among various stakeholders to mitigate its harmful impact (Sand et al., 2020). Collaborative efforts and networks should be formalized between different ministries in order to develop suitable policies and maximize the benefits of coordination. This includes coordinating public meetings in various areas of town to inform residents about the negative effects of poor plastic waste management and the importance of reusing and recycling plastic waste. It also involves coordinating and facilitating environmental competitions focused on creative approaches to plastic waste management among local communities, youth and women's groups, divisional schools, and other institutions (Astoria & Herdiansyah, 2022). Best practices and technologies for managing plastic waste should be promoted and disseminated through "Environment Day" and other public holidays. Another recommended strategy is to produce a film or video of the environmental challenges in each division, with a specific focus on plastic waste management, and then use these materials for environmental awareness efforts in each division (Alibi et al., 2019). This study fills a void in the existing literature on the effectiveness of coordination in supporting the management process of plastic waste, particularly in a small town like Lodwar. The following outlines the two main objectives of recycling plastic. Initially, it provides a practical method for handling current waste. Secondly, it is essential for the effectiveness of circular economy frameworks and zero-waste principles, which seek to minimize waste generation and foster enduring environmental sustainability (Kerala et al., 2019). The existing social, environmental, and economic effects of waste generation and disposal in production and disposal in society are significant. Many people

and organizations today wish to recycle more of their waste but simply do not know how to do it properly. This lack of knowledge often causes contamination issues, such as combining non-recyclable plastics with recyclable ones or trying to recycle contaminated soiled plastics with adhesive, chemical solvents or residual food. These contaminants can have a detrimental impact on the recycling process (Cabrera et al., 2022). Therefore, an education and guidelines campaign is needed to improve recycling outcomes. Italy has an extensive Waste Management Strategy that governs the management of all governmental waste and the treatment of all solid and liquid refuse, encompassing both hazardous and non-hazardous materials. The country possesses an advanced waste management system that encompasses source reduction, waste minimization, recycling and reuse, biological processing, energy recovery incineration, and final landfill disposal (Luttenberger, 2020). The optimal approach to handle waste is to prevent it from being generated initially. Consequently, a primary objective of any efficient waste management system is to prevent waste reuse, various strategies can be used to lessen environmental pollution. Such measures include implementing less hazardous manufacturing practices that require fewer dangerous chemicals, using new and improved leak detection systems for chemicals stored in tanks and drums, using new chemical methods to neutralize chemicals and reduce their reactivity, along with utilizing water-efficient technologies that decrease the demand for fresh water (Malinauskaite et al., 2017). Each of these tactics adds to a method of managing waste that is more sustainable. Nigeria is a country where Nigerians are primarily populated by individuals. Recycling is now a critical approach to reducing environmental damage and is seen as one of the streams that grows the fastest of the plastics industry. Recycling in Nigeria can imply a decrease in the need for petroleum-based raw materials, carbon dioxide emissions, and the volume of refuse directed to landfills or incineration facilities (Gregory, 2017). Alternative methods for reducing waste, such

as light weighting (using less material per product), product reuse, using biodegradable products, and energy recovery from waste combustion, are compared to recycling. Over several decades, there has been rapid growth in packaging recycling in many countries. New technologies and better systems for collecting, sorting, and processing plastics for recycling are opening up new opportunities. In the coming decades, the majority of plastic waste could be kept out of landfills if the public is involved. Private companies and the government act in a coordinated manner. This shift would make a significant contribution to global environmental sustainability. Uganda has rolled out an innovative public waste collection program for plastics as it strives to address environmental sustainability issues. Plastic pollution has become one of the most urgent environmental challenges in the nation because of the widespread use of single-use plastics and the wasteful disposal practices of citizens (Browning et al., 2021). Uncontrolled plastic disposal emits toxic chemicals that endanger the environment and cause contamination of soil, rivers, and air. To encourage customers and community members to dispose of plastic responsibly, thereby reducing plastic waste that causes blockage of drains and littering of the landscape, Vivo Energy Uganda has partnered with other organizations to place central points for community plastic disposal at its numerous Shell gas stations across the country (Marissa et al., 2020). This is a public collection model that could be useful for other countries such as Kenya. There has been significant concern from members of the public and environmental activists in Kenya about plastic waste management (Bailey, 2022). Population growth and ongoing urbanization have created increasingly chaotic waste generation patterns and material flows. The country has some laws and regulations governing waste management, but the lack of enforcement and poor practices have resulted in communities being suffocated by their own waste, which directly affects community well-being and the natural environment (Mihas et al., 2021). According to data from Nauru,

approximately 45 percent of the waste produced is collected and transported to the disposal site at Giotto, while 18 percent is recycled, with the remainder being dealt with in a manner deemed environmentally friendly (NEMA, 2015). These statistics show that, although there has been some improvement, a significant amount of waste is still not being properly managed. The informal settlements in Lodwar city are characterized by large piles of rubbish that are not covered and by overcrowded drainage channels, posing health risks to the population. Uncontrolled urban plastic waste can be a source of water-related diseases that ultimately result in high infant mortality rates (Wangi, 2012). Lodwar Town continues to experience significant challenges in plastic waste management. Determining the impact of planning is therefore essential coordination, and recycling on handling plastic waste in this study, specifically in Lodwar Town. These three dimensions will be addressed, helping to develop actionable recommendations at the local level for both authorities and the community.

2.4 Recycling Methods for Plastic Waste Disposal

In a study by Stoeva and Eriksson (2017), they analyzed the impact that recycling programs in Sweden and Bulgaria had on residents' participation in household waste recycling. They studied the waste separation practices of 112 students from Plovdiv, Bulgaria, and 111 university students from Kalmar, Sweden, using the Theory of Planned Behavior. The findings showed that citizens may be discouraged from recycling due to a lack of infrastructure for waste separation. Even if they have positive attitudes toward it. If local waste separation conditions were satisfactory, participants' behavior matched their attitudes toward waste separation and recycling. Specifically, this study was performed in Sweden and Bulgaria, while the current study is being carried out in Kenya. The geographical and cultural contexts differ, highlighting the need for local studies on recycling behavior and infrastructure. (Kumar and Bashar, 2015) conducted an experimental

investigation on structural concrete in which they substituted part of the coarse aggregate with electronic plastic waste (E-plastic). In light of the above, the use of non-degradable waste in construction is explored using E-plastic made from computer components as a replacement for coarse aggregate. Replacement levels varied by volume: 10%, Twenty, thirty, forty, and fifty percent. Both fresh and hardened concrete were tested after seven and twenty-eight days. The findings show that the mix's workability decreased as the percentage of E-plastic increased. Comparing the partially replaced concrete to the control concrete, the former had lower flexural, split tensile and compressive strengths. The concrete's dry density decreased as a result of the addition of E-plastic, and the concrete's deformability was high prior to failure. The results indicate that the use of E-plastic in concrete is possible, but results indicate that the use of E-plastic in concrete is possible, but the replacement ratio should be carefully considered to ensure structural integrity. A literature review was conducted on the sustainable recycling of plastic solid waste (PSW) by Kwanza, Mohawk (2017). They aimed to characterize the essential factors that contribute to the sustainable development of post-consumer packaging plastic waste recycling systems in both developed and developing nations. They examined numerous articles addressing municipal solid waste, sustainable solid waste management, and recycling. Additional research identified several social, environmental, and economic factors that support sustainable recycling programs for post-consumer plastic packaging. However, the effect of specific recycling methods on plastic waste handling, which is the focus of the current study, was not addressed in their review. This gap justifies the need for further empirical research in this area. (Erikson et al, 2019) examined the thermal degradation, process ability, and mechanical properties of multiple reprocessed PET, PE, and PP samples sourced from household waste that had been separated at the point of origin. According to the study, recycling PET, PE, and PP poses unique difficulties. Even when the waste

stream is heterogeneous, PET waste is very suitable for closed-loop recycling over several cycles because any degradation of PET polymer may be reversed through a decontamination process. There were significant differences in the process ability of different types of PE and PP packaging, especially for PP. Therefore, it is not technically possible to produce new packaging products through the current recycling of mixed PP waste or the separate recycling of individual PP packaging types. This emphasizes how crucial it is to minimize PE and PP waste prior to recycling in order to attain homogeneity. Increased plastic sorting and product design regulation could achieve this uniformity that considers the effects of these polymers on properties and recyclability. However, the study failed to make a clear point about how, in practice, recycling affects the handling of plastic waste.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

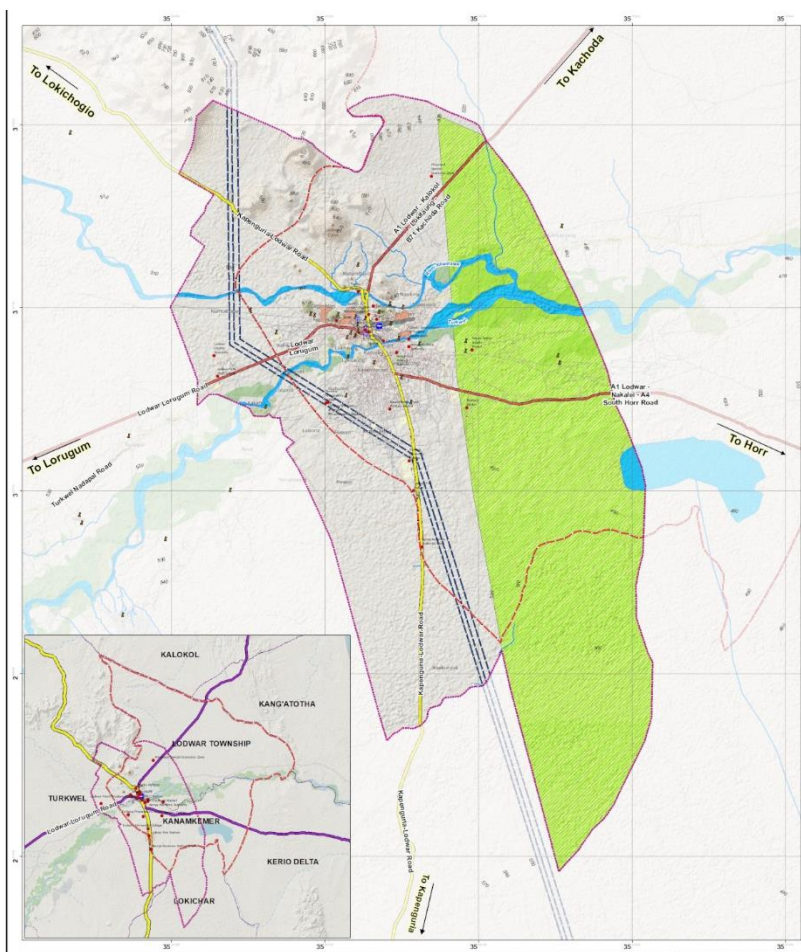
This section offers a detailed account of the approach employed in the research. It outlines the methods employed for collecting and examining data. The discussed areas include: study location, intended population, research design, sampling techniques and sample size determination, research tools, data collection procedures, data analysis methodologies, and ethical considerations.

