

**INFLUENCE OF PUBLIC PARTICIPATION ON SOLID WASTE  
MANAGEMENT IN KITALE TOWN, TRANS-NZOIA COUNTY,  
KENYA**

**GODFREY SIKUKU WEKESA**

**A Research Project Report Submitted in Partial Fulfillment of the Requirements of the  
Award of Degree Master of Arts in Project Planning and Management of the University of  
Nairobi**

**2017**

## DECLARATION

This research project report is my original work and has not been presented to any other university

í í í í í í í í í í í í í í ..

Godfrey Sikuku Wekesa

L50/82909/2015

í í í í í í í í í í í í ..

Date

This research project report has been submitted for examination with my approval as University Supervisor.

í í í í í í í í í í í í í í í ..

Dr. Patrick Cheben Simiyu

Lecturer

School of Open and Distance Learning

University of Nairobi

í í í í í í í í í í í í ..

Date

## **DEDICATION**

I dedicate this project research report to my wife Purity and my children Cynthia, Rauto, Juliet, Hillary and Gloria for they have been my source of strength and inspiration and I have sacrificed quality family time to focus on studies.

## ACKNOWLEDGEMENT

I wish to extend my gratitude to all who have been instrumental in the completion of this research project report. I am indebted to my supervisor Dr. Patrick Simiyu Cheben who was instrumental in guiding in formulating the topic and advising me to go over the research project proposal and report writing. Secondly, my gratitude goes to the University of Nairobi School of Open and Distance Learning, Department of Open Learning for offering me this opportunity to pursue my master's degree. I wish also to recognize the special assistance of Dr. Dorothy Kyalo Dean School of Open and Distance Learning, for organizing defence and for ensuring the programme is effectively supervised. Thirdly, I wish to appreciate the entire master's class of 2016/2017 for their positive moral support during the entire study.

Fourthly, I recognize the assistance of Kitale town residents for their support during the study and the youth group members who participated in the study for their valued input. My gratitude also goes to Professor Paul Odundo for teaching me research methods and Mr Julius Koringura for statistical techniques which were invaluable in my studies. Last but not least, my heartfelt appreciation and regards to the Almighty God for the special perfect gift of life, good health, ability to comprehend, remember and apply in life what was taught and financial breakthrough throughout my studies.

**TABLE OF CONTENT**

**DECLARATION.....ii**

**DEDICATAION.....iii**

**ACKNOWLEDGEMENT.....iv**

**TABLE OF CONTENT.....v**

**LIST OF TABLES.....viii**

**LIST OF FIGURES.....ix**

**ABBREVIATIONS AND ACRONYMS.....x**

**ABSTRACT.....xi**

**CHAPTER ONE: INTRODUCTION.....1**

1.1 Background of the studyí í í í í í í í í í í í í í í í í .í í í í í .í í í 1

1.2 Statement of the problemí .í í 5

1.3 Purpose of the studyí .í í í í í í í .í í ...6

1.4 Objectives of the studyí .í .í ..6

1.5 Research questionsí .6

1.6 Significance of the studyí .í í í í í 7

1.7 Limitations of the studyí .í í í í í í .7

1.8 Delimitation of the studyí .í í í í í í í 7

1.9 Assumptions of the studyí .í í í í í í í 8

1.10 Definition of significant termsí .í ..í í í 8

1.11 Organization of the studyí .í í í í í í .9

**CHAPTER TWO: LITERATURE REVIEW.....10**

2.1 Introductioní .10

2.2 Concept of solid waste management practices	10
2.3 Provision of solid waste storage services and solid waste management	12
2.4 Solid waste collection and solid waste management	13
2.5 Solid waste reduction at source and solid waste management	15
2.6 Solid waste transportation and solid waste management	18
2.7 Theoretical framework	20
2.8 Conceptual framework	21
<b>CHAPTER THREE: RESEARCH METHODOLOGY</b>	<b>22</b>
3.1 Introduction	22
3.2 Research design	22
3.3 Target population	23
3.4 Sample size and sampling procedure	23
3.5 Data collection instruments	25
3.6 Data collection procedure	27
3.7 Data analysis techniques	28
3.8 Ethical considerations	28
3.9 Operationalization of variables	28
<b>CHAPTER FOUR: RESEARCH FINDINGS AND DISCUSSIONS</b>	<b>30</b>
4.1 Introduction	30
4.2 Questionnaire response rate	30
4.3 Demographic characteristics of the respondents	31
4.4 Provision of solid storage facilities and their influence on waste management in Kitale Town	31
4.5 The extent to which solid waste collection influence solid waste management	36

4.6 The influence of solid waste reduction on solid waste management	40
4.7 Waste transportation and solid waste management	45
<b>CHAPTER FIVE : SUMMARY OF FINDINGS, CONCLUSIONS</b>	
<b>ANDRECOMMENDATIONS.....</b>	<b>50</b>
5.1 Introduction	50
5.2 Summary of the research findings	50
5.3 Conclusions	52
5.4 Recommendations	53
5.5 Contributions to the body of knowledge	55
5.6 Suggestions for further research	56
<b>REFERENCES.....</b>	<b>57</b>
<b>APPENDICES.....</b>	<b>59</b>
Appendix I: Letter of transmittal	59
Appendix II: Structured interview for residents	60
Appendix III: Semi structured interview for county government authorities managing solid waste	67
Appendix IV: Semi structured interview schedule for solid waste managers	68
Appendix V: Structured observation	70
Appendix VI: Research Authorization	71
Appendix VII: Research permit	72

## LIST OF TABLES

Table 3.1 Proportionate sampling of house hold owners, solid waste management members, and County Government Officials	í í í í í í í í í í í í í í í í í	24
Table 3.2 Operational definition of variables	í í í í í í í í í í í í í í í í í	29
Table4.1: Demographic information of respondents	í í í í í í í í í í í í í í í í í	32
Table 4.2: Provision of dust bins	í í í í í í í í í í í í í í í í í í í	33
Table 4.3: Types of containers provided	í í í í í í í í í í í í í í í í í í í .	34
Table 4.4 : Challenges faced in storage of solid waste in the premises	í í í í í í í í ..	35
Table 4.5 :Solid waste most difficult to store	í í í í í í í í í í í í í í í í í	36
Table 4.6: Assigned personnel for collection of solid waste	í í í í í í í í í í í í .	37
Table 4.7 Money used by residents on collection of solid waste per month	í í í í ..	38
Table 4.8: Frequency of solid waste collection	í í í í í í í í í í í í í í í í ..	39
Table 4.9: Solid waste reduction strategies	í í í í í í í í í í í í í í í í ..	41
Table 4.10: Significance of solid waste reduction at source	í í í í í í í í í í í í	42
Table 4.11 Measures to enhance solid waste reduction at source	í í í í í í í í í í í í	44
Table 4.12 challenges encountered in solid waste transportation and disposal	í í í í	47



## LIST OF FIGURES

Figure 2.1 Conceptual framework	í í í í í í í í í í í í í í í í í í í í	21
---------------------------------	---	----

## ABBREVIATIONS AND ACRONYMS

CBD	Central Business District
CBO	Community Based Organization
OCT	Centre For Ecological Technology
EIA	Environmental Impact Assessment
KRH	Kenya Refuse Handlers
NH	Neighbor Hood
NACOSTI	National Commission for Science, Technology and Innovation
NCC	Nairobi City Council
NEMA	National Environmental Management Authority
SIDS	Small Islands Developing States
SW	Solid Waste
SWM	Solid Waste Management
PSP	Private Sector Participation
UNDP	United Nations Development Program
UNEP	United Nations Development Program
USEPA	United States Environmental Protection Agency
WEDC	Water Engineering and Development Company

## ABSTRACT

Towns in developing countries are facing a double dilemma. On one hand, the urban population is growing rapidly causing a huge increase in demand for solid waste management services. On the other hand the local governments have failed to respond to the increased demand for solid waste management services. The local governments are constrained by resource and institutional limitations. It is often proposed that the solution lies in public sector participation. It is expected that the public sector, with its dynamism and flexibility, may fill in the service delivery gaps by forming partnership with the local governments. The purpose of this study was to examine the influence of public participation on solid waste management in Kitale town, Trans Nzoia County, Kenya. The study objectives are to establish whether provision of solid waste storage facilities by the public influence solid waste management in Kitale town, to explore the extent to which solid waste collection and storage by the public influence solid waste management in Kitale town, to assess how solid waste reduction at source by the public influence solid waste management in Kitale town and to determine how solid waste transportation and disposal by the public influence solid waste management in Kitale town. The study population size was 870 household owners from Milimani, Grassland, Section 19 and Kipsongo Estates. Descriptive survey design was used. Representative sample units were selected using stratified random proportionate sampling using Cochran formulae (1963) and purposive sampling. Sample size of 265 respondents was used which consisted of 243 household owners, County staff 8 and 14 group members dealing with solid waste management. The data was collected using questionnaires and interview schedules. The secondary data for this study was obtained through document review. The response rate was 83 percent. The questionnaire was pilot tested using a sample of ten (10) respondents from Milimani Estate after which its reliability was determined using Pearson Product Moment correlation coefficient ( $r$ ). The study used frequency distribution tables and percentages for results presentations and IBM SPSS version 20 to analyse data. The study established that provision of solid waste storage facilities by the public, solid waste collection and storage by the public, reduction at source by the public and solid waste disposal by the public influence positively solid waste management in Kitale Town. Based on the study findings it was suggested that the County Government should sensitize the public to provide adequate solid waste storage facilities for ease of control of solid waste. Sites for solid waste holding which are within the access of the public should be designated. Solid waste segregation/sorting at source should be encouraged in order to enhance solid waste recycling, composting and reuse. Finally, the County Government should enhance collaboration between solid waste management groups and the County in terms of solid waste transportation and disposal and also by constructing a modern sanitary landfill for solid waste disposal.

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background to the study

Most urban areas in the developing nations are confronted by an abnormal state of environmental pollution, partly because of deficient arrangement of essential services such as waste accumulation and water supply (Territory, 2001). Economic improvement, fast urbanization and changes in utilization designs, have added to an expansion in the amount and multifaceted nature of the solid waste generated. The outcome impact is boundless waste generation prompting more noteworthy interest for solid waste management (SWM) services.

However, overpowered municipalities have constrained human, technical and financial abilities, which restrict their ability to address the issue. There is developing agreement that prompt partners in this solid waste issue of (who generates waste) for this situation, the inhabitants necessity to cooperate with authorities in managing this issue because it affects human health and also environment (Mukisa, 2009).

The modality of synergetic operations in a coordinated way to deal with urban service delivery has regularly been proposed as a conceivable answer for the waste management issue (Ahmed and Ali, 2004, Band and post 2001, Rakodi, 1999), this specific situation, the participatory management approach where parts and obligations in regards to SWM are shared among the municipal and citizens, is a standout amongst the most frequently recommended techniques and its benefits and issues are very much reported ( Joseph, 2006; Papagordion, 2006, United National Environmental Program 2005. Zia and Devadas, 2007). Under this approach individuals can play an active role and contribute essentially to benefit delivery. There are various fruitful

contextual analyses of individuals' investment in SWM in developing nations (Ananda, 1999, Bernado, 2008) Mongkolchalarunga, 2005, Rath2006, Sujaddin 2008)

Distinctive organizations have thought of arrangements in help of private sector participation (PSP) in solid waste management in accordance with this UNEP/GC. Division 25/8(2009): called for reinforcing public private association in waste management BC Cop 10 (2011): strategic system recognizes private segment contribution as conceivable methods for implementation (Choice BC 10/2). The Rio + 20 result Doc (2012) outlines support of private segment association as a contribution to sustainable development: public private partnership as a critical device (para.46)

The rationale of effective public participation is plainly in light of the way that everybody produces waste and can be influenced specifically and by implication if waste isn't very much managed. In the Caribbean, there is for the most part an absence of formal techniques and rules for open investment and conference and this normally adds to wastefulness being used of assets and venture chance.