3.1 Study Area

Research took place in the town of Lodwar, the headquarters of Turkana County, Turkana Central Sub-County, where all the departmental offices are located. It is also a major business hub for the business community in Turkana County. The town is located in the northwest of the country, bordering Baringo, West Pokot, and Marsabit counties to the south, southeast, and west, respectively. Lodwar Township lies at coordinates 3.2072°N, 35.6970°E. The total area is 77,000 km². The climate is hot and warm, with annual rainfall of 300 mm to 400 mm being unpredictable (Gilbert Uma et al, 2023). The livelihood of most people in Turkana County is nomadic pastoralist and fishing. Lake Turkana is a fishing area. The livestock reared by the local communities are most commonly goats, camels, donkeys, and zebu cattle. The 2019 census shows the county has 926,976 residents. The discovery of oil has also led to an influx of people seeking business and employment opportunities. Lodwar Town was selected as the research field due to the fact that it is a fast-growing urban town in a developing country and is highly relevant to the topic of plastic waste. Lodwar is the main town in Turkana County, with a population of over 82,000. With the town's growth, brought about by the discovery of oil, waste production has increased, including plastic waste. Lodwar is located within a fragile ecosystem on the edge of the biggest desert lake

in the world, Lake Turkana. The lake is home to several unique and endangered species, including the Nile crocodile and the hippopotamus. Plastic pollution can pollute the lake and adversely affect these species. In addition, the capacity for waste management is limited; the municipal government in Lodwar has a limited ability to gather and get rid of trash in the town. This implies that a significant amount of plastic waste is not managed properly and is released into the environment.

Figure 3.1: Physical Map of Lodwar Town



3.2 Design of Research

The study utilized a descriptive design that is cross-sectional. That focused on the residents of Lodwar Town, NEMA officials, municipal personnel, and county public health officials. This design was appropriate because it provides data showing the management of plastic waste by traders and households in Lodwar Town at a certain moment in time.

3.3 The Population targeted by the study

The group examined in the study comprised several different groups. First, it included the urban population (households) as well as the wider town area. Second, relevant key informants were targeted, such as local leaders and environmental officers. Third, the study included those who produce plastic waste as part of their regular daily trading practice. The present study additionally focused on county government employees. This category included lower-level municipal officials and other local staff working directly or indirectly in policy formulation and the monitoring of implementation plans in Lodwar Town. Obtaining accurate numbers of traders in the county was difficult, but the Turkana County Traders Association had registered a significant number of traders, making it a good indicator. A comprehensive and current list of households was drawn from official town records. These records have been regularly used by the town administration over the years for planning and providing public services to the town's residents and are therefore appropriate sampling frames for the study.

3.4 Sample Determination

In order to determine the number of households that should be part of this research, the study utilized a well-known statistical formula developed by Fisher et al. (1998), frequently used in social science investigations. The equation takes the following form: $n = z^2pq / d^2$. Each symbol represents a specific statistical parameter, as described below.

- **n**= the desired sample size (the number of households to be surveyed).
- **z**= 95% confidence is represented by the standard normal deviation. Using the table of for a normal distribution, this figure is 1.96. Employing a 95% confidence level indicates that, with 95 out of 100 hypothetical samples, the scores obtained would accurately reflect the true characteristics of Lodwar Town's households.
- **p**= the estimated percentage of the intended audience that possesses expertise and methods related to the handling of waste. Since no prior research has been carried out to ascertain the actual proportion of households in Lodwar Town with such knowledge and practices, a conservative figure of 0.5 was adopted. This value maximizes the necessary sample size and is standard when the true proportion is unknown.
- **q**= the complement of **p**, calculated as **1 - p**. Thus, with **p = 0.5**, **q** also equals 0.5.
- **d**= the allowable sampling error, also known as the degree of precision or error margin. In the research, **d** was set at 0.05, meaning that the findings are expected to be accurate within plus or minus five percentage points. This level of precision is widely accepted in social science research.

Substituting these values into the formula yields the following calculation:

$$n = (1.96)^2 \times 0.5 \times 0.5 / (0.05)^2 = 384 \text{ respondents}$$

Therefore, the study required a minimum sample of 384 households to achieve the desired confidence and precision levels.

3.5 Sampling Techniques

Key informants (traders, municipal workers, NEMA officers, and county public health officers) were selected using purposive sampling. In the trader category, the study identified potential respondents based on membership in the Turkana County Traders Association, which comprises a wide variety of businesses in Lodwar Town that generate waste. These businesses included shops, supermarkets, and educational institutions, places of worship (churches and mosques), government offices, and similar establishments. Selection of municipal workers, NEMA officers, and public health officers was based on their direct involvement and responsibilities in waste management activities. Stratified sampling was applied for household sampling, using the economic status of different households as the basis for stratification. Households were classified into two categories: those in upscale peril-urban and urban estates. These were the two strata from which selected households were drawn to ensure that each stratum was appropriately represented in the overall sample. A complete list of all households was first compiled for each stratum, and then a subsample of households was selected from each stratum without replacement until the desired sample of each stratum's target sample size was attained.

3.6 The criterion for inclusion and exclusion

3.6.1. Criteria for inclusion

Participants in the research consisted of individuals formally registered as traders with the county government who also resided within the town's urban center or its peril-urban surroundings.

3.6.2 Criteria for Exclusion

Excluded from the research were individuals who declined to provide their consent for participation, as well as persons who had resided in the town for less than six months.

3.7 Research Equipment

A questionnaire was the primary tool employed by the researcher. The researcher employed a survey as the primary method for data gathering method for gathering data from the selected respondents. This was considered suitable for the study due to its ease of administration and the relatively short time frame involved. The questionnaire included only closed-ended questions, which provided a set of potential answers, making the forms easier to complete, helping participants answer every question, and allowing them to express their opinions on the variables being examined. The survey was divided into multiple sections. The initial section collected demographic details to help comprehend the background traits of the respondents. Sections that follow contain questions directly related to the primary variables of the researcher's study. The surveys were individually distributed by the researcher.

3.8 Research Pilot

A preliminary study was conducted in Kanamkemer Town in Turkana County, Kenya. This site was purposely chosen because it is not within the primary study area but has similar demographic, geographic, and waste management parameters to Lodwar Town. The primary purpose of the pilot study aimed to assess the reliability and validity of the research tools that would be utilized in the main study. In the pilot phase, 38 research questionnaires were distributed to respondents in Kanamkemer Town. This figure represented 10 percent of the overall determined sample size for the primary study, a proportion that aligns with the recommendations made by Dowdy and Dowdy (2015). The outcomes obtained from these piloted tools made it possible for the researcher to assess the regularity of participant feedback. Based on the results, adjustments were made to the items in the research instrument, and necessary revisions were implemented accordingly.

3.8.1 Research Validity

Validity is the extent to which a test or measurement tool accurately measures what it is assesses what it is intended to assess. In this research, the assessment of confirmation was guided by the judgments and expert opinions of researchers. Furthermore, input was solicited from specialists in the field, as recommended by Dross (2011). Subsequently, content validity was applied, which involves verifying whether the research tool properly covers all the relevant content in relation to the variables under study. Face validity, a subset of content validity, was addressed by asking experts to give their opinions on whether the instrument appears, on the surface, to measure the intended concept. Construct validity was also examined; here, the researcher assessed whether the research instruments allowed for meaningful inferences to be drawn from test scores concerning the underlying theoretical concept being studied. To ensure these validity standards were met, the researcher gave the questionnaires to the research supervisor and other research professionals. Their function was to validate that the questions truly tested or measured what they were designed to assess.

3.8.2 Reliability of the Study

Reliability refers to the extent to which a test consistently measures what it is intended to measure with accuracy. Thus, reliability emphasizes the degree to which empirical indicators of theoretical concepts exhibit stability or consistency across multiple measurement attempts (Mohegan, 2017). To assess this, the researcher utilized Cranach's alpha (α) coefficient to analyze the internal consistency of the survey instruments used in the study, thereby evaluating their reliability. This was achieved by calculating Cranach's alpha coefficient for each part of the questionnaire utilizing the data gathered from the pilot study. Cranach's alpha coefficient was calculated for each segment of the Survey tool utilizing the data gathered from the pilot study. Cranach's alpha reliability

coefficient typically falls between zero and one (Taber, 2018). Nonetheless, there is truly no minimum threshold for the coefficient. George and Mallory (2003) offer these guidelines: ≥ 0.9 – Excellent, ≥ 0.8 – Good, ≥ 0.7 – Acceptable, ≥ 0.6 – Questionable, ≥ 0.5 – Poor, and ≤ 0.5 – Unacceptable. Cranach's alpha exceeding 0.7 was considered the threshold for acceptability (Bonnet and Wright, 2015), which improved the identification of non-essential variables;

3.9 Data Collection Procedures

After receiving approval to conduct the study, the researcher proceeded to the research area. Questionnaires were self-administered and handed to the respondents to complete. The participants were provided one day to fill out the survey forms, and those completed on the same day were collected by the researcher. This was done to avoid losing filled questionnaires. Additionally, a 30-minute interview was conducted with municipal/county workers, public health officers, and representatives of NEMA. The researcher completed the observation checklist by observing available and unavailable indicators of interest relevant to the study objectives.

3.10 Methods of Data Analysis

Data were evaluated for precision, homogeneity, sensible completeness, and conformity before assessment using descriptive and inference data utilizing the Statistical Package for Social Sciences (SPSS) version 26. Descriptive statistics encompassed mean, frequency, percentage, and standard deviation. Correlation was utilized to analyze the direction and strength of the relationship between independent and dependent variables. Various regressions were applied to examine the effect of independent variables on dependent variables. Were employed to showcase the results. The subsequent regression method was employed.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon \dots\dots\dots \text{Equation 3.1}$$

Where:

- **Y** represents plastic waste handling in Lodwar Town.
- **β_0** represents the intercept when X is zero
- **X1** represents community participation.
- **X2** represents the "**polluter pays**" principle.
- **X3** represents planning and coordination.
- **X4** represents recycling processes.
- ε symbolizes the error term

3.10.1 Presumptions of the Regression Model

Multiple regression analysis relies on several essential assumptions, such as linearity, homoscedasticity, normality, multicollinearity, and the independence of residuals. The linearity assumption requires showing that a linear relationship is present between the dependent variable and the collection of independent variables. To investigate this assumption, the researcher employed an ANOVA test of linearity in conjunction with residual plots, as suggested by Garson (2012). The normality assumption states that the residuals are normally distributed and have an average value of zero. The Kolmogorov-Smirnov test, which is a form of normal probability assessment, was utilized to check if the residuals conform to a normal distribution (Lind, Marchal & Wathen, 2012). The idea of multicollinearity implies that there should be no substantial correlation between the control variables. This prior assumption was confirmed using Acceptance and the variance inflation factor (VIF). Many researchers view a tolerance below 0.10 or a VIF

value exceeding 10 as signs of significant multicollinearity issues (Field, 2009; Williams, 2015). The prior assumption of autocorrelation (or independence of the residuals) indicates that there is no relationship between consecutive observations of the dependent variable. The Durbin-Watson statistic was employed to assess the existence of autocorrelation. The Durbin-Watson statistic has a value that spans from zero to four. A value of precisely 2.00 indicates that there is no autocorrelation present in the residuals. As the statistic nears zero, positive autocorrelation is apparent; when the value goes beyond two, negative autocorrelation is indicated (Lind, Marchal & Wathen, 2012).

3.11 Consideration of Ethics

The researcher gave them the proposal for the study to the Institutional Research and Committee on Ethics (IREC) of Barton University (Number B9006032021) and the Turkana County government administration seeking clearance and approval to conduct the research. Prior to participating in the study, the respondents willingly signed a consent form. They were informed about their rights and the anticipated advantages of the study by the researcher. Before participating, they signed a consent form after being informed of the study's objectives. There was no inducement or coercion to take part. The structured questionnaires used serial numbers to guarantee participant anonymity. Participants were free to ask questions, and they received satisfactory responses. Before the participants could sign the consent forms, the researcher questioned them about the information provided to make sure they understood the study. Information and research instruments were kept.

CHAPTER FOUR

RESULTS

4.0. Introduction.

This chapter presents the results of the data analysis, along with interpretations and discussions. Tables are utilized to present the outcomes. A total of 384 questionnaires were handed out. A total of 345 questionnaires were properly filled out and returned. Table 4.1 shows an overall response rate of 89.8%, indicating success. A total of thirty-nine questionnaires, representing 10.2% of all, were submitted with incorrect responses. A response rate of 50% is seen as sufficient, 60% is regarded as favorable, and over 70% is viewed as outstanding (Combo and Tromp, 2009). Consequently, the research achieved an exceptionally high response rate, and 345 valid surveys were utilized for data analysis numbered 345.

Table 4.1.0

Response Rate

Items	Frequency	The Percentage	Of items
		items	
Returned	345	89.8	
items			
Unreturned	39	10.2	
Total.	384	100.0	

4.1 The respondents' socio demographic characteristics

There was a need to identify the background data of the. Residents (households) who took part. In this study. The background information presented includes gender, age, location of residence, marital status, faith, highest level of education, and occupation. Their responses are displayed in the following subsections.

4.1.1 Gender among the Respondents

Gender information was requested from the respondents. These are their answers. Presented in Table 4.1.0. As shown, the majority, 206 (59. Women made up 7% of the respondents. Whereas 139 (40. 3% of them were men. This indicates that more females participated in the study than males, implying that the majority of residents who generate plastic waste during their daily activities are women.

Table 4.1.1

Gender Female Total

Gender	Frequency	The Percentage
Male	139	40.3
Female	206	59.7
Total	345	100.0

4.1.2 Respondents Age

The research aimed to identify the age brackets of the inhabitants. The outcomes shown in the table.4.1.1 Show that 88 (25.5%) of the responders ranged in age from 18 to 28 years, 172 (49.9%) were aged 29 to 39 years, 75 (21.7%) were aged 40 to 50 years, and only 10 (2.9%) were aged 51 years and above. These findings the majority of residents who participated in the study were, according to the results of residents who participated in the research were in the 29 to 39 years age category. This represents a relatively younger group, which is likely to have a good understanding of plastic waste handling.

Table 4.1.3

The respondents' gender.

Age bracket	Frequency	Percentage
18 to 28 years	88	25.5
29 to 39 years	172	49.9
40 to 50 years	75	21.7
51 and above years	10	2.9
Total	345	100.0

4.1.3 Location of the Respondents

The respondents were also asked to state their location of residence. The table's findings 4.1.2 show that the majority, 223 (64.6%), resided in urban areas, while 122 (35.4%) resided in suburban

areas. These Findings suggest that most of the residents involved in the study were from urban areas, which face greater challenges regarding plastic waste handling.

Table 4.1.2

Location of the respondents

Location	of	Frequency	Percentage
Residents			
urban		223	64.6
sub-urban		122	35.4
Total		345	100.0

4.1.4 Marital Status among the Respondents

Residents were also asked to state their marital status. The results in Table 4.1.3 show that 139 (40.3%) of the respondents were single/never married, 38 (11.0%) were divorced/separated, 130 (37.7%) were in monogamous marriages, 34 (9.9%) were in polygamous marriages, and only four (1.2%) were widowed. These findings reveal that the majority of residents involved in the study were residents who involved in the study were single or never married.

Table 4.1.3

Marital Status among the Respondents

Relationship	Frequency	The Percentage
Single, never married	139	40.3
divorced, separated	38	11.0
monogamous marriage	130	37.7
polygamous marriage	34	9.9
Windowed.	4	1.2
Total	345	100.0

4.1.5 Faith among the Respondents

The respondents were asked to state their faith. The results are shown in Table 4.1.4. The table shows that 152 (44.1%) were Christian Catholics, 160 (46.4%) were Christian Protestants, and 33 (9.6%) were Muslims. This implies that most of the dwellers involved in the research were Christians.

Table 4.1.4:

Faith among the responders.

Age bracket	The Frequency	Percentage
Christian (Catholic)	152	44.1
Christian (Protestant)	160	46.4

Muslim	33	9.6
Total	345	100.0

4.1.6 Respondents Level of Education

The objective of the study was to determine the highest level of education that the respondents had achieved. According to the data in Table 4.1.5, it was found that 54 (15.7%) individuals had a higher percentage of a certain number. 54 (15.7%) had primary school level, 95 (27.5%) had high school (O-Level), 135 (39.1%) had college level, and 25 (7.2%) had university level. These findings imply that most of the locals who participated in the research. Had a college-level education, thus they possessed sufficient knowledge to answer the questionnaires.

Table 4.1.5

Respondents Level of Education

Highest level of education	Frequency	Percentage
Primary school	54	15.7
High school (O Level)	95	27.5
College	135	39.1
University	25	7.2
Total	345	100.0

4.1.7 Respondents Occupation

Residents were also obliged to specify their line of work. Table 4 presents the findings in Table 4.1.6, which show that one (0.3%) respondent worked in the private sector, 19 (5.5%) worked as civil servants, 11 (3.2%) worked as municipal workers, 214 (62.0%) were business people, and 100 (29.0%) did not specify their occupation. These findings reveal that most of the study's participants were employed in personal businesses.

Table 4.1.6

Respondents Occupation

Occupation	Frequency	Percentage
Private sector	1	0.3
Civil servant	19	5.5
Municipal worker	11	3.2
Business person	214	62.0
Others	100	29.0
Total	345	100.0

4.1.8 Management of Plastic Waste

The residents were asked to state how they manage plastic waste. Table 4.1 displays the results. Seven. 168 (48.7%) of the respondents, according to the results. burned waste, 65 (18.8%) transported waste to a collection point, 10 (2.9%) put waste into their own buckets and sacks because the town does not provide dustbins, 88 (25.5%) disposed of waste in a rubbish pit, and 14 (4.1%) used other unspecified ways. Results show that most people in town manage waste by

burning it. These findings disagree with the study by (Sancho, Yan, and Tran, 2013), which found that the majority of residents in Freetown, Sierra Leone, either throw their waste on land, into drains, or onto streets. Similarly, only 21% of the study's participants placed their waste in bins and bags so that it could be moved to specific locations for final disposal.

Table 4.1.7

Management of Plastic Waste

How to manage plastic waste	Frequency	Percentage
Burning	168	48.7
Transport to collection point	65	18.8
Put in their own buckets and sacks	10	2.9
Dispose to rubbish pit	88	25.5
Others	14	4.1
Total	345	100.0

4.2 Objective one: to ascertain the impact of community involvement plastic waste disposal

The residents were asked to indicate how the community participates in plastic waste disposal. The results are shown in Table 4.1.8. As illustrated, participants' views on community involvement in waste reduction varied considerably. A minority of 24 individuals (7.0%) strongly agreed that local residents have successfully reduced waste generation, particularly concerning hazardous items and non-recyclable materials. An additional 77 respondents (22.3%) simply agreed. However, the largest single category was those who were undecided, comprising 122 people (35.4%). Opposition to this idea came from 85 participants (24.6%) who disagreed, alongside 37

(10.7%) who strongly disagreed. The 2.90 as the mean score and 1.08 as the standard deviation of 1.08 indicate that, overall, respondents were undecided about whether the community has reduced the quantity of waste produced, particularly hazardous and non-recyclable goods. The study findings also show that 12 (3.5%) strongly agreed that the community burns or combines wastes because they do not separate them, which would make handling easier and safer; 22 (6.4%) agreed; 20 (5.8%) were undecided; 248 (71.9%) disagreed; and 43 (12.5percent) strongly disagreed. The majority of respondents had a mean of 2.17 and a standard deviation of 0.85. The majority of respondents disagreed with this statement. Furthermore, 14 (4.1%) strongly agreed that communities are reusing materials whenever possible; 100 (29.0%) agreed; 74 (21.4%) were undecided; 119 (34.5%) disagreed; and 38 (11.0%) strongly disagreed. The majority of respondents disagreed, as indicated by the mean of 2.81 and the standard deviation of 1.10. The majority of respondents disagreed that communities are reusing materials whenever possible. Finally, the study found that 3 (0.9%) strongly agreed that the community pays fair wages to the people who collect, store, and transport plastic waste safely; 31 (9.0%) agreed; 21 (6.1%) were undecided; 88 (25.5%) disagreed; and 202 (58.6%) strongly disagreed. Respondents disagreed that the community pays fair wages to those who collect, store, and transport plastic, as evidenced by the mean of 1.68 and standard deviation of 0.99. Collect, store, and transport plastic waste safely. The study findings revealed that the community has reduced the quantity of waste produced, particularly hazardous and non-recyclable goods.

Table 4.1.8

Plastic waste disposal and community involvement

Statements		SA	A	UD	D	SD	μ	Δ
1.Community burn or put together wastes since they do not separate wastes where they do not make them easier and safer to handle	F	24	77	122	85	37	2.9	1.08
1.Community burn or put together wastes since they do not separate wastes where they do not make them easier and safer to handle	%	7	22.3	35.4	24.6	10.7		
2.Community sorts all plastic wastes from the points of generation	F	12	22	20	248	43	2.17	0.85
2.Community sorts all plastic wastes from	%	3.5	6.4	5.8	71.9	12.5		

the points of
generation

3.Communities are
reusing materials
whenever possible

F	14	100	74	119	38	2.81	1.1
---	----	-----	----	-----	----	------	-----

3.Communities are
reusing materials
whenever possible

3.Communities are
reusing materials
whenever possible

%	4.1	29	21.4	34.5	11
---	-----	----	------	------	----

4. Community pays
fair wages to the
people who collect
store and transports
the plastic wastes
safely.

F	3	31	21	88	202	1.68	0.99
---	---	----	----	----	-----	------	------

4. Community pays
fair wages to the
people who collect
store and transports
the plastic wastes
safely.

%	0.9	9	6.1	25.5	58.6
---	-----	---	-----	------	------

Total number of respondents (n)	345
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Key: SA-Strongly Agree, A-Agree, UD-Undecided, D-Disagree, SD-Strongly Disagree,
 μ -Mean, δ -Standard Deviation

4.3 Objective Two: Impact of the "polluter pays" principle on plastic waste on environmental pollution

4.3.1. Descriptive Statistics for Influence of "Polluter Pays" Principle

The study sought to assess the impact of the "polluter pays" principle regarding plastic waste and environmental pollution in Lodwar Town.

Table 4.1.9

The Influence of "Polluter Pays" Principle on Plastic Waste on Environmental Pollution

1. 2. 3...

The Statements				SA	A	UD	D	SD	μ	Δ
1.	A	tax	F	13	1	75	166	90	2.08	0.91
	framework	has								
	been	established								
	for	landfill	tax							
	aimed	at	the							
	remediation	of								
	contaminated									

sites. Tax system has been put in place for landfill tax for contaminated site remediation								
1. A tax framework has been established for landfill tax aimed at the remediation of contaminated sites. Tax system has been put in place for landfill tax for contaminated site remediation	%	3.8	0.3	21.7	48.1	26.1		
2. The town has implemented specific fees and charges for residents	F	11	1	1	186	146	1.68	0.79

based on the amount of residual waste generated per household and per square meter of living space. Town sets certain fee and charges residents for residual waste per household, per square meters living space

2. The town has implemented specific fees and charges for residents based on the amount of residual waste generated per household and per square meter of living space. Town sets certain fee and charges residents for residual waste per household, per square meters living space

A deposit system has been introduced for

%	3.2	0.3	0.3	53.9	42.3
---	-----	-----	-----	------	------

F	13	1	33	50	248	1.5	0.96
---	----	---	----	----	-----	-----	------

specific categories of waste, such as glass and plastic bottles.