Customarily in the Caribbean, Solid Waste Management was managed through general wellbeing enactment that was a piece of a charge and control approach. In a few nations for instance, searching was illegal (UNDP, 1996). In mid 1990s, especially after assembled countries meeting on condition and improvement done in January 1992 at Rio de Janeiro, nations started to formally embrace Natural Effect Evaluation (EIA) arrangements, undated enactment, techniques and rules that required data spread and open counsel on ventures for which advancement licenses were mandatory. Earth sound waste management was featured as a noteworthy natural issue in part 21 of Plan 21 that was received at Rio Meeting which reaffirmed the presentation of the Unified Countries gathering on human condition that was embraced in June 1972 at Stockholm.

This laid the reason for participatory arranging of SWMPS in Small Islands Developing State (SIDS) Caribbean included. Though, in SWM public participation was not very much arranged or facilitated and now and again was in strife with great natural management. Recycling companies have added to living circumstances change and neediness diminishment in Asia. This was resounded by the College of Loughborough's, Water Designing and Advancement Center (WEDC) which theory that solid waste gathering ought to be privatized in light of a careful comprehension of the mind boggling cooperation between extensive variety of activities they concurred with World Bank's subsidizing on diminishment to destitution and enhanced living conditions yet featured commitment to decreased joblessness and social disturbance (WEDC 1998). WEDC's exploration depended on three South-Asian urban areas viz Colombo (Srilanka), Dhaka (Bangladesh) and Fisdabad (Pakistan).

In Africa, it is generally acknowledged that solid waste management is an issue. For example, in Nigeria, solid waste is a noteworthy concern (Butu and Mzhelia 2014). Adeyemi et al 2001 watched that solid waste constitutes a noteworthy issue in most creating nations. Adeyami included that waste management is a standout amongst the most recalcitrant issues confronting city executives and ecological offices. Ogwueleka 2009 detailed that solid waste management is by a long shot one of the best difficulties confronting natural bodies in the nation as the aftereffect of the management challenges. Adefemi and Awokunimi 2009 detailed a breakdown of peace in connection to waste management. They watched that urban focuses are encountering an expanded rate of natural weakening because of aimless dumping of solid waste.

The current endeavors of some waste management organizations in Nigeria went for including individuals from people in general in waste management operations have not yielded constructive reaction from the general population (Ogumba, 2004). In any case, take note of that

variables which impact open reaction and interest in waste and natural sanitation issues incorporate the nearness or nonappearance of proper offices, arrangements for waste transfer and law attention to the issues related with poor waste management . Imam et, al, 2008, Adewole 2009) contended that crossing over the data hole and understanding the difficulties of the Nigerian open associated with accessible waste management practice will be useful in creating suitable measures including conduct adjusting measures.

In Kenya, growing human population and an expansion in urbanization has prompted expanded waste age and many-sided quality of the waste streams. Regardless of the presence of waste management laws and policies, poor practices and weak implementation have prompted town and urban areas being overpowered by their own waste, subsequently influencing environment and public health (NEMA 2015).

Throughout the year waste management has been the order of the local authorities. However, local authorities did not organize the foundation of legitimate waste management frameworks and thus assigned small assets for its management. Further the chambers have lacked specialized and institutional abilities to oversee waste. This has prompted the present poor condition of waste management which included unpredictable dumping, uncontrolled waste and absence of waste isolation the nation over. For example, a study done situation Nairobi demonstrates that around 30 ó 40% of the waste generated isn't collected and under half of the population is served. In Nakuru, it is assessed that 45% of the waste generated is gathered and disposed at Giotto Dumpsite, 18% is recuperated and the rest accumulated in the environment (NEMA 2015).

Consider endeavors have been made by the Kenya Government to expand solid waste management through public participation. For example, in the Constitution of Kenya 2010, article 42 gives that "each individual has the privilege to a clean and healthy environment,

articles 69, on commitments to the earth, the constitution gives that the state should support open investment in the management, assurance and protection of the earth. Further, the Ecological Management and Coordination Act (EMCA), cap 387, section 3, stipulate that each individual in Kenya is qualified for a clean and healthy environment and has an obligation to defend and improve environment. Environmental management and Coordination (Waste Management Regulations of 2006, control 2 expresses that "Any individual whose exercises produce waste should gather, isolate and arrange or cause to be disposed off such waste in the way accommodated under these regulations". These endeavors have stimulated an increasing interest of the general population in support in solid waste management.

## **1.2 Statement of the problem**

Limited solid waste management through public participation in Kenya has contributed to poor solid waste management in numerous urban centers, Kitale Town included. The constrained participation has budded from co-ordination and cooperation issues that exist among the three partners in SWM-the communities, the government and the private divisions (NEMA 2007). The Kenya government, through the constitution of Kenya 2010, energizes public participation in all development exercises, solid waste management included. Further, the county government of Trans-Nzoia has drafted a bill titled Solid Waste Management Bill of 2016 that accommodate public participation in solid waste management.

The above intercessions by both the national and county government have empowered enthusiasm among the overall population to take an interest in management of solid waste exercises in Kitale town. In perspective of this, this study sought to investigate how public participation in solid waste management as far as waste storage, collection and storage, source decrease and transportation and transfer of solid waste can impact management of solid waste in



Kitale town.

### **1.3 Purpose of the Study**

The purpose of this study was to investigate the influence of public participation on solid waste management in Kitale town, Trans- Nzoia County, Kenya

### **1.4 Objectives of the Study**

The study sought to address the following specific objectives.

- i. To establish how solid waste storage facilities by the public influence solid waste management
- ii. To explore the extent to which solid waste collection for intermediate by the public influence solid waste management.
- iii. To determine the extent to which solid waste reduction by the public influence solid waste management.
- iv. To determine how solid waste transportation by the public influence solid waste management

### **1.5 Research Questions**

The study sought to answer the following questions.

1. How does provision of solid waste storage facilities by the public influence solid waste management?
2. To what extent does solid waste collection for intermediate by the public influence solid waste management?
3. To what extent does solid waste reduction by the public influence solid waste management?
4. To what extent does solid waste transportation by the public influence solid waste

management?

### **1.6 Significance of the study**

This study may have obtained information that will guide county authority to come up with comprehensive ways of encompassing the public in effective management of solid waste in Kitale town and other major market centers within the county.

The result of this study could yield information that will assist the community members to identify opportunities available in the solid waste management sector for their personal economic growth.

This study is expected to highlight the extra role the community can play in SWM which is expected to increase town sanitation and cut down cost incurred by the county in managing solid waste.

This study could also bring forth the plans the county has in terms of future involvement of the community in management of solid waste. This could be significant in guiding the community in future engagement with the county in terms of solid waste management.

### **1.7 Limitations of the study**

This study was limited on obtaining some information on solid waste management since some respondents did not like to discuss waste management strategies. By use of the transmittal letter, rapport was established to increase cooperation through instilling confidence. The study was also supplemented with information that was obtained from the document review on solid waste management. The other limitation was identification of specific groups that deal with solid waste management in Kitale town. This was handled by use of snow bowl method where by the identified solid waste managers assisted in identifying others.

### **1.8 Delimitations of the study**

The study was only focused on management of solid waste through public participation in Kitale town. Other factors affecting solid waste management in Kitale town were outside the scope of this study.

### **1.9 Assumptions of the Study**

The study assumed that some communities Members are participating in solid waste management in Kitale Town. It also assumed that the communities in Kitale Town are facing some challenges in management of solid waste through participation in Kitale Town.

The study further assumed that the county authority is facing some challenges in engaging public in Kitale Town in SWM activities and those they have plans for future engagement with community in solid waste management in town.

### **1.10 Definition of significant key terms**

Terminologies explained in this section were: Solid waste, solid waste management and public participation.

#### **Solid waste**

Solid waste is also called garbage and not much different from urban waste. According to NEMA, (2007) solid waste is the organic and inorganic waste materials generated by commercial, households, industrial and institutional activities that have lost an incentive in seeing the underlying client".

#### **Solid Waste Management**

Solid waste management as used in this study refers to the collection, storage, transportation,

processing, recycling and disposal of waste materials.

### **Waste Recycling**

Waste recycling is the process of collecting and preparing recyclable materials and reusing the materials in their original form or using them in manufacturing processes that do not cause the destruction of recyclable material in the manner that precludes further use. Yard waste composting also be added to the above definitions.

### **Public Participation**

Participation is "the action or fact of partaking having or forming a part of".

### **1.11 Organization of the study**

The study was organized in five chapters. Chapter one formed the basis of the study. The chapter highlighted the introduction of the study: background to the study, research objectives and significance of the study, the delimitation and the limitations of the study. Definitions of terms are also provided. Chapter two, literature review; it looked at the background of public participation in solid waste management and concept of public participation. This was in reference to work of other scholars who have carried out studies in the field. The theoretical framework guided the study as it identified the indicators to be analyzed. Chapter three on the other hand looked at the research design and methodology, the target population, sampling design and sample size, data collection techniques and procedures, data analysis and ethical consideration. Chapter four focused on data analysis and presentation whereby data collection from the respondents was presented and analyzed using both quantitative and qualitative analysis. The findings were presented in the tables form using frequency and percentages. The findings were discussed in chapter five. The research summarized the findings and gave the

conclusion. Recommendations were also made, contribution to the body of knowledge was made and areas of further research were suggested by the scholar.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter contains the literature review of the effects of public participation on solid waste management. The chapter focused on the review of present and previous researchers on public participation in solid waste management as well as similar project on solid waste management. The chapter analyzed the role community plays in solid waste management, challenges faced in involving the community in solid waste management, ways and means of addressing the challenges faced, and strategies to improve community participation for better solid waste management. This chapter also contains the theoretical and conceptual framework of the study.

#### **2.2 Concept of Solid Waste Management Practices**

There are a few factors that have bolstered expansion of the volume of strong waste created. One of the parts that have prompted broadened sold waste age is smart urbanization (UNEP.2007). Urbanization runs with expansion of towns which show up through the change of social and budgetary framework organization s and industrialization. The headway in such organization s warrants the augmentation in people in such regions. An expanded mass in this way surmises broadened energy for social organization s and also consumables which possibly demonstrate a more noteworthy base for misuse age a critical piece of the time.

The improvement in the volumes of waste conveyed has in addition been wound up being synonymous with better methodologies always related with more basic fortune which change over into higher utilize levels, in this way rolling out more waste s in the midst of improvements in misuse affiliation (UNEP, 2007) .Abundance impacts individuals to get a handle on pointless

requests and buy designs influencing individuals to acquire a more significant measure of what isn't remarkably essential for their thriving. Right when individuals have more than what they genuinely expect, inability to utilize all that they sumptuously have, finally drives them to dispose of the trivial abundance which changes into solid waste s. An extraordinary piece of the time more buy, in like way proposes the entire all the additionally bundling materials-which analyzing waste s into solid wastes particularly for the made things. The produced things contain materials which are astoundingly hard to isolate for instance plastics, in this way developing waste volumes savagely (Bourney, 2006). In an industrialist world a decisive reason for the makers is to make as more favorable position as the market can allow. Due to the line of thought, the makers are more worried over suiting the thing to the purchaser. Little or even no exertion is made to bundle the things in an earth delicate way and those that endeavor, are still incredibly far. When in doubt, the weight is left to the buyer to discard the waste bundling material by their own particular systems. In doing in that limit, the producers genuinely practice the cost of the solid waste s organization by extending it to the buyers. The issue here is that if all else fails the makers don't amazingly endeavor to give any direction to the end client on the most skilled procedure to deal with the waste truly. This muddles the solid waste s organization process as the general populations who "make" the solid waste s have not considered disguise of the cost of solid waste organization say an approach to manage doing corporate social duties.