A deposit system has been introduced for specific categories of waste, such as glass and plastic bottles.

A deposit system has been introduced for specific categories of waste, such as glass and plastic bottles.

4. There is producer financial responsibility driven systems for packaging,

4. There is producer financial responsibility driven systems for packaging,

%	3.8	0.3	9.6	14.5	71.9
---	-----	-----	-----	------	------

F	15	14	34	149	133	1.92	1.02
---	----	----	----	-----	-----	------	------

%	4.3	4.1	9.9	43.2	38.6
---	-----	-----	-----	------	------

Total number of respondents (n)	345	\
---------------------------------	-----	---

Key: SA - Strongly Agree, A - Agree, UD - Undecided, D - Disagree, SD - Strongly Disagree, μ - Mean, δ - Standard Deviation.

The results are presented in Table 4.1.9. The results indicate that 13 respondents (3.8%) strongly agreed that a tax system for landfill tax intended for contaminated site remediation has been established, while 1 respondent (0.3%) of respondents agreed, while 75 individuals (21.7%) were undecided, 166 participants (48.1%) disagreed, and 90 respondents (26.1%) strongly disagreed. The mean of 2.08 and the standard deviation of 0.91 indicate that most respondents disagreed with the presence of such a tax system. The findings further showed that 11 (3.2%) strongly agreed that the town-specific fees and charges are levied on residents for residual waste, calculated based on each household and the square meterage of living space; 1 (0.3%) agreed; 1 (0.3%) was undecided; 186 (53.9%) disagreed; and 146 (42.3%) strongly disagreed. The average is 1.68, with a standard deviation of 0.79, indicating that the majority also disagreed with this statement. Additionally, the study revealed that 13 (3.8%) strongly agreed that a deposit system has been introduced for certain waste types (e.g., glass bottles, plastic bottles), with 1 (0.3%) agreeing, 33 (9.6%) undecided, 50 (14.5%) disagreeing, and 248 (71.9%) strongly disagreeing. The mean of 1.50 and the standard deviation of 0.96 indicate that most respondents disagreed with the existence of a deposit system for specific waste categories. Finally, the study showed that 15 (4.3%) strongly agreed that producer-responsibility systems are in place for packaging and electrical/electronic waste; 14 (4.1%) agreed; 34 (9.9%) were undecided; 149 (43.2%) disagreed; and 133 (38.6%) strongly

disagreed. The mean of 3.88 and the standard deviation of 1.236 indicate that the majority disagreed with this statement. In summary, the study findings demonstrate that most residents agreed that a deposit system has been established for certain waste types (e.g., glass bottles, plastic bottles). However, the majority of residents disagreed that producer-responsibility systems exist for packaging and electrical/electronic waste.

4.3.2 Relationship between the Polluter Pays Principle and plastic waste in the environment

The researcher sought to establish the relationship between the Polluter Pays Principle and the treatment of plastic waste. Results are shown in Table 4.1.10. Analysis shows that the principle of 'polluter pays' has a statistically significant relationship with plastic waste handling ($X^2 = 93.57$; $p < 0.01$). This finding further revealed that, from the funds collected through the tax system, 71 respondents (20.60%) indicated that these financial resources are used for plastic waste collection, while 45 respondents (13.00%) reported that the funds are allocated to the transportation of plastic waste. Additionally, very small proportion-3 respondents (0.90%)-stated that tax system funds are directed toward plastic disposal. Turning to the revenues generated from town fees, 26 respondents (7.50%) said these funds are used for collecting plastic waste, 55 respondents (15.90%) for transporting plastic waste, and 62 respondents (18.00%) for plastic disposal. The study results also showed that, with respect to the deposit system, 10 respondents (2.90%) reported that the funds are used for plastic waste collection, 42 respondents (12.20%) for plastic waste transportation, and 31 respondents (9.00%) for plastic disposal.

Table 4.1.1

Association between “Polluter Pays” Principle and Plastic Waste on environment pollution

		Plastic Waste Handling	Plastic Waste Handling	Plastic Waste Handling	χ^2	P- value
		Plastic waste collection	Plastic Waste Transportation	Plastic waste Disposal		
“Polluter Pays” Principle	Tax system	71(20.60%)	45(13.00%)	3(0.90%)	93.57	.000
“Polluter Pays” Principle	Town fees	26(7.50%)	55(15.90%)	62(18.00%)	93.57	.000
“Polluter Pays” Principle	Deposit System	10(2.90%)	42(12.20%)	31(9.00%)	93.57	.000

4.3.3 Relationship between the Socio-Demographic Characteristics of Respondents and the "Polluter Pays" Principle

Research further confirmed the relationship between the Socio-Demographic Characteristics of respondents and the "Polluter Pays" Principle.

Table 4.1.11

Correlation between the Socio-Demographic Traits of Respondents and the "Polluter Pays" Principle

		"Pollute r pays" principle	"Polluter pays" principle	"Pollute r pays" principle	χ^2	P- value
		Tax system	Town fees	Deposit System		
Gender	Male	44(12.8 %)	71(20.6%)	24(7.0%)	10.215 a	0.00 6
Gender	Female	75(21.7 %)	72(20.9%)	59(17.1 %)		
Age Bracket	18 to 28 years	21(6.1%)	40(11.6%)	27(7.8%)	67.565 a	.000
Age Bracket	29 to 39 years	91(26.4 %)	52(15.1%)	29(8.4%)		
Age Bracket	40 to 50 years	2(.6%))	46(13.3%)	27(7.8%)		
Age Bracket	51 and above years	5(1.4%)	5(1.4%)	0(0.0%)		

Location of Residence	Urban	67(19.4%)	106(30.7%)	50(14.5%)	9.951a	0.007
Location of Residence	Sub-urban	52(15.1%)	37(10.7%)	33(9.6%)		
Marital Status	Married	50(14.5%)	55(15.9%)	34(9.9%)	32.453a	.000
Marital Status	Divorced/separated	8(2.3%)	24(7.0%)	6(1.7%)		
Marital Status	Monogamous marriage	37(10.7%)	50(14.5%)	43(12.5%)		
Marital Status	Polygamous marriage	22(6.4%)	12(3.5%)	0(0.0%)		
Marital Status	Windowed	2(.6%)	2(.6%)	0(0.0%)		
Faith	Christian (Catholic)	60(17.4%)	53(15.4%)	39(11.3%)	16.840a	0.002
Faith	Christian (Protestant)	44(12.8%)	72(20.9%)	44(12.8%)		

Faith	Muslim	15(4.3%)	18(5.2%)	0(0.0%)		
	)					
Highest Level of Education	Primary school	26(7.5%)	26(7.5%)	2(.6%)	85.308	.000
	)				a	
Highest Level of Education	O Level	31(9.0%)	40(11.6%)	24(7.0%)		
	)	)	)	)		
Highest Level of Education	College	51(14.8%)	45(13.0%)	39(11.3%)		
	)	)	)	)		
Highest Level of Education	University	7(2.0%)	0(0.0%)	18(5.2%)		
	)			)		
Highest Level of Education	No formal education	4(1.2%)	32(9.3%)	0(0.0%)		
	)			)		
Occupation	Private sector	0(0.0%)	0(0.0%)	1(.3%)	27.040	0.00
	)			)	a	1
Occupation	Civil servant	4(1.2%)	10(2.9%)	5(1.4%)		
	)			)		

Occupati on	Municipal worker	5(1.4%)	6(1.7%)	0(0.0%)
Occupati on	Business person	70(20.3 %)	103(29.9 %)	41(11.9 %)
Occupati on	Others	40(11.6 %)	24(7.0%)	36(10.4 %)

The table shows that gender is statistically significantly associated with the 'polluter pays' principle ($X^2 = 10.215$; $p < 0.01$). Regarding age, the chi-square analysis indicates that age bracket is statistically significantly associated with the 'polluter pays' principle ($X^2 = 67.565$; $p < 0.01$). Location of residence is also statistically significantly associated with the 'polluter pays' principle ($X^2 = 9.951$; $p < 0.01$). Marital status was found to be statistically significantly associated with the 'polluter pays' principle ($X^2 = 32.453$; $p < 0.01$). Religion (faith) found statistically significantly associated with the 'polluter pays' principle ($X^2 = 16.840$; $p < 0.01$). From the chi-square analysis, the highest level of education is statistically significantly associated with the 'polluter pays' principle ($X^2 = 85.308$; $p < 0.01$). From the chi-square analysis, occupation is statistically significantly associated with the 'polluter pays' principle ($X^2 = 27.040$; $p < 0.01$).

4.3.4 Correlation between the Socio-Demographic Attributes of Participants and the Management of Plastic Waste

Furthermore, the research identified the relationship between the demographic traits of participants and the management of plastic waste.

Table 4.1.12

Correlation between the Demographic Traits of Respondents and the Management of Plastic Waste

		Plastic Waste Handling	Plastic Waste Handling	Plastic Waste Handling		
		Plastic waste collection	Plastic Waste Transportati on	Plastic waste Disposal	χ^2	P- value
Gender	Male	56(16.2 %)	37(10.7%)	46(13.3 %)	20.734 a	.000
Gender	Female	51(14.8 %)	105(30.4%)	50(14.5 %)		
Age Bracket	18 to 28 years	4(1.2%)	63(18.3%)	21(6.1%)	154.63 1a	.000
Age Bracket	29 to 39 years	91(26.4 %)	53(15.4%)	28(8.1%)		
Age Bracket	40 to 50 years	2(.6%)	26(7.5%)	47(13.6 %)		
Age Bracket	51 and above years	10(2.9%)	0(0.0%)	0(0.0%)		

Location of Residence	Urban	69(20.0%)	87(25.2%)	67(19.4%)	1.822a	0.402
Location of Residence	Sub-urban	38(11.0%)	55(15.9%)	29(8.4%)		
Marital Status	Single/never married	32(9.3%)	73(21.2%)	34(9.9%)	61.388a	.000
Marital Status	Divorced/separated	1(.3%)	18(5.2%)	19(5.5%)		
Marital Status	Monogamous marriage	50(14.5%)	49(14.2%)	31(9.0%)		
Marital Status	Polygamous marriage	24(7.0%)	0(0.0%)	10(2.9%)		
Marital Status	Windowed	0(0.0%)	2(.6%)	2(.6%)		
Faith	Christian (Catholic)	62(18.0%)	44(12.8%)	46(13.3%)	24.402a	.000
Faith	Christian (Protestant)	35(10.1%)	78(22.6%)	47(13.6%)		
Faith	Muslim	10(2.9%)	20(5.8%)	3(.9%)		

Highest Level of Education	Primary school	25(7.2%)	19(5.5%)	10(2.9%)	66.751	.000
	)	)	a			
Highest Level of Education	O Level)	15(4.3%)	65(18.8%)	15(4.3%)		
	)	)				
Highest Level of Education	College	42(12.2%)	37(10.7%)	56(16.2%)		
	)	)				
Highest Level of Education	University	14(4.1%)	11(3.2%)	0(0.0%)		
	)	)				
Highest Level of Education	No formal education	11(3.2%)	10(2.9%)	15(4.3%)		
	)	)				
Occupation	Private sector	0(0.0%)	0(0.0%)	1(.3%)	21.292	0.006
	a					
Occupation	Civil servant	1(.3%)	8(2.3%)	10(2.9%)		
	)					
Occupation	Municipal worker	0(0.0%)	4(1.2%)	7(2.0%)		
Occupation	Business person	71(20.6%)	89(25.8%)	54(15.7%)		
	)	)				

Occupati on	Others	35(10.1 %)	41(11.9%)	24(7.0%)
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The research results show that gender is statistically significantly associated with plastic waste handling ($X^2 = 20.734$; $p < 0.01$). Regarding age bracket, the chi-square analysis indicates that age bracket is statistically significantly associated with plastic waste handling ($X^2 = 154.631$; $p < 0.01$). Regarding the location of residence, the chi-square analysis indicates that the location of residence is statistically significantly associated with the 'polluter pays' principle ($X^2 = 1.822$; $p < 0.01$).