As a general slant, headway goes with extended waste age. Data from Asia asserts that more made countries like Japan, Laos and Thailand; have greater city squander s delivered per capital. Inquisitively similarly these have not been signs of diminishing the extending measure of waste delivered (UNEP, 2007). The quick augmentation in squander age has along these lines made effective waste s administration a significant part of the time, testing. Thusly, it has put human

life and the earth being alluded to. Two or three nations in Asia have gone up against eco-naming as a market based contraption/system to manage the waste issue (UNEP, 2007). Over eco-naming, the 3r approach (Decrease, reuse and reuse) is in like way finding the opportunity to be clearly unmistakable in Asia and particular parts of the world.

Signs open demonstrates that the conduct by which solid waste s is managed are as different as the lunar race itself. A piece of the techniques for misuse organization are true blue and organically consistent, while some are not expectedly, solid waste is generally gathered as a store of junk by neighborhood bosses or buy firms to be taken to an exchange station and a brief span later to a landfill (every so often aggregated and taken straight to the landfill).

Regardless, since there are not for the most part enough resources and establishment for squander administration especially in making countries, this proposes a couple of waste s won't be assembled, or will be despicably disposed of (UNEP 2008). Along these lines, open dumps, expending waste, rodent and fragrances which are incredibly consistent in creating countries have made neighborhoods defenseless against prosperity perils (UNEP 2007). Understanding, the Assembled States Natural Insurance Organization (USEPA), attests that it revealed the environmental and human life to risk by the technique for release of ozone exhausting substances and contamination of ground water independently.

Thusly, strong waste s if not particularly administered, can aggregately have persisting and difficulties to pivot negative effects on the earth. Attempts to upgrade the management of strong waste have been there. One of the recommendations has been the use of a fused management technique.

### **2.3 Provision of solid waste storage services and solid waste management**

Extensive research endeavors have been coordinated to open cooperation in solid waste



management. Such looks into have had intriguing discoveries rise in help of open investment in management of solid waste. In the examination on private management of solid waste in India (Sauro, 2000) discovered a few entryways in the solid waste management rehearses that could without much of a stretch point of participation of public as the most conceivable arrangement it was discovered that efficient dealing with of waste at the diverse stages appropriate from the source to the transfer destinations was missing (Joardar, 2000). Fundamental arranging ought to in a perfect world be a pretended by people in general, at the wellspring of waste age. Without waste arranging, it turns out to be for all intents and purposes hard to deal with the solid waste reasonably.

In consider by Ikiara (2004), it was discovered that because of constrained open mindfulness and negative impression of casual performers, there is in truth minimal open help for source division of waste, and waste reusing, reuse, and minimization. Support for investment is expanding, in any case, even inside NCC, as is clear, for example, in the city committee's arrangement on private division associations (NCC, 2001).

The main formal open private association in the city's SWM area to date was the pilot one-year benefit contract granted in 1997 to one of the privately owned businesses, the Kenya decline handlers constrained (KRH), by the NCC. The agreement included every day clearing of avenues, streets, paths, asphalts and markets in the city's Focal Business Region (CBD), SW accumulation and transportation from a similar region, and transfer at a concurred month to month rate of Kshs 1,312,500. The privately owned business did at first and the CBD turned out to be observably perfect. Installment issue prompted poor execution, however especially due to sit in by unpaid specialists.

The NCC additionally has some casual associations with CBOs, went for helping individuals living in ghettos and other spontaneous settlements, and advancement of treating the soil exercises and ecological clean ups.

#### **2.4 Solid waste collection and solid waste management**

There ways that the conduct by which solid waste is controlled are as shifting as humankind itself. Two or three frameworks for waste organization are legitimate and earth enduring, while some are absolutely not. Generally, solid waste (an extraordinary piece of the time inferred as trash) is all things considered collected as a heap of waste by adjoining specialists or by private firms to be taken to an exchange station and after that to a landfill (every so often amassed and taken straight to the landfill).

Regardless, considering the course that there are not by and sufficiently large resources and establishment for squander administration , especially in making countries, this circumstance finally surmises that some waste won't be assembled, or will be dishonorably disposed of (UNEP,2002). In this manner, landfills, expending waste, rodents and aromas which are especially standard in creating countries have made neighborhood areas defenseless to prosperity perils (UNEP, 2007). In comprehension, the Amassed States Regular Confirmation Office (USEPA) affirms that shocking exchange of social waste revealed the earth and human life to chance by technique for outpouring of ozone exhausting substances and corrupting of ground water separately.

The manner by which squander is disposed of especially in the creating countries like Kenya, may simply suit participation of individuals when all is said in done to switch the effects of poor strong waste exchange. Joandar (2000) found that the most by and large practiced metropolitan exchange systems has been uncontrolled dumping, amassed in low-lying outskirts zones and

provoking channel ate pervasion and pollution flood and contaminations of soil, ground water, trenches, and conduit ways. Uncontrolled dumping when penetrated eccentrically by individuals by and large it powers broad effect, as Sauro raises. However, in itself, dumping isn't a viable technique for administration of waste, it would truly be a qualified harming procedure, yet it can be controlled and the effects pivoted if individuals when all is said in done were locked in with the waste administration and exchange structure.

The measure of open interest in strong waste administration is conspicuously uncommon between the made and making countries. In made countries, open collaboration in strong waste administration may go the degree that organizing of the waste delivered. The private firms by then assemble the authoritatively masterminded squander at a charge. The costs paid disguise for the strategies in which the overall public should have appreciated the waste administration line. By the day's end, the weight is passed on to the private waste specialist to a detriment Mukisa (2009).

In developing nations like, the photo is extraordinary. In any case, dominant part of the population is poor to famously manage the cost of charges for waste gathering. Furthermore, a considerable lot of the general population insensibly though honestly, discard waste thoughtlessly with little worry about the up and coming impacts that their imprudent transfer will at last reason. General society assumes it is totally the worries of the nearby organizations to guarantee appropriate waste management at no additional charge on people in general.

In Kenya, organization between neighborhood experts and different specialists (the private area, NGOs and groups) to encourage sharing of SWM duties and money related weights, are just start to rise in Nairobi, Ikiara (2004). There are scarcely and ponder and dynamic procedures of communitarian activity amongst partners and connections are generally casual. Powerful

coordination among the various on-screen characters in the city's SWM segment is missing. Private trash accumulation firms generally work in a situation of open rivalry, with next to zero collaboration from the city specialist. Indeed, even the waste management exercises of their organizations are not outfitted at all towards waste reusing, reuse or minimization.

## **2.5 Solid waste reduction at source and solid waste management.**

Waste evading for the most part called source diminishing in the structure, produce, buy, or use of materials and things to decrease the sum or possibly danger of disposed of misuse. Misuse avoidance besides gathers, in major terms, "diminishing waste by not making it" (USEPA, 2002:4). USEPA declares that since it lessens the measure of waste that a get-together should manage, misuse repulsiveness is the favored metropolitan solid waste organization strategy. As appeared by USEPA (1998:2). source diminishing joins reuse hones and "has come to be viewed as a sound judgment approach with monstrous potential to utilize assets suitably, spare cash, and abatement misuse" and by goodness of the particular great conditions it presents, many states in the Gathered States of America (USA) have intelligently included with innovative endeavors towards solid waste adjusting action. Grass cycling and yard treating the soil are taken to be "sorts of source decreasing or squander killing movement in light of how the materials are totally occupied from the trade working environments and require no metropolitan organization or transportation" (USEPA, 2005:7-9).

Reusing joins the reuse of materials that are potential waste yet are to some degree changed into gigantic assets. The most essential perfect position with reusing is that it diminishes the time of ozone harming substances since there is redirection of the disaster from the landfills. Reusing besides lessens the use of new assets, in a course adding to logical change. Materials like paper, glass. Steel, plastic, and aluminum can be reused with the genuine target that as opposed to

organizing them of, they can be recovered and subsequently reused.

Treating the dirt insinuates;

"The controlled enthusiastic normal decay of characteristic issue, for instance, supports scraps and plant matter, into humus-a soil like material. Fertilizer goes about as a trademark compost by offering supplements to the earth, growing accommodating soil living things, and covering certain plant illnesses" (USEPA, 2002:4). This recommends the prerequisite for engineered fertilizers will be diminished and meanwhile, treating the dirt aides in reducing of nursery releases from strong waste.

Start implies the controlled expending of waste in an offer to diminish the volume that requirements to go to landfills, and now and again to create control. Start can be used for squander that can't be deflected or reused. There is moreover a part here of giving more secure exchange procedures to ease through "upgrading the arrangement and administration of incinerators and landfills" (USEPA, 1993:2). Disregarding the way that "the consuming method can create hazardous air radiations, these can be controlled by presenting control equipment, for instance, destructive gas scrubbers and surface diverts in combustors" (USEPA, 2002:4).

Though strong waste is extremely trying to manage and dispose of. It isn't by and large completely pointless. Innovative strategies for overseeing strong waste can be considered to make strong waste important. Within for Organic Development (CET) which supports viable advances in New England grasped such a meander. Changing waste compositing into a "technique for cooperating" (Majercak, 2002:1). Through composed exertion with business haulers, business squander generators and, agriculturists, the endeavor took off with the farmers being the treating the dirt administrators who may then send the things to the market.

Partaking in such a complex of joint exertion, in itself demonstrates an open entryway for building an agreeable vitality that would helpfully abuse strong waste to make it gainful. This would come to fruition into a twofold get since preparing the dirt can fit to a great degree well in the business focus stream as it allows to benefits both monetarily (wage to agriculturists) and earth (reducing nursery gasses and diminish on leachates age), from regular waste. Agriculturists furthermore get connected with to deal with their own specific hardship by utilizing it as waste products, in this way compelling on the utilization of synthetics or oil based manures (Majercak, 2002). Such an endeavor may not by any extend of the creative energy be anything besides hard to begin and keep up, yet rather it could end up being productive.

In Africa, a little volume of the conveyed solid waste is reused or recouped as there is little "money related prodding influence and market for reused materials (UNEP, 2002:249). On one hand, Bournay, (2006) watches that rich nations keep sending waste to Asia and Africa which ends up extending the weight in those landmasses. This waste is in sort of old things that never again meet the purchaser inclinations and measures in the rich nations, and likewise pointlessly ridiculous bundling of made things for pass on. The impediment of the rich nations is that the waste they send can be "reused at any rate" (Bournay. 2006:24). Then again, different European nations have reusing plans for glass and paper. However, the accomplishment of such plans has in like way been decreased by the expanded time of waste paper and glass and in this way influencing the solid waste issue to the present moment to be coordinated (UNEP, 2002). It moreover somewhat sounds unfeasible to expect that there will be able and able reusing of waste in Africa, when greatly the run strategy for misuse organization and trade is arrive filling.

In Kenya, the level of strong waste that is recovered from common point of view is only 8% (percent) of the recyclable and 5% (Percent) of the treated the dirt. Regardless, there is recovery

proceeding into the undertakings yet the rate is dark. Treating the dirt by packs has potential however the social affairs are going up against different necessities, the most incredulous of which is procurement of land to lead business. Another issue is nonattendance of an unfaltering business sector for the recuperated materials, particularly for waste papers and manure. From this time forward, for instance, the self-change exercises of the Mukuru meander earned Kshs. 1.55 million out of 1996 from the recuperation of 1,018 tons of materials for reliably.

A review drove at the Dandora dumpsite uncovered that forager recuperate recyclable materials from metropolitan solid waste. The foragers supposedly recovered more than 30 novel sorts of materials which the certified ones being ferrous metals (aluminum and copper) while there is astounding potential in reusing, there is an issue of recyclable being defiled with un-recyclable wastes.

Also, there is no course of action on reusing in the nation which has prompted the show of some reusing affiliations procuring waste materials and to the mishandle of waste pickers by agents and reusing firms.