4.4 Objective four: strategies implemented by county governments for the collection, transportation, and disposal of plastic waste

The research aimed to explore the impact of planning and coordination on the management of plastic waste in Lodwar Town.

Table 4.1.13

Government strategies implemented for the collection, transportation, and disposal of plastic waste

The Statements		SA	A	UD	D	SD	μ	Δ
1. There are waste collectors and transporters in the town	F	21	10	3	208	103	1.95	0.99
1. There are waste collectors and transporters in the town	%	6.1	2.9	0.9	60.3	29.9		

2.Plastic waste collection is done at household level	F	16	43	24	96	166	1.98	1.21
2.Plastic waste collection is done at household level	%	4.6	12.5	7	27.8	48.1		
3.There is reusing/recycling of plastic waste generated at household level	F	17	81	92	90	65	2.7	1.17
3.There is reusing/recycling of plastic waste generated at household level	%	4.9	23.5	26.7	26.1	18.8		
4.Transportation of plastic waste to disposal sites are done by contractors	F	14	138	49	79	65	2.88	1.24
4.Transportation of plastic waste to disposal sites are done by contractors	%	4.1	40	14.2	22.9	18.8		
5. Lodwar town has waste management guideline/policy.	F	21	40	117	97	70	2.55	1.12

5. Lodwar town has waste management guideline/policy.	%	6.1	11.6	33.9	28.1	20.3
Total respondents (n)	345					

Key: SA - Strongly Agree, A - Agree, UD - Undecided, D - Disagree, SD - Strongly Disagree, μ - Mean, δ - Standard Deviation.

The results are presented in Table 4.1.13. The results indicate that a small proportion of respondents, specifically 21 individuals (6.1%), strongly agreed with the statement that waste collectors and transport service providers exist within Lodwar Town. A further 10 (2.9%) agreed, and 3 (0.9%) were undecided. Conversely, 208 participants (60.3%) disagreed with the existence of such collection and transport services, while 103 participants (29.9%) strongly disagreed. The mean score of the respondents was 1.95 with a standard deviation of 0.99, indicating that most disagreed about the existence of waste collectors and transporters in the town. The analysis further revealed that 16 respondents (4.6%) strongly agreed that plastic waste collection takes place at the household level, while 3 (32%)-note: this figure is likely a typo in the original-agreed, 43 (12.5%) were undecided, 96 (27.8%) disagreed, and 166 (48.1%) strongly disagreed. The statement that household-level plastic waste collection occurs received a mean of 1.98 and a standard deviation of 1.21, indicating the most disagreement. Continuing, 17 respondents (4.9%) strongly agreed with the assertion that the reuse or recycling of plastic waste generated at the household level takes place, while 12 (48%)-preserving the original wording-strongly

agreed, 81 (23.5%) agreed, 92 (26.7%) were undecided, 90 (26.1%) disagreed, and 65 (18.8%) strongly disagreed. The mean and standard deviation (mean = 2.70, SD = 1.17) showed that most respondents were undecided regarding the presence of plastic waste reuse/recycling in households. Moreover, 14 respondents (4.1%) strongly agreed that contractors should be responsible for transporting plastic waste to disposal sites. A larger group, 138 participants (40.0%), agreed with this statement, while 49 (14.2%) were undecided, 79 (22.9%) disagreed, and 65 (18.8%) strongly disagreed. The mean of 2.88 and the standard deviation of 1.24 indicate that respondents as a whole tended toward indecision. Finally, 21 respondents (6.1%) strongly agreed that Lodwar Town possesses a formal waste management guideline or policy. A further 40 participants (11.6%) also agreed, 117 (33.9%) were undecided, 97 (20.3%) disagreed, and 70 respondents (28.1%) strongly disagreed. The mean of 2.55 and the standard deviation of 1.12 indicate that the majority of respondents were undecided regarding the existence of a waste management guideline or policy in Lodwar Town.

Table 4.1.14

ANOVA results

	The Sum of	Do	Mean	F	Sig.
	Squares		Square		
Between the Groups	66.596	12	5.550	21.806	.000
Within the Groups	84.494	332	.254		
Total	151.090	344			

Key: The Findings

The results shown in Table 4.1.14 shows that the ANOVA results examining the effect of planning and coordination on plastic waste management were statistically significant. The computed F-statistic was 21.806, associated with a p-value of .000, which is less than the predetermined alpha level of .05. A significant difference exists between the mean values of the different categories for planning, coordination, and plastic waste handling. This result indicates that planning and coordination influence the processing of plastic waste.

4.5 Objective three: Influence of Recycling Methods to convert Plastic Waste into usable products in Lodwar Town

Table 4.1.15

Recycling Methods to convert Plastic Waste into usable products

The Statements		SA	A	UD	D	SD	μ	Δ
There is reselling of plastic materials to avoid generation of waste	F	12	9	37	271	16	2.99	1.13
There is reselling of plastic materials to avoid	%	3.5	2.6	10.7	78.6	4.6		

generation of
waste

The households
are reusing the
plastics for other
purpose

F	27	116	49	131	22	1.74	1.04
---	----	-----	----	-----	----	------	------

The households
are reusing the
plastics for other
purpose

%	7.8	33.6	14.2	38	6.4		
---	-----	------	------	----	-----	--	--

The town have
recycling
company which
has assisted in
plastic material
recycling

F	12	14	41	85	193	1.51	0.89
---	----	----	----	----	-----	------	------

The town have
recycling
company which
has assisted in
plastic material
recycling

%	3.5	4.1	11.9	24.6	55.9		
---	-----	-----	------	------	------	--	--

There is new technological recycling machine in the county	F	4	4	58	32	247	3.26	0.87
There is new technological recycling machine in the county	%	1.2	1.2	16.8	9.3	71.6		
Total respondents (n)		345						

Key: SA - Strongly Agree, A - Agree, UD - Undecided, D - Disagree, SD - Strongly Disagree, μ - Mean, δ - Standard Deviation JJ (Mean = 1.74, Standard Deviation = 1.04).

The results of the study are displayed in Table 4.1.15. The results concerning the statement about reselling plastic materials to avoid waste generation indicated a mean score of 2.99 and a standard deviation of 1.13, with 35.1% of respondents either strongly disagreeing or disagreeing. The results further reveal that the reuse of plastics by households for alternative purposes recorded a mean of 1.74 and a standard deviation of 1.04. Additionally, the statement concerning the existence of a recycling company that has facilitated plastic material recycling produced a mean of 1.51 and a standard deviation of 0.89. Ultimately, the study demonstrated that. Finally, the study showed that 4 respondents (1.2%) strongly agreed, and 4 others (1.2%) agreed that the county has a new technological recycling machine. Meanwhile, 58 participants (16.8%) were undecided, 32 (9.3%) disagreed, and a substantial proportion, 247 respondents (71.6%), strongly disagreed. Based on the

computed mean and standard deviation, the predominant view among participants was one of indecision concerning the existence of a new technological recycling machine in the county (Mean = 3.26, standard deviation = 0.87). According to (Oriento, 2010), approximately 30 to 40 percent of all plastic waste generated in urban settings remains uncollected, and fewer than 50 percent of the population is served by any form of collection and disposal system. Insights gathered from key informants in the present study indicated that the town lacks an adequate number of waste collectors and transport service providers. Furthermore, the majority of residents are uninformed as to whether contractors are responsible for transporting plastic waste to disposal sites.

4.6 Plastic Waste Handling

The study sought to determine how plastic waste has been handled in Lodwar Town. The findings are displayed in Table 4.1.16. The table indicates that the views of the residents of Lodwar Town on reducing plastic-related solid waste were divided. Thirty-six (10.4%) strongly agreed that the large waste problem due to plastics has decreased, with 59 (17.1%) agreeing, 92 (26.7%) being neutral, 123 (35.7%) disagreeing, and 35 (10.1%) strongly disagreeing. The average response was 2.82 (SD 1.15), and most respondents were neutral on this question, meaning that they are not sure whether plastic waste has been reduced. Regarding landfill space and slow-degrading plastic waste, 23 (6.7%) strongly agreed this has been alleviated, 27 (7.8%) agreed, 43 (12.5%) were neutral, 189 (54.8%) disagreed, and 63 (18.3%) strongly disagreed. The average (2.3) and the mean and standard deviation (1.07) suggest that most of the data of residents disagreed with the statement, meaning they feel that valuable space at the landfill site continues to be filled with plastic waste. When asked generally about the reduction of plastic pollution in the town, 35 residents (10.1%) strongly agreed, 58 (16.8%) agreed, 48 (13.9%) were undecided, 169 (49%) disagreed, and 35 (10.1%) strongly disagreed. The mean (SD = 1.17) is 2.68, indicating a

generally neutral perspective, with no clear indication that residents are more or less convinced that plastic pollution has reduced. Overall, respondents were not sure about the reduction of general plastic waste and plastic pollution, yet they agreed that there has not been a reduction in land filling. Of respondents who were asked whether recycled plastic products like shampoo bottles, oil funnels, floor tiles, and traffic cones are created, 9 (2.6%) strongly agreed, 31 (9%) agreed, 67 (19.4%) were undecided, 103 (29.9%) disagreed, and 135 (39.1%) strongly disagreed. The mean score (2.06) and standard deviation (1.09) show that the majority of residents disagreed, with some doubts about their local recycling efforts. Interestingly, 77.4% of the respondents, totaling 267 individuals, expressed strong agreement that the management of plastic waste in Lodwar Town is a serious problem, with 8.4% (29) agreeing, 9.9% (34) undecided, and 4.3% (15) disagreeing. The mean is 4.59 (SD = 0.84), indicating good agreement. This shows a paradox: although there is a general consensus that the issue of clogging up landfills has been reduced, residents strongly believe that plastic waste management is serious. When asked about the regularity of waste collection, 45 residents (13%) strongly agreed that waste is collected regularly, 41 residents (11.9%) agreed, 28 residents (8.1%) were undecided, 209 residents (60.6%) disagreed, and 22 residents 6.4% of respondents expressed strong disagreement. The mean score was 2.65 (SD = 1.17), and the majority of respondents did not know when collection was to take place. Likewise, when asked about waste collection from designated locations in estates/markets, 14.2% (49) strongly disagreed, 10.4% (36) disagreed, 5.5% (19) were undecided, 57.4% (198) disagreed, and 12.5% (43) strongly disagreed. The mean of 2.57 and the standard deviation of 1.25 show neutrality, indicating that residents lack clear awareness about whether waste is collected from these points. On waste separation practices, only 10 residents (2.9%) strongly agreed that plastic waste is separated from other collected waste before disposal, 132 (38.3%) agreed, 31 (9%) were

undecided, 204 (59.1%) disagreed, and 87 (25.2%) strongly disagreed. The mean of 2.00 (SD = 0.87) confirms that most residents disagree that separation occurs. Finally, regarding the supervision of waste collection, transport, and disposal by the Lodwar Town authority, 13 residents (3.8%) strongly agreed, 100 (29%) agreed, 52 (15.1%) were undecided, 127 (36.8%) disagreed, and 53 (15.4%) strongly disagreed. The mean is 2.00 (SD = 0.87), indicating neutrality. Thus, most residents were undecided about whether the town authority coordinates the entire waste management process, even though they largely agree that plastic waste is not separated beforehand.

Table 4.1.16

Management of Plastic Waste

Statement		SA	A	UD	D	SD	μ	Δ
The huge solid waste caused by plastics has been reduced	F	36	59	92	123	35	2.8	1.1
							2	5
The huge solid waste caused by plastics has been reduced	%	10.4	17.	26.	35.	10.		
			1	7	7	1		
The clogging up of valuable landfill space by	F	23	27	43	189	63	2.3	1.0
								7

plastic waste,
which takes
ages to break
down, has been
reduced.

The clogging
up of valuable
landfill space by
plastic waste,
which takes
ages to break
down, has been
reduced.

Plastic
pollution has
been reduced in
the town

Plastic
pollution has

%	6.7	7.8	12.	54.	18.		
			5	8	3		
F	35	58	48	169	35	2.6	1.1
						8	7
%	10.1	16.	13.	49	10.		
		8	9		1		

been reduced in
the town

Recycled
plastic has been
used to create
items such as
shampoo
bottles, oil
funnels, floor
tiles and traffic
cones among
many other
products.

Recycled
plastic has been
used to create
items such as
shampoo
bottles, oil
funnels, floor
tiles and traffic
cones among

F	9	31	67	103	135	2.0	1.0
						6	9

%	2.6	9	19.	29.	39.		
			4	9	1		

many other
products.

Handling	F	267	29	34	15	0	4.5	0.8
plastic waste in							9	4

Lodwar town is
of great concern

Handling	%	77.4	8.4	9.9	4.3	0		
----------	---	------	-----	-----	-----	---	--	--

plastic waste in
Lodwar town is
of great concern

Waste is	F	45	41	28	209	22	2.6	1.1
collected							5	7

regularly.

Waste is	%	13	11.	8.1	60.	6.4		
----------	---	----	-----	-----	-----	-----	--	--

collected

regularly.

Waste is	F	49	36	19	198	43	2.5	1.2
collected from							7	5

collection

points in the

estates/markets

.

Waste is	%	14.2	10.	5.5	57.	12.
collected from			4		4	5
collection						
points in the						
estates/markets						

Plastic waste	F	10	13	31	204	87	2.0	0.8
is separated								7
from waste								
collected before								
disposal								

Plastic waste	%	2.9	3.8	9	59.	25.
is separated					1	2
from waste						
collected before						
disposal						

Waste	F	13	100	52	127	53	2.6	1.1
collection,							9	5
transportation								
and disposal								
process is								
supervised and								
coordinated by								

Lodwar town authority.						
Waste collection, transportation and disposal process is supervised and coordinated by Lodwar town authority.	%	3.8	29	15.	36.	15.
				1	8	4
Total respondents (n) 345	Total respondent s (n) 345	Total respondent s (n) 345				

Key: SA-Strongly Agree, A-Agree, UD-Undecided, D-Disagree, SD-**Strongly Disagree**, μ -Mean, δ -Standard Deviation.

4.6.1 Plastic Waste Disposal

Residents were asked to indicate where they typically dispose of their solid plastic waste. The results are presented in Table 4.1.17. The findings show that 10 (2.9%) of the respondents stated

that they dispose of solid plastic waste in waste paper bags, 57 (16.5%) dispose of it in waste trash bins, 123 (35.7%) dispose of it in open fields, 144 (41.7%) dispose of it in rubbish pits, and 11 (3.2%) dispose of it using other unspecified means. This reveals that the majority of residents in Lodwar Town dispose of their solid plastic waste in rubbish pits.

Table 4.1.17

Plastic Waste disposal Place

Waste disposal Place	Frequency	Percentage
Waste paper bags	10	2.9
Waste trash bin	57	16.5
Open fields	123	35.7
Rubbish pit	144	41.7
Others	11	3.2
Total	345	100.0

4.6.2 Plastic Waste Ferrying

The residents were asked to state the types of trucks that were ferrying waste. The results are displayed in Table 4.1.19. The findings indicate that 332 (96.2%) of the respondents used open trucks to ferry waste, while 13 (3.8%) used inbuilt trucks.

Table 4.1.19

Truck Ferrying Plastic Wastes

Truck	Ferrying	Frequency	Percentage
Wastes			
Open trucks		332	96.2
Inbuilt trucks		13	3.8
Total		345	100.0

4.6.3 Waste Disposal Suggestions

The residents were asked to give suggestions on waste disposal. The results are displayed in Table 4.1.10. The findings show that almost all 343 (99.4%) of the residents suggested that waste should be collected from every street. Only one (0.3%) resident suggested that waste disposal is everyone's responsibility. Thus, this reveals that most residents in Lodwar Town believe it is the responsibility of the town administration to dispose of waste, and therefore the administration should be collecting waste from every street.

Table 4.1.10:

Residents Suggestions

Residents Suggestions			Frequency	Percentage
Collection	from	every	343	99.4
street				
Everybody responsibility			1	0.3
Total			345	100.0

4.7 Assumptions of Multiple Regression Model

The study tested the normality, linearity, multilinearity, and independence of residuals.

4.7.1 Linearity Test Results

The study aimed to test the linearity assumption for variables in the study. Results are shown in Table 4.1.11. The results show that the deviation from the linearity and the mean of the Community participation were $0.156 > 0.05$ and $0.000 < 0.05$, respectively. The polluter pays principle had deviations from the linearity and linearity values of $0.108 > 0.05$ and $0.000 < 0.05$, respectively. The results of the study also showed that planning and coordination methods had deviations from linearity and linearity values of $0.122 > 0.05$ and $0.000 < 0.05$, respectively, and that recycling methods had deviations from linearity and linearity values of $0.138 > 0.05$ and $0.000 < 0.05$, respectively. This means that linearity values for all four study variables were less than 0.005.

Table 4.1.11

Results of the Linearity Test

The Variables	Deviation from Linearity	Linearity
Community participation	.156	.002
“polluter pays” principle	.108	.013
Planning and coordination	.122	.041
Recycling methods	.138	.000

4.7.2 Examination of Multicollinearity

The research aimed to evaluate the multicollinearity assumption by utilizing tolerance and the variance inflation factor (VIF). The findings are displayed in Table 4.1.12. The findings reveal that the tolerance and VIF values for Community Participation were (Tolerance = 0.601, VIF = 1.664). The "Polluter Pays" principle was (Tolerance = 0.583, VIF = 1.715). Planning and Coordination had a tolerance of 0.726, VIF = 1.378 and Recycling Methods had a tolerance of 0.805, with a VIF of 1.243. The findings of the study suggest that the tolerance values for all four variables exceeded 0.10, while all VIF values remained below 10. This suggests that the dataset did not exhibit any multicollinearity problems.

Table 4.1.12

Multicollinearity Test

Variables	Tolerance	VIF
Community participation	.601	1.664
“polluter pays” principle	.583	1.715
Planning and coordination	.726	1.378
Recycling methods	.805	1.243

Key: VIF-variable inflation factor

4.7.3 Normality Test

The study sought to assess the normal distribution of the data using the One-Sample Kolmogorov-Smirnov Test. The findings are outlined in Table 4.1.13. The findings demonstrate

that Community Participation showed a Kolmogorov-Smirnov significant value of $p = 0.067$, which exceeds 0.05. The "Polluter Pays" principle demonstrated a Kolmogorov-Smirnov significant value of $p = 0.173$, which also surpassed 0.05. Planning and Coordination showed a Kolmogorov-Smirnov significant value of $p = 0.276$, exceeding 0.05, whereas Recycling Methods had a Kolmogorov-Smirnov significant value of $p = 0.224$, also above 0.05. These results indicate that all Kolmogorov-Smirnov values exceeded 0.05, verifying that the variables followed a normal distribution.

Table 4.1.13

Results of the Normality Test

The Variables	Kolmogorov-Smirnov ^a	Sig.	Shapiro-Walk	Sig.
Community participation	.313	.067	.815	.081
"polluter pays" principle	.377	.173	.574	.394
Planning and coordination	.296	.276	.809	.146
Recycling methods	.430	.224	.486	.386

4.7.4 Autocorrelation Test

Autocorrelation refers to the extent of correlation of identical variables across consecutive time periods. The study sought to assess the assumption of residual independence by using the Durbin-

Watson statistic. The results are presented in Table 4.1.14. This table indicates that the Durbin-Watson coefficient value found in this research was calculated to be 1.205. The Durbin-Watson statistic equals zero in cases of perfect positive autocorrelation and exceeds two in instances of negative autocorrelation. The Durbin-Watson statistic is anticipated to fall between 1.5 and 2.5 for observations that are independent. Hence, the Durbin-Watson statistic of 1.205 suggests that the data points are within the acceptable threshold.

Table 4.1.14

Autocorrelation Test

R	R Square	Adjusted Square	R Std. Error of the Estimate	Durbin-Watson
.803	.644	.640	.39770	1.205

4.8 Inferential Statistics

This section outlines the findings from the correlation and multiple regression analyses, aligning with the specific objectives of this study.

4.8.1 Correlation Analysis Results

The study used correlations to test the direction and strength of the relationship between the independent variables and the dependent variable. The results are presented in Table 4.1.15. The findings show that there was a significant positive effect of Community Participation on Plastic Waste Handling ($r = 0.651$; $p < 0.01$). There was a significant positive effect of the "Polluter Pays" principle on Plastic Waste Handling ($r = 0.667$; $p < 0.01$). The findings also show that there was a significant positive effect of Planning and Coordination on Plastic Waste Handling ($r = 0.503$; $p <$

0.01). Finally, there was a significant positive effect of Recycling Methods on Plastic Waste Handling ($r = 0.563$; $p < 0.01$).

Table 4.1.15

The Multiple Correlation Results

Independent Variable	Plastic waste handling (Dependent Variable)
Community participation	0.651**
“Polluter pays” principle	0.667**
Planning and coordination	0.503**
Recycling methods	0.563**

4.8.2 Multiple Regression Analysis

The researcher employed multiple regression analysis to ascertain the relationship between the dependent and independent variables.

4.8.3 Regression Model Summary

The research aimed to ascertain the summary of the model through the coefficient of determination. The results are displayed in Table 4.1.16. The findings indicate that Community Participation, the "Polluter Pays" principle, Planning and Coordination, and Recycling Methods were found to be satisfactory variables for influencing Plastic Waste Handling in Lodwar Town. This is supported by the coefficient of determination, or R square, of 80.3%, implying that

Community Participation, the "Polluter Pays" principle, Planning and Coordination, and Recycling Methods explain 80.3% of the variations in Plastic Waste Handling in Lodwar Town. The findings additionally suggest that the model utilized to establish the connection between the variables was adequate. Adjusted R^2 is a refined version of R^2 that has been modified to account for the number of predictors in the model, reducing the likelihood of random chance. The adjusted R^2 of .640, which was marginally lower than the R square value, served as a precise indicator of the relationship between the independent and dependent variables.

Table 4.1.16

Regression Model Summary

R	R Square	Adjusted Square	R	Std. Error of the Estimate	Durbin-Watson
.803	.644	.640		.39770	1.205

4.8.4 Regression Model Goodness of Fit

The research assessed model adequacy through analysis of variance, as illustrated in Table 4.1.17. The findings suggest that the outcomes derived from the regression model were significant, indicating that the regression model was accurately computed and not coincidental, as evidenced by a p-value of 0.000, which is lower than the critical p-value of 0.05. Additionally, the findings suggest that the independent variables effectively predict Plastic Waste Management in Lodwar Town. This was backed by an F-statistic of 153.811 and the stated p-value (0.000), which was lower than the standard 0.05 significance level.