## **2.6 Solid waste transportation and solid waste management**

Strong waste administration comprises of three sub parts, gathering framework, transportation and transfer framework. In Indonesia, transportation of rubbish from exchange stations to transfer locales is overseen by city purging division. Transportation framework utilizes compartments and dump tractors in different volumes. The trucks take the holders from exchange stations and afterward convey the refuse compartment to the transfer site. In a paper displayed in strong waste administration workshop at Kitalyushu, September 19-20,2002, it was uncovered that the group assumes the liability in dealing with their own neighborhood including paying the pay of city workers and road sweepers, giving rubbish canisters and compartments,

buying of trucks and so on.

In India, as indicated by the India foundation report 2006, city experts have gone into auxiliary and additionally transportation contracts to abstain from putting resources into vehicles and gear's and to profit of a more proficient framework. In such a course of action, the private firms furnish compartments and/or vehicles with drivers and fuel. The onus of keeping up the armada of vehicles additionally lies with them. Such temporary workers are either paid per trip or to the treatment/transfer site or per trip or to the treatment/transfer site or per ton for the treatment and transfer of 1000 tons for each day. The private area in India has been associated with way to entryway accumulation of strong waste, road clearing limitedly, stockpiles and transportation and for treatment and transfer of waste administration part in India, November 2009.

In Kenya, all the more particularly in Nairobi city committee, which has the social duty of giving SWM administrations to natives focus its endeavors on local locations and foundations that can manage the cost of private administration to the detriment of regions possessed by poor people (UNEP).

With NCC's horrifying execution and the disappointment of private administration to stretch out into low wage and spontaneous settlement zones, group based activity in squander accumulation, transport; stockpiling, exchanging and reusing began to rise in 1992. There is various CBOS, including altruistic association, ethnicø affiliations, welfare social orders town board of trustees, self-improvement gathering and private (or neighborhood/affiliation (RH). Dominant part of the CBOs is occupied with squander fertilizing the soil in spite of the fact that the fundamental movement of around 44 percent of them is neighborhood cleaning (Ikiara 2004). 33% of CBOs is associated with squander picking. Regardless of individual and restricted execution, the group when all is said in done plays a little waste administration part.



## 2.7 Theoretical Framework

This investigation is intensely educated by the Social Capital hypothesis and the Base up approach championed by Chambers (in Field, 1985). Social Capital alludes to the organizations, connections, and standards that shape the quality and amount of a general public's social cooperation, which influence social orders or groups to work. It isn't only the aggregate of social bite the dust foundations which support a general public, the paste holds them together (World Bank, 1999). Social Capital is more about the associations among people, interpersonal organizations and the standards of correspondence and reliability that emerge from them (Putnam 2000, John Field 2003).

The focal postulation got from the Social Capital hypothesis is that connection empowers individuals to construct groups, to confer themselves to each other and to weave the social texture. A feeling of having a place and a solid affair of informal organizations (and connections of trust and resistance that can be included), it is contended, convey awesome advantages to individuals. The Social Capital hypothesis progresses an ordinary contention that, trust between people consequently moves toward becoming trust amongst outsiders and trust of a wide texture of shared organizations; it turns into a mutual arrangement of qualities (Field, 2003).

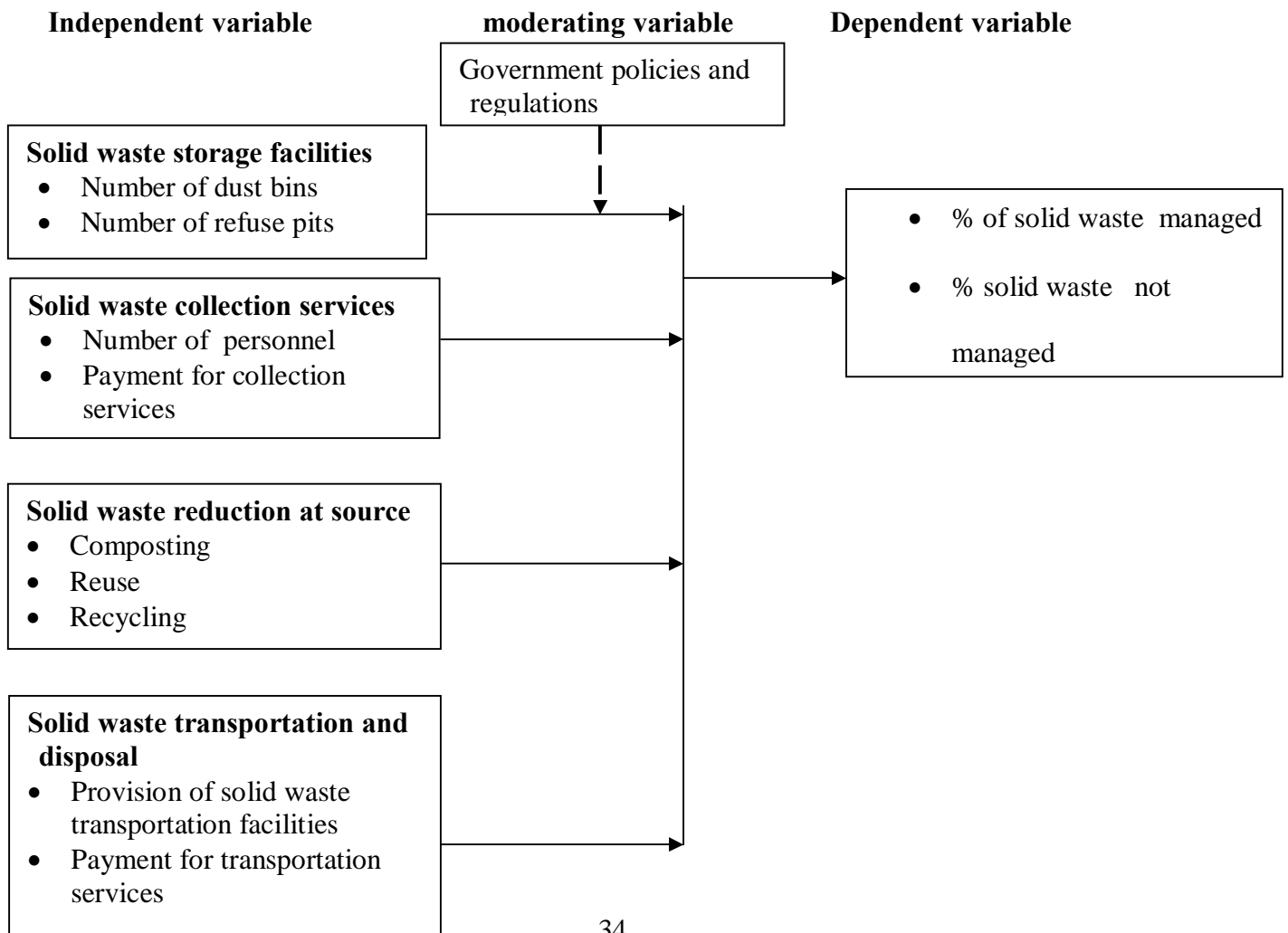
In the journey for solid waste management arrangements, the entire talk can't be examined in disengagement of group investment. There are some social collaborations that ought to be figured in. As indicated by Thomas-Expectation (1998), the group is a substance with proficient performers who ought to be managed an extraordinary stage in the solid waste management process. Supremacy ought to in this manner not be given to the advanced methodologies, but rather likewise to what the group knows, ponder the entire procedure. Information, practices and demeanors shape some portion of their social universes.

This investigation contend that informal organizations have esteem and there is substantial proof that groups with a decent 'stock' of such social capital will probably profit by bring down wrongdoing figures, better wellbeing, high instructive accomplishment, and better monetary development.

## 2.8 Conceptual Framework

The relationship between the independent and dependent variable is illustrated by this conceptual framework in figure 2.1

**Figure 2.1 Conceptual framework**



## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

This chapter highlights the research design that was adopted, the target population, sample size and procedures for selection of such sample. Also included in the chapter are research instruments, instruments validity and reliability and method that were employed in data collection procedure and analysis techniques. Lastly ethical consideration.

#### **3.2 Research Design**

This study was conducted through descriptive survey research design. This design is most preferred when conducting research study to a large population since it allows generalization of results of the research sample to a larger target population. The research was to establish the influence and the relationship of public participation in provision of solid waste storage facilities, solid waste collection and storage, solid waste reduction at source and waste transportation disposal by the public on solid waste management in Kitale town without manipulation.

The research also described and explained the factors as they were. Descriptive research design involves describing the characteristics of a particular individual, or a group. Descriptive research includes surveys and fact-finding inquiries of different kinds. This research design is applicable where by the person conducting the research has no control over variables, can only report what is happening and what happened. The research study involves the use of questionnaires and interview guide to gather information Kothari (2004).

### **3.3 Target Population**

The study population comprised of residents from Milimani, Grassland, section 19 and Kipsongo estates who participate in solid waste management and the groups that offer waste management services in those estates. The study targeted all house hold owners and the members of the groups dealing with solid waste management in these estates. It also targeted 22 staffs from the department of Environment working in the section of solid waste management. The target population consisted of 870 households owners who stay in the above mentioned estates and participate in solid waste management, the 48 members of the four solid waste management groups, and 22 County government environment department staff. Target population included all members of a real or hypothetical set of people, events or objects to which researcher wish to generalize the results of his research. It is the totality of cases of people, organizations or institutions which possess some certain common characteristics that is relevant to the study (Borg, Gall J. & Gall M. 2007).

According to the estimates done by the department of economic planning of the County Government of Trans-Nzoia, Milimani, Grassland, Section19 and Kipsongo estates have 870 households. These are the households where solid waste is managed through collaborative effort between organized youth groups and the general public.

### **3.4 Sample size and sampling procedure**

#### **3.4.1 Sample Size**

This research study adopted a formula by Krejcie and Morgan 1970 where they developed a table of sample size determination. In this case data was collected from 265 respondents. Data was collected by structured interviews from 243 respondents, 22 semi structured interview was

also done with respondents from the county government and youth group members dealing with solid waste management who were proportionately sampled considering their location and the information they anticipated to possess.

**Table 3.1 Proportionate sampling of house hold owners, solid waste management members, and County Government Officials**

<b>stratum</b>	<b>Population</b>	<b>Sample size</b>
Milimani	80	24
Grassland	90	27
Section 19	210	64
Kipsongo	420	128
County government staff	22	8
Solid waste management members	48	14
<b>Total</b>	<b>870</b>	<b>265</b>

### **3.4.2 Sampling procedure**

This research utilized stratified sampling, systematic sampling, simple random sampling and purposive sampling procedures. Sampling is the procedure by which a generally modest number of individual, protest or occasion is chosen and analyzed to discover something about the whole population from which it was chosen. A sample is a small proportion of focused population chosen using some efficient equation (Mugenda, 2008).

Stratified random sampling was utilized to choose the family unit owners in Kitale Town who participates in solid waste management. Stratified random sampling system is a strategy that recognizes sub bunches in the population and their proportions and select from every subgroup to

frame sample (Sign and Oso, 2009). It bunches a population into isolated homogeneous subsets that offer comparable qualities and chooses from every subgroup in order to guarantee fair portrayal with a perspective of representing the distinction in sub-aggregate attributes. The family unit proprietor target population was not uniform. This is on the grounds that they remain in various domains and take part contrastingly in solid waste process. Stratified random sampling procedure was in this manner used to guarantee that the objective population is isolated into various homogenous strata and that every circumstance is spoken to in the specimen extent equal to its size in the population. This guaranteed every stratum trademark is spoken to in the example therefore raising the outer legitimacy of the investigation.

Stratified random sampling was utilized to choose respondents under family unit proprietors to avoid bias. This technique likewise guaranteed every part has break even with circumstance and autonomous possibility of being incorporated into the sample. Purposive sampling technique was utilized to choose staff of Trans-Nzoia Region government and waste management assemble individuals. It was used to select who to include in sample based on their typicality in order to collect focused information. According to Airy (1972) the sample of 10% to 20% is acceptable thus from a population of 22 total staff the researcher worked with a sample of three respondents representing 13% of the total staff population and 8 respondents from 65 group members dealing with solid waste management representing 13.3% to avoid the biasness associated with small samples which tend not to be representative (Mugenda & Mugenda, 1999).