Table 4.1.17

Multiple Regression Model Goodness of Fit Test Results

	Sum	of	Do	Mean	F	Sig.
	Squares			Square		
Regression	97.312		4	24.328	153.811	.000b
Residual	53.777		340	.158		
Total	151.090		344			

4.8.5 Multiple regression coefficients

The research focused on identifying the coefficients for the study's variables. The findings are displayed in Table 4.1.18. The results of the regression indicate that the Community contribution significantly and positively affects the management of plastic waste in Lodz (β -r = 0.295, p = 0.013). The Polluter Pays principle was shown to have a positive and significant effect on plastic waste management in Lodwar City (β -strand = 0.285, p = 0.023). Moreover, the planning and coordination significantly and positively influenced the treatment of plastic waste in Lodwar City (β -SCR (0.118, p =0.002). Ultimately, it was discovered that recycling techniques positively and significantly influenced plastic waste management in Lodz (β -r t = 0.280, p = 0.030). The overall regression findings thus suggest that these factors positively and significantly influence the management of plastic waste in Lodwar City, Turkana County.

Table 4.1.18

Multiple Regression Coefficients

	Unstandardized Coefficients	Unstandardized Coefficients	Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	.639	.090		7.089	.009
Community participation	.295	.038	.321	7.680	.013
“Polluter pays” principle	.285	.041	.295	6.954	.023
Planning and coordination	.118	.032	.141	3.714	.002
Recycling methods	.280	.034	.298	8.274	.030

4.9 Hypotheses Testing

The study's hypothesis suggests that community involvement does not significantly affect the management of plastic waste in Lodwar Town, Turkana County. Upon rejecting the null hypothesis (Ho1), it was concluded that community involvement significantly influenced the management of plastic waste in Lodwar Town, Turkana County ($\beta_1 = 0.162$; $p < 0.05$). The hypothesis of the study suggests that the "Polluter Pays" principle has minimal influence on the management of plastic waste in Lodwar Town, Turkana County. Following the dismissal of the null hypothesis (Ho2), it was concluded that the "Polluter Pays" principle significantly affected the management of plastic waste in Lodwar Town, Turkana County ($\beta_2 = 0.285$; $p < 0.05$). The study's hypothesis suggests that planning and coordination do not significantly affect the management of plastic waste in Lodwar Town, Turkana County. After dismissing the null hypothesis (Ho3), it was concluded that planning and coordination significantly influence plastic.

Table 4.1.19

Summary of Hypotheses Test Results

Hypotheses	β and P values	Decision rule(accept/reject)
H ₀₁ : There is no significant effect of Community participation on Plastic waste handling in Lodwar town, Turkana County.	$\beta_1=0.295$, $p=0.013<0.05$	Rejected the null hypothesis

H02: There is no significant effect of “polluter pays” principle on Plastic waste handling in Lodwar town, Turkana County.	$\beta_2=0.285$, $p=0.023<0.05$	Rejected the null hypothesis
H03: There is no significant effect of Planning and coordination on Plastic waste handling in Lodwar town, Turkana County.	$\beta_3=0.118$, $p=0.002<0.05$	Rejected the null hypothesis
H04: There is no significant effect of Recycling methods on Plastic waste handling in Lodwar town, Turkana County.	$\beta_4=0.280$, $p=0.030<0.05$	Rejected the null hypothesis

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

The waste is managed in Lodwar Town, Turkana County, Kenya. This chapter outlines the study's results, followed by conclusions based on the main goal of the investigation, which was to analyze the factors affecting the plasticity of those findings. Finally, recommendations for potential future research avenues are offered... Ultimately, suggestions for possible future areas of investigation are provided.

5.1 Impact of Community Engagement on Plastic Waste Management.
The primary aim of the research was to determine the impact of community engagement on the management of plastic waste in Lodwar Town, Turkana County. The results indicated that a majority (35.4%) of residents were uncertain if the community had achieved success

lowered the volume of waste generated, especially hazardous materials and non-recyclable items. Nevertheless, a clear majority (71.9%) not only rejected the idea that the community separates waste to facilitate safer and more manageable handling, but also, most respondents (34.5%) disagreed that communities make an effort to reuse materials whenever feasible. Moreover, a substantial proportion (58.6%) disagreed that communities respect and provide fair compensation to individuals who safely collect, transport, and store waste. The findings reported here align well with those documented by Ragas et al. (2017), who examined how local communities in Kaduna, Nigeria, participate in managing plastic waste. That research focused on three main areas: classifying the different types of solid waste generated in the metropolitan area, evaluating existing disposal methods along with their limitations, and measuring residents' awareness levels and attitudes regarding community-led waste management efforts. They

discovered, among other things, that vegetable and organic waste constituted the most prevalent type of waste in Kaduna metropolis, that the majority of households did not practice waste separation, and that most households undertook waste handling based on their own individual initiatives. The present study's findings indicated that the community has indeed reduced the amount of waste created, particularly toxic items and those that cannot be recycled. A similar pattern was observed by Zahra et al. (2018), whose work showed that a targeted door-to-door educational campaign led to measurable improvements in how much people, knew about correct solid waste disposal techniques. At the same time, households were able to give precise accounts of their own internal waste handling routines. The results also revealed that community members either burn or combine wastes because they do not separate them, which would otherwise make handling easier and safer. This finding diverges from Sire (2019), who reported that solid wastes were collected twice weekly in most residential areas by municipal authorities and the private sector. The discrepancy arises because, in the current study context, residents mix wastes together, a practice that does not promote safer or simpler handling. Furthermore, the study found that communities do attempt to reuse materials wherever possible. This supports the position of Solutions (2015), which noted that reusing products is preferable to recycling because it conserves the energy required to dismantle and remanufacture items. Reuse also substantially cuts down on waste and pollution by reducing the demand for raw materials, thereby preserving both forests and water supplies. Lastly, the findings demonstrated that communities do not provide fair wages to those who collect, store, and transport plastic waste safely. This agrees with Narayan et al. (2021), who observed that communities often fail to respect and fairly compensate waste collection and transport workers.

5.2 "Polluter Pays" Principle and Plastic Waste on Environmental Pollution

The results indicate that a majority (48.1%) of residents disagreed that the town imposes specific fees and charges on households for residual waste, calculated on a per-household and per-square-meter of living space basis. Similarly, most respondents (53.9%) disagreed that a landfill tax system aimed at remediating contaminated sites has been put in place. This outcome contrasts with the conclusions drawn by Bharadwaj, Ray, and Nepal (2020), who found that rising levies could support the recovery of plastic waste for recycling and reuse. According to their research, if the recovery and collection efficiency remained low, an additional 1 percent tax on imports of plastic would raise enough money to pay for the treatment of plastic waste. In order to explore sustainable financing options for municipal solid waste management and to reduce environmental damage in developing countries such as Nepal, the Commission proposed to apply this revenue model for recovering plastic to other materials such as paper and metal. The results of this study also show that a large majority of the local population (71.9) agreed that a refund system is in place for certain categories of waste (e.g., glass and plastic bottles). However, in the case of packaging waste and electrical and electronic waste, the majority of respondents (43.2) did not agree that producer responsibility schemes exist. The present study therefore contradicts Stove and Eriksson (2017), who observed that the town establishes specific fees and charges for residual waste per household. In general, households are confronted with a complex tax rate structure, which has led to rising system revenues. The disagreement arises because, in Lodwar Town, no producer-responsibility systems are currently in place for packaging or electrical/electronic waste.

5.3 Recycling Methods and Plastic Waste Conversion into Usable Products

The study's results indicated that a very large proportion (78.6%) of residents disagreed with the statement that plastic materials are resold as a strategy to prevent waste generation at the source.

Additionally, a clear majority, 55.9 percent of respondents disagreed that they use plastics for other purposes. At their own homes, such as for storage or making makeshift tools. Moreover, most respondents (55.9%) disagreed that the town possesses a functioning recycling company that actively supports the reprocessing of plastic materials. However, concerning the presence of new technological recycling machinery, a substantial percentage (71.6%) of residents was unaware of whether such equipment exists within the county. According to Kerala et al. (2019), plastic recycling is critically important, both as a method for managing existing waste and as a core component of the circular economy and long-term environmental sustainability. It supports zero-waste systems designed to reduce waste generation and enhance sustainability.

5.4 Government Strategies and Plastic Waste Disposal

Based on the study results, a majority (60.3%) of residents disagreed that the town has an adequate number of waste collectors and transporters. Similarly, most respondents (48.1%) disagreed that they reuse or recycle plastic waste generated within their own households. On the other hand, a plurality (26.1%) of residents was unaware of whether contractors are responsible for transporting plastic waste to disposal sites. Furthermore, a majority (33.9%) had no knowledge of whether the town possesses a waste management guideline or policy. These findings align with those of Hare et al. (2017), who noted that plastic waste management is among the most visible urban services, and that its effectiveness and sustainability serve as indicators of good local governance, sound municipal management, and successful urban reforms. Consequently, waste management is a strong marker of a town's overall performance. The current study also agrees with (Moochings, Tokai, and Hanashima, 2015), who examined barriers to waste management policy implementation in Maputo City, the capital of Mozambique. Using structural modeling methods-specifically Interpretive Structural Modeling (ISM) and Decision-Making Trial and

Evaluation Laboratory (DEMATEL)-they identified the most significant obstacles to effective policy execution. Their analysis clarified the interrelationships among barriers: ISM revealed the hierarchical structure, while DEMATEL distinguished cause-and-effect relationships. Their findings indicated that institutional structural weaknesses and a lack of cooperation among stakeholders are the primary contributors to poor waste policy performance in Maputo City. However, unlike the current study conducted in Kenya, their research was carried out in Mozambique.

CONCLUSION AND RECOMMENDATIONS

6.0 Introduction

This section provides a summary of the overall investigation and presents the conclusions resulting from the study, followed by the recommendations arising from these conclusions. Conclusions are drawn directly from the research findings, whereas recommendations are based on the conclusions drawn. This section summarizes the overall investigation and presents the conclusions resulting from the study, followed by the recommendations arising from these conclusions. Conclusions are drawn directly from the research findings, whereas recommendations are based on the conclusions drawn.

6.1 Conclusions of the Study

Based on the evidence gathered, several conclusions were drawn:

- i. The level of engagement among local residents significantly affects how plastic waste is ultimately disposed of in Lodwar Town.
 - ii. Applying the "polluter-pays" principle has a measurable impact on reducing environmental contamination resulting from improperly handled plastic refuse in this location.
 - iii. The handling of plastic waste in Lodwar Town is significantly influenced by recycling techniques and turning plastic waste into valuable items.
- IV. The management of plastic waste is greatly influenced by the government's approaches to the collection, transport, and disposal of plastic waste.
- ### **6.3 Study Recommendations**
- The subsequent recommendations are derived from the research's results and conclusions.
- IV. The methods

employed by the government for collecting, transporting, and disposing of plastic waste greatly influence plastic waste management. The management of plastic waste is greatly influenced by the approaches adopted by the government for collecting, transporting, and disposing of plastic waste.6.3StudyRecommendationsThe subsequent suggestions stem from the study's results and conclusions.

6.2 The Study Recommendations

Based on the results of the research and the conclusions presented, the following proposals are made:

- i. To mobilize resources and strengthen the local administration, systems should be established that draw on and use public-private partnerships.
- ii. Urban authorities should develop waste management guidelines or policies to ensure efficient and reliable waste disposal services.
- iii. Prompt transport of stored waste is urgently required to avoid accumulation of household refuse in storage areas. In addition, the community should support efforts to collect and transport waste by involving private collectors.

6.3 Research Suggestions

The following areas of future research are proposed:

- i. Impact of household behavior on waste collection and treatment in Lodwar, Turkana Region
- ii. The dynamics, challenges, and achievements of solid waste management in Lodwar City, Turkana Region.

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APPENDICES

Appendix A: Questionnaire for Participants

Data collection instrument.

This questionnaire is an information-collecting tool for a study. All information volunteered were treated with utmost confidentiality.

SECTION A: SOCIODEMOGRAPHIC CHARACTERISTICS OF STUDY PARTICIPANTS

INSTRUCTIONS:

Please tick /cross your answers appropriately

1. What is your gender?
 - i. Male []
 - ii. Female []
2. Age bracket;
 - i. to 28 Years []
 - ii. to 39 Years []
 - iii. to 50 Years []
 - iv. 51 and above Years []
3. Location of residence?
 - i. Urban []
 - ii. Sub-urban []
 - iii. Rural []

4. What is your current marital status?
 - i. Single/never married []
 - ii. Divorced/separated []
 - iii. Monogamous Marriage [] Polygamous marriage []
 - iv. Windowed []
5. What faith do you profess?
 - i. Christian (Catholic) []
 - ii. Christian (protestant) []
 - iii. Muslim []
 - iv. Other (specify)
6. What is your highest level of formal education you attained?
 - i. Primary School []
 - ii. High School (O level) []
 - iii. College []
 - iv. University []
 - v. No formal education []
 - vi. Others specify
.....
7. Occupation
 - i. Engineer []
 - ii. Private sector/no []
 - iii. Civil servant []

iv. Banker []

v. Municipal worker []

vi. Business person []

vii. Others

specify.....

8. Where do you dispose plastic wastes at home/business premises?

i. Waste paper bags []

ii. Waste trash bin []

iii. Open fields []

iv. Rubbish pit []

v. Others specify.....

SECTION B: COMMUNITY PARTICIPATION AND PLASTIC WASTE DISPOSAL

Please indicate by ticking the extent to which you agree with the following statements. Use the following Likert scale: One=Strongly Disagree; two=Disagree; three=Neutral; four=Agree; five=Strongly Agree.

STATEMENT	5	4	3	2	1
1. Community have reduced the amount of waste created, especially toxic products and products that cannot be recycled					

2. Community is separating wastes where they are made to make them easier and safer to handle					
3. Communities are reusing materials whenever possible					
4. Communities are respecting and paying fair wages to the people who collect, transport, and store wastes safely.					

SECTION C: “POLLUTER PAYS” PRINCIPLE AND PLASTIC WASTE DISPOSAL

Please indicate by ticking the extent to which you agree with the following statements. Use the following Likert scale: One=Strongly Disagree; two=Disagree; three=Neutral; four=Agree; five=Strongly Agree.

STATEMENT	5	4	3	2	1
1. Tax system has been put in place for landfill tax for contaminated site remediation					
2. Town sets certain fee and charges residents for residual waste					

per household, per square metres living space					
3. Deposit System has been put in place for certain waste types (for example glass bottles, plastic bottles)					
4. There are producer responsibility driven systems for packaging, electric/electronic waste					

SECTION D: STRATEGIES IN PLACE IN COLLECTION, TRANSPORTATION AND DISPOSAL OF PLASTIC WASTE

Please indicate by ticking the extent to which you agree with the following statements. Use the following Likert scale: One=Strongly Disagree; two=Disagree; three=Neutral; four=Agree; five=Strongly Agree.

STATEMENT	5	4	3	2	1
1. There are waste collectors and transporters in the town					
2. Plastic waste collection are done at household level					

3. There is reusing/recycling of plastic waste generated at household level					
4. Transportation of plastic waste to disposal sites are done by contractors					
5. Lodwar town has waste management guideline/policy.					
6. 10. Alternative use of paper bags will help reduce plastic wastes in Lodwar town					

SECTION E: RECYCLING METHODS TO CONVERT PLASTIC WASTE INTO USABLE PRODUCTS

Please indicate by ticking the extent to which you agree with the following statements. Use the following Likert scale: One=Strongly Disagree; two=Disagree; three=Neutral; four=Agree; five=Strongly Agree.

STATEMENT	5	4	3	2	1
-----------	---	---	---	---	---

1. There is reselling of plastic materials to avoid generation of waste					
2. The households are reusing the plastics for other purpose					
3. The town have recycling company which has assisted in plastic material recycling					
4. There is new technological recycling machine in the county					

Appendix B: Response Rate

The number of questionnaires that were distributed was 384. 345 questionnaires was correctly filled and returned. This represented an overall successful response rate 89.8%, as shown on Table. The research study response rate was excellent. According to Combo and Tromp (2009), responses of a research study that attains 50%, response rate is adequate, 60% good and above 70% rated excellent. Therefore, the study response rate was excellent and the valid questionnaires that were adopted for data analysis were 345.

Items	Frequency	Percentage
Returned	345	89.8
Unreturned	39	10.2
Total	384	100.0

Appendix C: Pilot Study Results

The internal consistency of the research tool (questionnaire) was assessed and the results were presented in Table below

Variables	Cranach's Alpha	N of Items
Community participation	0.709	5
"Polluter pays" principle	0.731	4
Planning and coordination	0.725	5
Recycling methods	0.714	4

The study results as shown in table showed that, community participation had a Cranach's alpha of 0.709, "polluter pays" principle had a Cranach's alpha of 0.731, and planning and coordination had a Cranach alpha of 0.725, recycling methods had a Cranach's alpha of 0.714. The questionnaire was reliable and no amendments were required. These results are concurring with (Franked, 2014) who stated that an alpha value, which is greater than, or equal to 0.7 indicate acceptable reliability.

Appendix D: Letter of Introduction

Kisii University,

P.O BOX 1714

ELDORET

DATE:

Dear Respondent,

I am a student at Kisii University, within the School of Health Sciences, pursuing a Master of Science in Public Health, specializing in Environmental and Occupational Health and Safety. The research I am conducting is part of the requirements for completing my research project. My study focuses on assessing the factors that influence the effectiveness of plastic waste handling in Lodwar Town, Turkana County, Kenya. To collect the necessary data, I am using the attached questionnaire and interview schedules. I kindly request you to complete the questionnaire, providing the relevant information as honestly and objectively as possible, using the spaces provided. All information you provide will be treated with the utmost confidentiality and used solely for the purposes of this study.

Thank you for your cooperation.

Yours faithfully,

Nakusi Peter

MHS16/40027/15

Appendix E: University Permission



UNIVERSITY-ELDORET CAMPUS

OFFICE OF THE DEPUTY DIRECTOR ACADEMICS STUDENT AFFAIRS

Phone: 00723322557

Email: directoreldoret@kisiiuniversity.ac.ke

P. O. Box 6434- 30100

ELDORET - KENYA

REF: MHN16/40027/15

14th July, 2021

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: RESEARCH PERMIT FOR PETER EKAMAI NAKUSI
REG NO MIN 11/20637/15

The above subject refers;

The above named is our bonafide student of Kisii University – Eldoret Campus pursuing a Degree course in **Master of Public Health [Environmental and Occupational Health and Safety Option]** in the School of Health Science. He is working on his research titles "*Assessment of factors that influence the effectiveness of plastic waste handling in Lodwar Municipality, Turkana, Kenya*" in partial fulfillments for the requirement of the Degree award.

We are kindly requesting your office to provide him with the necessary assistance in data collection and completion of his research.

Any assistance offered to the student will be highly appreciated. Please do not hesitate to call the undersigned for any verification.

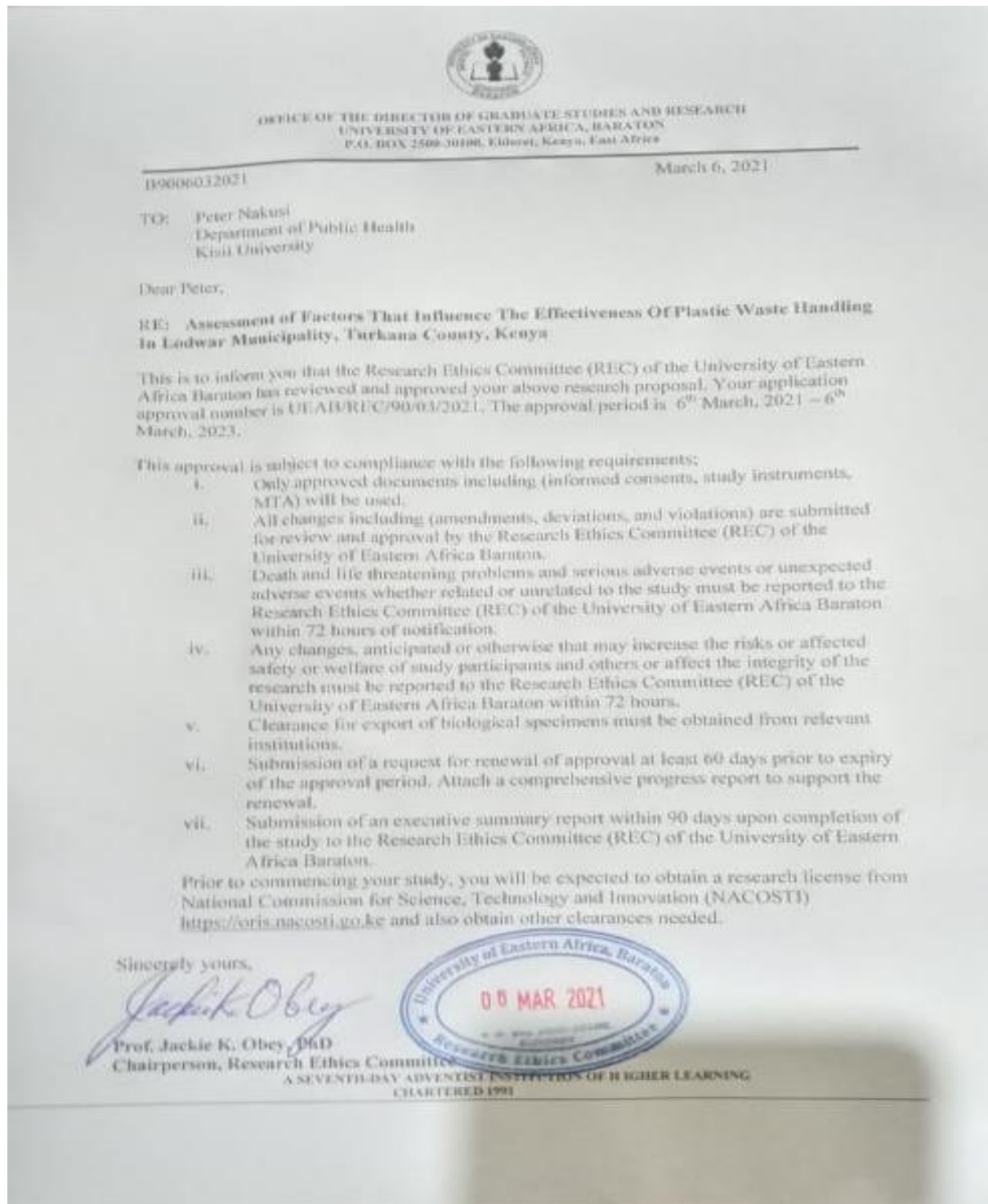
Thank you.



Dr. Charles Ongiyo-PhD-0720086205

DEPUTY DIRECTOR – ACADEMIC STUDENT AFFAIRS

Appendix F: IREC Letter of Permission



School Of Postgraduate

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