### **3.5 Data Collection Instruments**

Data collection instruments are tools used to collect data from respondents. Questionnaire and interview schedule were used to collect data from respondents. The study employed two types of instruments, questionnaire for household owners and street vendors and interview schedule for

the county Government officials and solid waste management team.

Dvivedi (2006) defines a questionnaire as a device for securing answers to questions by using a set of questions. A questionnaire was used to collect data from sampled respondents either being a resident, business vendor or a trader was hoped that the respondents were literate and therefore did not have no problem in reading and answering the questionnaire. Use of the questionnaire, help to save on time when the sample size is big.

Interview are the most common forms of data collection in qualitative research, Lichtenen (2010) and Kwale (1996) argue that the aim of an interview is to gain open minded description of different aspect of the subject's life world and also assisted him to keep the research on track so that the interview remains focused on the topic at hand, thus interview schedule was used on collecting detailed information regarding public participation in solid waste management in Kitale Town.

### **3.5.1 Pilot Testing of the Instruments**

A pilot considers was done on four estates, two respondents from every one bunch mentioned earlier and which was excluded in the main research. An information section screen was created utilizing these questionnaires and their information keyed and analyzed. Result got was utilized to make vital change in accordance with the instruments Poland (2005). The primary point of piloting was to decide the exactness and consistence of the instruments before they were utilized for actual information collection. This likewise helped the analyst to build up to what degree the instrument was to quantify precisely the characteristics under scrutiny.

### **3.5.2 Validity of the Instruments**

In this study validity of the research instrument starts at the design stage. According to Leady

and Ormrod (2005) and Silver (2005) content and construct and constructor validity is supposed to be established by referring the instruments to the professional judgment to check whether it measures what it claims to measure. Thus, the researcher sought the advice of the department of extra mural studies- Kitale Office, University of Nairobi to validate the instrument. Their correction and suggestions were used to produce the final copy of the questionnaires.

### **3.5.3 Reliability of instruments**

Reliability is the degree to which a test consistently measures whatever it measures Mugenda (2008). Reliability is the ability to consistently yield the same result when repeated measurements are taken under the same conditions. Test-retest method was employed in the study to ensure reliability of the research instruments and that the research instruments yield consistent results, pretesting through piloting was done. This involved administering the result instrument to aid respondent from the estates which are outside the study area at two separate times, (one-week interval) to determine the instruments reliability. Pearson product moment formula was used to calculate the reliability of the instruments hence calculating correlation coefficient to establish the relationship between the two sets of scores. According to Kerlinger (1986), a correlation coefficient of at least 0.5 is considered high enough for the instrument to be used for the study.

### **3.6 Data Collection Procedure**

The researcher sought approval of the proposal by the department of Extra Mural studies and approval letter from the School of Open and Distance Learning (University of Nairobi). The letter was used by the researcher to acquire a research permit from the National Commission for Science, Technology and Innovation (NACOSTI), and then the researcher got field entry



permission. The questionnaire was hand delivered by the researcher to the respondents and was administered in a period of 3 weeks.

The interview was conducted by the researcher himself because of the small numbers of respondents involved. Before the interview the respondents were given an initial motivating talk by the researcher to prepare them psychologically and also to inform the rationale for the study.

The interview was as brief as possible to avoid boredom.

### **3.7 Data Analysis Techniques**

Quantitative and qualitative was generated using questionnaires and interview schedule. Both descriptive and inferential statistics was used in the data analysis. Data collected was analyzed through measure of frequencies and percentages; it was then presented using tables.

Interview was done with the county authorities and solid waste management members who were audio taped. A qualitative thematic strategy of data analysis was then employed; inferences were made objectively and systematically by searching for emerging themes. Information was then under common themes and presented in the form of narratives. The analysis utilized the SPSS program version 17.

### **3.8 Ethical Considerations**

Before the management of the questionnaires, the researcher sought to be granted permission to conduct the study. Thus after clearance from the school of continuing and distance education the researcher applied for a permit from the National Council of Science, Technology and Innovation (NASCOSTI) the permit is a requirement by (NACOSTI) for all research projects and it was used to seek permission from participants. Informed consent was sought from all participants before data collection (Bogan & Biken 1998).

The researcher also ensured confidentiality of the data collected.

### 3.9 Operationalization of variables of the table

The variables considered in this research study were two (independent and dependent). The independent variable was public participation while dependent variable was solid waste management. The variables in this study were measured by use of nominal, ordinal and ratio scales. The measurement of the various variables in this study were undertaken as shown in table 3.2

**Table 3.2 Operational definition of variables**

<b>Objectives</b>	<b>Variables independent</b>	<b>Indicators</b>	<b>Measurement</b>	<b>Measurement scale</b>
To establish whether provision of solid waste storage facilities by public influence solid waste management	Provision of solid waste storage facilities.	Availability of dust bin/litter bins	No. of dustbin/litter bins	Ratio scales
To explore the extent to which waste collection and storage services by the public influence solid waste management	Waste collection services	Clean town Solid waste transfer stations	Absence of litter No. of refuse transfer stations	Nominal scale Ordinal scale
To assess the extent to which solid waste reduction at source by the public influence solid waste management	Solid waste reduction at source	Recycled/reuse d product Compost plants	No. of recycled products Amount of compost produced	Nominal ordinal scale
To determine the extent to which solid waste transportation and disposal by the public influence solid waste management in Kitale town	Solid waste transportation	Refuse transporting vehicles Refuse disposal at the dumpsite	No of transporting vehicles No of solid waste transportation heaps Frequency of disposal	Ordinal Ordinal

## **CHAPTER FOUR**

### **RESEARCH FINDINGS AND DISCUSSIONS**

#### **4.1 Introduction**

Constrained public participation in solid waste management in Kenya has added to poor solid waste management in numerous urban focuses, Kitale Town included. The restricted investment has grown from co-appointment and coordinated effort issues that exist among the three partners in SWM-the groups, the legislature and the private divisions (NEMA 2007). This section summarizes the results and findings of the study. The purpose of the study was to investigate the influence of public participation on solid waste management in Kitale town, Trans- Nzoia County, Kenya. The objectives of the study are: To establish whether provision of solid waste storage facilities by the public influence solid waste management, to explore the extent to which solid waste collection and storage by the public influence solid waste management, to assess how solid waste reduction at source by the public influence solid waste management and to determine how solid waste transportation and disposal by the public influence solid waste management.

#### **4.2 Questionnaire Response Rate**

The research study targeted a total of 265 respondents. The response rate was 83% (220) with 128 (58%) being male while 92 (42%) were females

According to Mugenda and Mugenda (1999), a response rate of 50% and above is adequate for analysis and reporting. The success to high response rate by residents was accorded to proper field preparation done by the researcher.

### 4.3 Demographic characteristics of the respondents

This section shows the respondents background information based on gender shown in table 4.1

**Table 4.1: Demographic information of respondents**

<b>Gender</b>	<b>Frequency</b>	<b>Percent</b>
Male	128	58
Female	92	42
<b>Total</b>	<b>220</b>	<b>100</b>

Table 4.1 shows that 128(58%) of the respondents were male while 72(42%) were female. The higher number of male respondents could be attributed to the fact that activities related to solid waste management (collection, transportation, and disposal) are mostly done by male youths who seemed to have more information pertaining solid waste management than their female counterparts. Further the youthful females who were found at home by the time of interview felt shy to discuss freely about solid waste management.

### 4.4 Provision of solid waste storage facilities and their influence on waste management in Kitale town

The first objective of this study was to establish whether provision of solid waste storage facilities by the public influence solid waste management in Kitale town.

To achieve this objective, the residents were asked to respond to several questions intended to establish their participation in provision of solid waste storage facilities for solid waste management. The questions asked on this objective included whether the public provide dust

bins for solid waste storage, types of containers provided, , main type of waste generated, suppliers of waste storage facility, whether challenges are faced in solid waste storage, type of challenges faced, waste most difficult to store and reasons for difficult in storage .

The study sought to establish whether the public plays any role in the provision of dustbins for solid waste storage. The findings are presented in table 4.2 below:

**Table 4.2: Provision of dust bins**

<b>Response</b>	<b>Frequency</b>	<b>Percentage</b>
Self	85	37.5
County Government	0	0
Donor	0	0
Private provider	137	62.5
<b>TOTAL</b>	<b>220</b>	<b>100</b>

This study established that 100% of the respondents who were interviewed had provided dustbins in their premises for solid waste storage whereby it was observed that most households had provided different types of dustbins at their household doors for storage of garbage. Respondents confirmed that these dustbins/refuse pits provided, 62.5% of them are provided by the private solid waste collectors and 37.5% of these storage facilities are provided by individuals themselves as shown in table 4.2. Further, it was noted that the County Government does not provide any of these facilities. This indicates that the public are now assuming an active role in managing their solid waste at the source. This is perhaps after realizing that the County Government cannot effectively do so. This move has greatly improved the state of solid waste

storage at household level by controlling waste scattering and making it easy for collection to the designated storage sites. This state was observed that has greatly improved the sanitary state of the estate. This finding agrees with the Nairobi City Council policy on private sector involvement in solid waste management (NCC, 2001) which pointed out that support for public participation in solid waste management is increasing.

The study further sought to establish the types of containers provided by the residents for solid waste storage. The data was collected in this regard analyzed and presented as shown in table 4.3 below.

**Table 4.3: Types of containers provided**

Type of container	Frequency	Percentage
Carton box	22	10
Bucket	110	50
Standard dust bin	22	10
Polythene bags	66	30
TOTAL	220	100

The results in table 4.3 indicate that the most used containers for solid waste storage by the residents are buckets whereby 50% of respondents indicated that they use them. Second in order are polythene bags where by 30% of respondents use them. 20% of the respondents indicated that they either use carton boxes (10%) or standard dust bins 10% for solid waste storage. The fact that most of the residents commonly use buckets or polythene bags for waste storage contribute a lot to complexity of solid waste management because a lot of plastics which are non-degradable are injected in waste stream. These findings agree with the study by Tay ójoo et al

2007, which indicate that households waste is commonly placed in plastics bags or other collection containers in community centers which are placed at the road sites to be collected by vehicles or hand operated carts. Nyadero S. (2010) suggest that, the fact that the residents have provided storage facilities indicate that they are willing to participate in solid waste a situation that has greatly improved the sanitary state of such estates as compared to those days when they entirely relied to municipality for the service.

The study also investigated to find out whether the public face any challenges in storage of solid waste in their premises and the types of challenges faced.

**Table 4.4: Challenges faced in storage of solid waste in the premises**

**N=220**

<b>Challenge</b>	<b>Frequency</b>	<b>percentage</b>
Irregular collection and disposal	94	42.9
Vandalization/theft	32	14.2
Inadequate space for storage	94	42.9
<b>TOTAL</b>	<b>220</b>	<b>100</b>

The results in table 4.4 suggest that most of the challenges experienced in solid waste storage at source are irregular collection and disposal (42.9%) and inadequate space for storage at source (42.9%). County staff interviewed also agreed with this findings who attributed the situation to inadequate means of transport for the county that can be used to transport solid waste .These

challenges if not properly addressed by the relevant authority may affect effective public participation in solid waste management. As a way forward, synergetic approach in solid waste management should be encouraged. This can be done through a joint effort between the County Government and the public whereby County Government assists in timely transportation and disposal. These findings concur with studies by (Joseph 2006, papagordion,2006, United National Environmental Program2005, Zia & Devadas,2007) which state that participatory management approach where parts and duties with respect to SWM are shared among the civil and natives is a standout amongst the most as often as possible recommended strategies.

The study went ahead to establish the type of waste that is most difficult to store and why.

The findings are given in table 4.5 below

**Table 4.5: Solid waste most difficult to store**

<b>Item</b>	<b>Response frequency</b>	<b>Percentage</b>
Food remains	154	70
Papers	22	10
Plastic waste(bottles, tins, basins)	44	20
<b>TOTAL</b>	<b>220</b>	<b>100</b>

The results in table 4.5 suggest that food remains (70%) of the waste, is the most difficult to store. The reasons given were that most of this waste decompose easily and is large in volume. The rest of waste generated including papers, plastics (bottles, tins, and basins) had only 30% of respondents saying that they are difficult to store at source. In this case, for effective solid waste storage to happen, there should be solid waste segregation at source and should be frequently



transported and disposed in order avoid health and environmental problems. Ikiara (2004) in his study, he agrees with these findings whereby he found out that because of restricted open mindfulness and negative view of casual on-screen characters, there is in certainty little help for source partition of waste in this way prompting challenges away.

#### **4.5 The extent to which solid waste collection influence solid waste management.**

The second objective of the research study was to explore the extent to which solid waste collection especially for those residents who doesn't participate directly in solid waste collection in Kitale town. To achieve this objective, respondents were asked to respond to several statements intended to determine how waste is collected from their premises and frequency in collection. Data was collected and was analyzed under the question to what extent does solid waste collection and storage by the public influence solid waste management in Kitale town? This section therefore presents findings on the relationship between public participation in solid waste collection and storage and solid waste management.

To determine the public participation in solid waste collection, the respondents were asked to state that collects solid waste from their premises for disposal to designated solid waste collection points. The responses are summarized in table 4.6

**Table 4.6: Assigned personnel for collection of solid waste**

<b>Collector</b>	<b>Frequency</b>	<b>Percentage</b>
Myself	18	8
House keeper	26	12
Private waste collector	178	80
County Government	0	0
<b>TOTAL</b>	<b>220</b>	<b>100</b>

The results in table 4.6 suggest that most of the waste is collected by private collectors (80%) and the rest of it (20%) is collected by premises owners or their house helpers. The County Government of Trans óNzoia does not collect any waste from these areas. This implies that the decision by the public to manage solid waste in their estates by either engaging private waste collectors or by doing it themselves has greatly influenced positively the state of solid waste management in their estates. Through this arrangement, it was observed that solid waste was properly controlled despite the fact that the County Government does not offer solid waste management services in these estates. The reasons given by County Government authorities for non-participation in solid waste collection at household level were lack of adequate number of staff. These findings agree with a study by (Mukisa 2009) which pointed out that overpowered regions have constrained human, specialized and money related abilities which confine their ability to address solid waste management issue. There is a developing agreement that quick partners in this issue of solid waste (the generators of waste) in this case the occupants need to hold hands with experts in managing this issue has expansive natural and wellbeing impacts. To determine the respondents' amount of shillings spent on solid waste collection, they were asked to state their monthly average expenditure on this activity. The responses are summarized in table 4.7

**Table 4.7 Money used by residents on collection of solid waste per month**

<b>Amount/month</b>	<b>Frequency</b>	<b>Percentage</b>
Less than Ksh 100	98	44.4
Ksh 100-200	72	33.4
Ksh 200-500	25	11.1
Above Ksh 500	25	11.1
<b>TOTAL</b>	<b>220</b>	<b>100</b>

The results in table 4.7 show that most of the residents spent money on collection of solid waste from their premises to the designated garbage collection points. Majority of the residents (44.4%) spent less than ksh100 per month for this activity. Others (33.4%) of them spent between ksh100-200, (22.2%) spent ksh200 and above on this exercise. From these results, it is implied that very little amount of money is spent on collection of garbage from premises to the designated collection sites. This is likely to be the case because most of these collection sites are not far away from their premises, so residents opt do it themselves or pay very little money for the service. These results agree with findings by (UNEP,2002) which indicate that most developing countries lack resources and infrastructure for solid waste management and therefore the responsibility of doing this is left to the residents themselves, which in some cases lead to some waste not being collected or improperly collected.

#### **4.5.1 Frequency of solid waste collection in a week for disposal**

To determine public participation in solid waste management in their areas, the respondents were asked how many times solid waste is collected from their estates in a week. The responses are summarized in the table 4.8 below

**Table 4.8: Frequency of solid waste collection**

<b>Times/week</b>	<b>Frequency</b>	<b>Percentage</b>
Once	26	12
Twice	26	12
More than twice but not daily	165	75
I don't know	3	1
<b>TOTAL</b>	<b>220</b>	<b>100</b>

Table 4.8 shows that 75% of the residents have their waste collected more than twice a week but not daily. 24% of the respondents indicated that waste from their premises is collected once or twice per week for disposal. Only 1% of the respondents indicated that they don't know the frequency of the solid waste collection in their estates. These findings confirm that the residents of the study areas actively participate in solid waste management, something that has been made possible by engaging the private sector in this activity who carries out the exercise at an agreed fee.

According to the youth who were interviewed one of the challenges experienced in solid waste collection is lack of solid waste storage facilities (bulk containers, skip bins and refuse holding chambers) for control of solid waste at the designated solid waste collection points. This has resulted in occasions of garbage scattering around collection points. In some areas this has turned to be an eyesore to the public because the community members do not have the capacity of transporting this waste to dumpsites. These findings agree with Joander (2000) who in his study found that the most broadly honed civil transfer techniques have been uncontrolled dumping, gathered in low-lying periphery areas and prompting leachate permeation and contamination keep running off and sully of soil, ground water, trenches and waterway ways.

Uncontrolled dumping when drilled aimlessly by general society it forces broad impact as Saury calls attention to. Notwithstanding, in itself dumping isn't reasonable method for management of waste, it would really be a qualified ruinous technique, yet it can be controlled and the impact turned around if people in general were bolstered in this procedure of waste management and transfer structure.

#### **4.6 The influence of solid waste reduction on solid waste management.**

The third objective was to establish whether public participation in solid waste reduction at source influence waste management in Kitale town. To achieve this objective, the respondents were asked to respond to several statements to describe the effect of their participation in solid waste reduction at source. Data was collected and analyzed under the questions whether the respondents are aware of any source reduction strategy, whether according to them, solid reduction at source has significant effect on solid waste management, whether they have encountered any challenge in their effort to reduce solid waste at source and what the County Government should do to enhance solid waste reduction. It was established that 89% of the respondents were aware of waste reduction at source strategy.

To determine strategies used by the public to reduce solid waste at source, they were asked to indicate which of the listed strategies are used at their household level. The results are as indicated in the table 4.9 below.

**Table 4.9: Solid waste reduction strategies**

<b>Strategies</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Recycling</b>	<b>20</b>	<b>10</b>
<b>Reuse</b>	<b>32</b>	<b>15</b>
<b>Composting</b>	<b>24</b>	<b>11</b>
<b>Burning</b>	<b>172</b>	<b>87</b>
<b>Controlled purchasing and consumption</b>	<b>167</b>	<b>76</b>

Table 4.9 shows that the most used strategy to reduce solid waste within the study area is burning

87%, followed by controlled purchasing 76%. Recycling, reuse and composting had responses below 20%. These results may be attributed to the fact that burning of waste is easier since much of such waste are plastics and papers that can be easily burned. Further, the hard economic conditions facing these low class residents cannot allow them to purchase extra goods and food that can be thrown away as waste. When asked the question, most of them indicated that they prepare food that they feel is enough for their consumption.

Regarding recycling, reuse and composting of solid waste generated, the low response received can be attributed to the fact that most of the residents lack facilities and skills of doing this kind of activity. However, despite low level of solid waste treatment (recycling, reuse and composting) are using biodegradable solid waste as compost for application in their small vegetables gardens. Some were seen using plastic for flower planting around their houses. Capacity building for this group of people will enhance the application of these strategies and therefore great reduction of waste volumes. These findings are in agreement with the study by (USEPA,2007:4) which concurs that solid waste can be reduced by not producing waste. Counteractive action is the most favored metropolitan solid waste management procedures. An examination by (UNEP,2002:249) likewise concurs with these discoveries in that in Africa, a little volume of the created solid waste is reused or recuperated as there is little "monetary impetus and market for reusing materials".

To determine significance of solid waste reduction at source, the respondents in the study areas were given various options to pick on those they believe are significant in solid waste reduction at source. The results are shown in table 4.10 below

**Table 4.10: Significance of solid waste reduction at source**

<b>Significance</b>	<b>Frequency</b>	<b>Percentage</b>
Saves natural resources	<b>26</b>	<b>12</b>
Reduces environmental pollution	<b>209</b>	<b>95</b>
Source of income to waste handles	194	<b>88</b>
Reduces solid waste management cost	<b>55</b>	<b>25</b>

95% of the respondents indicated that solid waste reduction at source reduces environmental pollution, while 88% of the respondents indicated that solid waste reduction at source save natural resources. Further, 25% of the respondents indicated that solid waste reduction at source reduces solid waste management costs and therefore results in saving of money by both the public and the County Government. The County Government staffs who were interviewed also agreed with the response by the public whereby they said that solid waste reduction at source has greatly reduced pressure on the county in terms of collection services and also extend the life of the dumpsite. These findings agree with a report by USEPA (1998.2) which states that source reduction involves reuse activities and come to be recognized as a common sense approach with significant potential to use resources efficiently, save money and reduce waste.

By solid waste diminishment at source, the waste materials are totally redirected from the transfer offices and require no civil management or transportation (USEPA, 2005/7/9). This incredibly diminishes the cost brought about by the region government in overseeing such waste s which should be put away, gathered and transported to the last transfer destinations.

Solid waste diminishment at source by methods for reusing includes the reuse of materials that

are potential waste yet are fairly transformed into important assets. This has vital favorable position in that it diminishes the generation of nursery gasses since there is preoccupation of the loss from the landfills. Reusing likewise diminishes the utilization of new assets in a path adding to feasible advancement.

Amid the meeting, 88% of the respondents demonstrated that solid waste decrease at source gives wellspring of pay to the solid waste handlers. Through advancement, methods for managing solid waste can be conceived to make solid waste helpful. As indicated by the Middle for Natural Innovation (CET), solid waste can be transformed into compost which can be sold at a benefit.

As indicated by Majercak, (2002) ranchers can compost operators who can send the fertilizer item to the market.

To determine challenges faced in reduction of solid waste at source, respondents were asked to state challenges they experienced in SW reduction at the source.

Most respondents (80%) indicated that poor market for recycled products is the main challenge they face in their effort to recycle solid waste. They indicated that most people perceive recycled product as of poor quality compared to the freshly manufactured goods. 74% of the respondents indicated that lack of adequate skills and equipment is their challenge to recycle solid waste. They stated that for them to be able to effectively recycle solid waste like plastic, they need proper skills and equipment, which unfortunately was lacking among them. A further 38% of the respondents indicated that lack of support by the County Government has impeded their effort to recycle solid waste. They stated that the County Government has not supported them in



acquiring the necessary skills and equipment required for solid waste management. Further they said that the County Government has not in any way helped them to get market for the recycled products. These findings agree with a study by (UNEP, 20002:249) which brought up that in Africa, a little volume of created waste is reused or recuperated as there is somewhat financial motivating force and market for reused materials.

To determine measures that can be taken by the County Government to enhance solid waste reduction at source; the respondents were asked to pick any of the listed responses. The results are given in table 4.11

**Table 4.11 Measures to enhance solid waste reduction at source**

	Measures	Frequency	Percentage
1	Sensitization of the public on solid waste reduction at the source	202	91%
2	The County Government to formulate policies that encourage solid waste reduction at source	45	22%
3	Give incentives to those who practice solid waste reduction at source.	147	67%

Table 4.11 shows that most respondents (91%) believe that for solid waste reduction at source to be enhanced, the public should be sensitized on the need to reduce solid waste at the source. Results obtained from the interview by the County Government staff indicate that such sensitization exercises are done during monthly county cleanup activities organized by the department of environment, national environmental events and workshops .They believe that through such sensitization, solid waste segregation at source will be made possible, something

that will enhance solid waste recycling and they will also be equipped with necessary skills required for solid waste reduction at the source. 67% of the respondents believe that giving incentives to those practicing solid waste reduction at the source will further improve it. They suggested that such incentives to include things like being given space to practice solid waste recycle, the government assisting them to market recycled products and exempting them from payment for various county licenses. 22% of the respondents feel that by the County Government formulating policies that encourage solid waste reduction at source, many people will be attracted in the field thus enhancing solid waste reduction at the source. The interviewed County Government staff agreed with these findings whereby they said that it may encourage solid waste reduction at source, solid waste segregation and motivating the solid waste recycling. These findings agree with that of (UNEP 2002:249) which watched that, in Africa a little volume of the produced solid waste is reused or recouped as there is minimal financial impetus and markets for reused materials. This has extraordinarily hampered solid lessening at the source in many parts of the district.

These discoveries are in concurrence with an examination by Ikiara (2004), it was discovered that because of restricted open mindfulness and negative impression of casual performers, there is in reality minimal open help for source detachment of waste, and waste reusing, reuse, and minimization.

Orderly dealing with of waste at the distinctive stages ideal from the source to the transfer locales was missing (Joardar, 2000). Fundamental arranging ought to in a perfect world be a pretended by the general population, at the wellspring of waste age. Without waste arranging, it

turns out to be basically hard to deal with the solid waste economically.

#### **4.7 Waste transportation and solid waste management.**

The fourth and final objective of the research study was to establish the extent to which public participation in solid waste transportation for disposal influence solid management in Kitale town. To achieve this objective, respondents were asked to respond to several statements intended to establish whether they participate in solid waste transportation and disposal, the means used to transport the waste and whether they experience/encounter any challenge in transportation and disposal of solid waste in Kitale town. The results are summarized as indicated below

66% of the respondents indicated that they don't transport waste for disposal from their respective estates instead they stated that their waste is transported by the County Government even though irregularly. The reason given for this kind of situation is that the residents lack means of transport to do this kind of work. 34% of the respondents said that their waste is transported by the private solid waste management at a fee. This is done by use of pickups, hand carts and rarely by bicycles. According to the residents, these private waste transporters have played a vital complimentary role to the County Government which hardly collects all the wastes from the estates. This situation according to them has greatly increased the sanitary state of their estates and according to the County Government staff interviewed, besides improving the sanitary state of the estates, it has also helped them to save a lot of financial resources through this complimentary role.

Both the residents and the County Government staff interviewed indicated that the transported solid waste is disposed on the open dumpsite thus posing serious public and environment problems to the neighborhood through leachates reaching the nearby stream and smell and fly

nuisance to the neighboring slaughter house. This findings agree with the study by Joandar (2000) who discovered that the most broadly honed city transfer techniques has been uncontrolled dumping, amassed in low-lying periphery areas and prompting drain ate permeation and contamination spillover and pollutions of soil, ground water, channels, and waterway ways. Uncontrolled dumping when honed aimlessly by people in general it forces sweeping impact, as Sauro brings up. In any case, in itself, dumping isn't a practical method for management of waste, it would really be a qualified damaging technique, yet it can be controlled and the impacts turned around if the general population were engaged with the waste management and transfer structure.

A paper displayed in Kitalyushu, Indonesia in September 19/20/2007 concurs with the discoveries that it recommends that the group assumes liability in dealing with their own particular neighborhood including paying of the compensation of rubbish gathering and road clearing, giving trash canisters and compartments, acquiring of trucks and so on.

In Kenya, all the more particularly in Nairobi city chamber, which has the social duty of giving SWM management s to subjects focus its endeavors on local locations and foundations that can manage the cost of private management to the detriment of zones occupied by poor people (UNEP).

With NCC's horrifying execution and the disappointment of private management to reach out into low wage and impromptu settlement regions, group based activity in waste accumulation, transport; stockpiling, exchanging and reusing began to develop in 1992. There is various CBOS,

including beneficent association, ethnicø affiliations, welfare social orders town council, self-improvement gathering and private (or neighborhood/affiliation (RH). Dominant part of the CBOs is occupied with waste fertilizing the soil in spite of the fact that the primary movement of around 44 percent of them is neighborhood cleaning (Ikiara 2004). 33% of CBOs are associated with waste picking. In spite of individual and confined execution, the group by and large plays a little waste management part.

To determine the challenges encountered by the public in solid waste transportation and disposal the respondents, were asked to state the challenges encountered in the processes of solid waste transportation and disposal, the responses are summarized in the table 4.12

**Table 4.12 challenges encountered in solid waste transportation and disposal.**

	Challenge	Frequency	Percentage
1	Stiff government regulations	116	52%
2	Inadequate means of transport	188	85%
3	Inadequate solid waste disposal site	97	44%

The results in table 4.12 indicate that respondents pointed out to more than one challenge they encounter in their effort to participate in solid waste transportation and disposal. 85% of the respondents pointed out that inadequate means of transport for solid waste transportation are the main challenge they face in transporting and disposing off solid waste. 52% of the respondents pointed out stiff government regulations like obtaining of license from NEMA for both the transporting vehicles and the actual transportation of solid waste and payments for use of the county dumpsite as some of the stiff government requirements. These charges prove to be too

expensive for those involved in the transportation. Stiff requirements for them to have a purpose made vehicle for transportation of solid waste was also cited as a challenge faced.

Finally, 44% of the respondents stated that inadequate dumpsite is another challenge facing solid waste transportation and disposal. Most of them claim that the road to the dumpsite is impassible during rainy seasons and also routes inside the dumpsite are not motorable especially during the rainy seasons. All these make access to the dumpsite difficult during wet seasons. The above-mentioned challenges mean that in most cases solid waste in the study estates is improperly disposed off resulting in both health and environmental problems. These finding agree with (UNEP 2002) which points out that since there are dependably insufficient assets and framework for waste management particularly being developed regions, this situation at last infers that some waste won't be gathered or will be dishonorably arranged or subsequently bringing about wellbeing risks. In order to improve public participation in solid waste management, the interviewed county government staffs pointed out that the county government has planned to silence all groups involved in solid waste management, partner with the groups in terms of provision of transport ,something the community and the youth lack, they also said that the county government is coming up with a policy that will motivate those community members who participate in solid waste reduction at source through recycling, reuse and composting.

Generally, the interviewed staff agreed that through public participation in solid waste management, the concerned estates have improved a lot in terms of sanitation as compared to those estates that public participation in solid waste management is not taking place.

## CHAPTER FIVE

### SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Introduction

This chapter presents a summary of the findings, conclusions, recommendations of the study and suggestions for future studies. The chapter further summarized the studies contribution to the existing body of knowledge.

#### 5.2 Summary of the research findings

The findings of the study are summarized and presented according to the four variables of study namely provision of solid waste storage facilities, solid waste collection and storage, solid waste reduction at source and solid waste transportation and disposal.

The study utilized a total of 220 respondents, representing 83% of Questionnaire response rate and including all 22 respondents from the county government and 48 youth group members dealing with solid waste management.

The first objective was to establish whether provision of solid waste storage facilities by the public influence solid waste management in Kitale town. This study established that 80% of the respondents had provided dustbins in their premises for solid waste storage. Further the study revealed that 62.5% of the dustbins are provided indirectly by the private solid waste collectors and 37.5% of the dustbins are provided directly by individual residents. It was noted the municipality does not provide any dustbin for solid waste storage in this estate. It was observed that provision of dustbins by the public greatly improves solid waste storage at household level by controlling solid waste scattering and making it easy for collection to the designated storage sites.

Further the study revealed that the commonly used solid waste storage facilities are plastic buckets 50% and polythene bags 30% of the respondents .The fact that most of the residents commonly use buckets or polythene bags for solid waste storage contribute a lot to complexity of solid waste management because the materials which are non-biodegradable are injected in waste stream .Following the government ban on manufacture and use of polythene paper bags, this situation is likely to change.

The second objective of this study was to explore the extent to which solid waste collection by the public influence solid waste management in Kitale town .Data analysis and interpretation of responses from the residents, interview with the county staff and waste management youth group members and document review revealed that most of the waste is collected by private collectors (80%) and the rest (20%) is collected by premises owners or their house helpers .The decision by the public to manage solid waste in their estates by either engaging private waste collectors or by doing it themselves has greatly influenced positively the state of solid waste management in their estates .Through this arrangements it was observed that solid waste properly controlled in the estates under study despite the fact that the county government does not offer solid waste management services in these estates .

The third objective was to establish whether public participation in solid waste reduction at source influence solid waste management in Kitale town. Data analysis and interpretation of responses from the residents, questionnaire and interview with the county staff and the youth groups involved in solid waste management and documents review revealed that 89% of the respondents were aware of waste reduction at source strategy. Of the strategies used for solid waste reduction burning (87%) was the commonly used followed by controlled purchasing and consumption .Most of the residents (95%) indicated that solid waste reduction reduces



environmental pollution .Others (12%) of the respondents indicated that solid waste reduction at source save natural resources. Other benefits indicated were source of income (88%), and reduction of solid waste management costs. The study revealed that there are challenges the residents are facing in reduction of solid waste at source. These include: lack of adequate skills and equipmentø in solid waste reduction strategies, poor market for recycled products (80%) and inadequate support by the County Government (35%).

The fourth and final objective of the research study was to establish the extent to which public participation in solid waste transportation for disposal influences solid waste management in Kitale town. Data analysis and interpretation of the questionnaire responses from the residents, and interview with the County Government staff and youth group solid waste managers and document review revealed that 66% of the respondents indicated that their waste is transported for disposal by the county government and even though irregularly .Lack of transport by the residents was given as a possible reason for this arrangement.34% of the respondents said that their waste is transported by the private solid waste managers at a fee .This kind of arrangement has helped to reduce the accumulation of solid waste in the estates even though some heaps were still observed .The residents cited the following as their main challenges to the transportation for disposal of solid waste; inadequate means of transport 85%,stiff government regulations 52% and inadequate solid waste disposal site 44%.

### **5.3 Conclusions**

This study investigated influence of public participation on solid waste management in Kitale town. The study specifically sought to address the following objectives: to establish whether provision of solid waste storage facilities by the public influence solid waste management in Kitale town, to explore the extent to which solid waste collection and storage by the public

influence solid waste management, to assess how solid waste reduction at the source by the public influence solid waste management in Kitale town and to determine how solid waste transportation for disposal by the public influence solid waste management in Kitale town. In view of these findings, the study concludes that provision of solid waste storage facilities by the public, solid waste collection and transportation by the public, solid waste reduction at source by the public, and solid waste transportation for disposal significantly influence positively solid waste management in Kitale town. The study established that provision of solid waste storage facilities by the public (80%) contributes to improved solid waste management in Trans-Nzoia County when other factors are held constant. It was concluded that active public participation in provision of solid waste storage facilities has a positive influence on solid waste management in Kitale town thus the authority should encourage it. It was concluded from the study findings that direct (20%) or indirect (80%) solid waste collection and transportation by the public influence solid waste management positively hence likely to improve on the effectiveness and efficiency of solid waste management in Kitale town if the town authority can upscale it.

It was concluded from the study findings that solid waste reduction at source by a mean of (65%) by the public influence positively solid waste management in Kitale town. In view of this, the general public should be motivated to participate in solid waste reduction at source for both creations of wealth to the different groups involved and town cleaning.

It was further concluded from the study finding that public participation (34%) in solid waste transportation and disposal has great influence on solid waste management in Kitale town even though they lack support from the County Government. In view of this, organized private groups should be encouraged to transport and dispose solid waste to the designated county dumpsite in order to improve town cleanliness.

## **5.4 Recommendations**

Based on the findings of this study, the following recommendations were made:

Firstly, provision of solid waste storage facilities by the public influence positively on solid waste management in Kitale town, therefore Kitale town authority should sensitize the public to provide adequate solid waste storage facilities for ease of control of garbage.

Secondly, solid waste collection and storage by the public influence solid waste management in Kitale town greatly. Based on these findings, Kitale town authority should designate sites for solid waste holding which should be within the access of the public in order to enhance this activity of solid waste collection and transportation.

Thirdly, solid waste reduction at source by the public has a positive influence on solid waste management in Kitale town. In view of this, Kitale town authority should encourage solid waste segregation/ sorting at source in order to enhance solid waste composting, reuse and recycling. County government of Trans-Nzoia should also train the youths on solid waste composting, reuse and recycling.

Fourthly, on the other hand, public participation in solid waste transportation for disposal influences solid waste management largely. In view of this, Kitale town authority responsible for solid waste management should identify groups which are involved in solid waste transportation and disposal and collaborate with them in this area by providing solid waste transportation means like Lorries and tractors. This is the case because the study established that most of the groups involved in solid waste transportation have problems in getting transport means. Further, the county government of Trans -Nzoia should construct a modern sanitary landfill for disposal of the ever increasing amount of solid waste.

## 5.5 Contributions to the body of knowledge.

The contributions made by this study to the body of knowledge are as indicated in table 5.1

**Table 5.1: Contributions to the body of knowledge**

<b>Objectives</b>	<b>Contribution to the body of knowledge</b>
a) To establish whether provision of solid waste storage facilities by the public influence solid waste management	Involvement of the public in provision of solid waste storage facilities will enhance solid waste management in Kitale town by improving solid waste storage thus making it easy for collection
b) To explore the extent to which solid waste collection influence solid waste management.	Involvement of the public in solid waste collection and transportation to designated point is critical in solid waste management since this greatly improves sanitary state of the County by controlling solid waste scattering in estates.
c) To assess how solid waste reduction at source by the public influence solid waste management	Involvement of the public in solid waste reduction at source through solid waste composting, reuse and recycling will greatly reduce the volume of waste to be collected, transported and disposed by the County Government of Trans-Nzoia thus creating clean environment and also there will be income for the public arising from sale of

recycled, reused products in the compost manure.

d) To determine how solid waste transportation for disposal by the public influences solid waste management Involvement and sensitization of the public on solid waste transportation and disposal will assist the County Government in controlling illegal dumping of solid waste in town and will reduce the cost incurred by the county government in transporting and disposing solid waste. For this to happen, collaboration between the County Government and the solid waste management groups in terms of provision of means of transport for solid waste is key.

---

### **5.6 Suggestions for further research**

The research covered only part of public participation in solid waste management in Kitale town; the following areas are suggested for further study;

- (i) Influence of public awareness creation on solid waste management in Kitale town.
- (ii) The level of willingness by the public to pay for solid waste management services in Kitale town.
- (iii) The ways and means to be used in creating partnership between the County Government and the youth groups involved in solid waste management in terms of having the available garbage transportation vehicles for transportation of waste.

## APPENDICES

### APPENDIX 1: LETTER OF TRANSMITTAL

**GODFREY S. WEKESA**

**P.O BOX 4211-30200**

**KITALE**

**20<sup>TH</sup> JULY, 2017**

Dear Sir/Madam,

**REF: REQUEST FOR PARTICIPATION IN RESEARCH STUDY**

I am a student studying at the University of Nairobi pursuing degree in Master of Arts project planning and management.

I am carrying out a research project on influence of public participation on solid waste management in Kitale town, Trans Nzoia County, Kenya.

I will appreciate if you could kindly take part in the research study. Your identity will be treated with utmost confidentiality and anonymity.

Thank you.

Yours faithfully,

Godfrey S. Wekesa

L50/82909/2015

**APPENDIX II: STRUCTURED INTERVIEW SCHEDULE FOR RESIDENTS/HOUSEHOLD OWNERS AND SOLID WASTE MANAGERS PUBLIC PARTICIPATION IN SOLID WASTE MANAGEMENT IN KITALE TOWN**

Instruction: please tick (ç) or fill in the appropriate answer in the spaces provided.

**PART 1**

Identification data

- |    |                             |                          |
|----|-----------------------------|--------------------------|
| 1. | Type of respondent          | <input type="checkbox"/> |
| ➤  | Resident                    |                          |
| ➤  | Solid Waste Manager         | <input type="checkbox"/> |
|    | Other (specify).....        | <input type="checkbox"/> |
| 2. | Premise ownership           | <input type="checkbox"/> |
| ➤  | Private owner               | <input type="checkbox"/> |
| ➤  | Tenant                      |                          |
| 3. | Ward/Estate                 | <input type="checkbox"/> |
| ➤  | Milimani                    |                          |
| ➤  | Section six/nineteen        | <input type="checkbox"/> |
| ➤  | Grassland                   | <input type="checkbox"/> |
| ➤  | Kipsongo                    |                          |
| 4. | Gender                      | <input type="checkbox"/> |
| ➤  | Male                        |                          |
| ➤  | Female                      | <input type="checkbox"/> |
| 5. | Highest level of education? | <input type="checkbox"/> |
| ➤  | Never went to school        | <input type="checkbox"/> |

- Primary level
- Secondary level
- Tertiary level

**PART II**

**PROVISION OF SOLID WASTE STORAGE FACILITIES**

By the public and its influence on solid waste management

6. Do you have any solid waste storage container in your premises? If yes, what type of do you have?

- a) Yes
- b) No

- a) Carton box
  - b) Bucket
  - c) Standard dust bin
  - d) Other, specify \_\_\_\_\_
- 

7. Which are the main types of waste generated in your premises?

List according to volume generates?

- a) Food remain
- b) Papers
- c) Plastic wastes (bottle, Tins, Basins etc.)

8. Who provides/supplies to you this waste storage facility?



Self

County Government

Donor

Other specify \_\_\_\_\_

9. Do you encounter any challenges in the process of storage of solid waste at your premises, if yes what are the challenges?

a) Irregular collection and disposal

b) Vandalization/theft

c) Inadequate space for storage

d) Others, specify \_\_\_\_\_

10. Of the wastes listed above, which one poses more difficulties in storage?

a) Food remains

b) Papers

c) Plastics

d) Other specify \_\_\_\_\_

11. In reference to 10 above, why do you think this is the case?

a) Because of its large volume.

b) Because it decomposes fast and therefore smelly

c) Other specify \_\_\_\_\_

12. In your view, do you think provision of solid waste facilities by the public influence solid waste management in your estate? Yes/no

If yes how?

- A] Control solid waste at source
- b] Make solid waste collection easier
- c]All the above

**PART III**

**THE EXTENT TO WHICH SOLID WASTE COLLECTION INFLUENCE SOLID WASTE MANAGEMENT.**

12. Who collects the waste from your home/shop/stall for disposal?

- a) Myself
- b) Housekeeper
- c) Private waste collector
- d) County Government

13. If yes, approximately how much do you pay per month?

- a) Less than Kshs.100/=
- b) Kshs.100 ó 200
- c) Kshs.200 ó 500
- d) Above Kshs.500

14. If not collected by self, how many times in a week is waste taken from your home/shop/stall for disposal?

- a) Once
- b) Twice

- c) More than twice but not daily
- d) I don't know

**PART IV**

**THE INFLUENCE OF SOLID WASTE REDUCTION AT SOURCE ON SOLID WASTE MANAGEMENT.**

15. Are you aware of any strategy of solid waste reduction at source?

- a) Yes
- b) No

16. If yes Q22 above, which one of the listed strategies do you practice?

- a) Solid waste recycling
- b) Solid waste reuse
- c) Solid waste composting
- d) Solid waste burning
- e) Controlled purchasing and consumption of waste generating items
- f) Other, specify \_\_\_\_\_

17. In your own view does solid waste reduction at source strategies have any significance?

- a) Yes
- b) No

18. If yes, what is it?

- a) Saves natural resources
- b) Reduces environmental pollution
- c) Source of income to waste handlers

- d) Reduces solid waste management costs
- e) Other specify \_\_\_\_\_

19. Do you encounter any challenges in your efforts to reduce solid waste at source?

- a) Yes
- b) No

20. If yes above, what are these challenges?

- a) Lack of adequate skills in solid waste reduction strategies.
- b) Negative attitude by the public towards reused/recycled/composted products
- c) Lack of support by the county government
- d) other, specify \_\_\_\_\_

21. What do you think should be done by the County Government to enhance solid waste reduction at source?

- a) Sensitize the general public on solid waste reduction at source.
- b) Formulate policies that encourage solid waste reduction at source.
- c) Give incentive to those who demonstrate great effort in solid waste reduction at source
- d) Other specify \_\_\_\_\_

**PART V**

**INFLUENCE OF SOLID WASTE TRANSPORTATION FOR DISPOSAL ON SOLID WASTE MANAGEMENT.**

22. Do you transport waste from your waste transfer stations to the final disposal site (dumpsite)?

a) Yes

b) No

23. If yes, by which means do you use to transport the waste?

a) vehicle (lorry/tractor)

b) hand cart

c) bicycle

d) other specify \_\_\_\_\_

24. If no in Q 30 above, what are the reasons for not transporting the waste?

a) Waste transported by the county government

b) Lack of means of transport

c) Other specify \_\_\_\_\_

32. Are there any challenges encountered in solid waste transportation?

a) Yes

b) No

25. If yes, what are the challenges?

a) Stiff government regulations

b) High cost of hire of transport

c) Inadequate refuse disposal sites

d) Other specify? \_\_\_\_\_

26. Do you think your participation in solid waste management has any impact on the sanitary state of Kitale town?

a. Yes

b. No

27. If yes, how?

a. Helps to improve sanitary state of town

b. Helps in reduction of the cost for solid waste management by the county government.

c. Create employment opportunity for people in town hence economic empowerment.

d. Other, specify \_\_\_\_\_

Thank you very much for your cooperation.

### APPENDIX III

#### SEMI STRUCTURED INTERVIEW FOR COUNTY GOVERNMENT AUTHORITIES

##### MANAGING SOLID WASTE IN KITALE TOWN.

1. Position of respondent
2. Section
3. Sex
4. Period worked

##### **Part two:**

1. Do you ever involve the public in solid waste management in Kitale Town?

How do you do it.?

What is the response of the public on this initiative?

2. What challenges do you experience while involving the public in solid waste management in Kitale town while involving the public/community in solid waste management in Kitale town?

3. How do you deal with any challenges involving the public in solid waste management.

4. What plan do you have with regard to improve community/public participation in solid waste management in Kitale town

5. How do you rate public participation in solid waste management

6. In solid waste is beneficial in any way?

If yes, what are the benefits?

## **APPENDIX IV**

### **SEMI STRUCTURED INTERVIEW SCHEDULE FOR SOLID WASTE MANAGERS**

#### **PART 1: IDENTIFICATION DATA**

1. Duties of the respondent
2. Estate
3. Sex
4. Level of education

#### **PART II: RESEARCH QUESTIONS**

##### **(a) PROVISION OF SOLID WASTE STORAGE FACILITIES BY THE PUBLIC**

- (I) Who provides solid waste storage facilities in your estate?
- (ii) Do you think public participation in provision of solid waste storage facilities can improve solid management in your estates?
- (iii) In which way can provision of solid waste storage facilities improve solid waste management in your estate?
- (iv) Which type of solid waste storage facilities are commonly provided for solid waste storage by the public?

##### **(b) SOLID WASTE COLLECTION AND INTERMEDIATE DISPOSAL**

- (v) What is the role of the public in solid waste collection service in your estate?
- (vi) How is solid waste collected and transported in your estate?
- (vii) Is there any fee paid by the public for solid waste collection and transportation in your estate, if yes, how much?
- (viii) What are the challenges encountered in the process of your involvement of collection and transportation of solid waste?



(ix) Which type of facilities/means do you use in collection and transportation of solid waste?

**PUBLIC PARTICIPATION IN SOLID WASTE REDUCTION AT SOURCE.**

Are you aware of any solid waste reduction strategies at source? If yes, which one.

Do you ever engage yourselves in waste reduction at source before final disposal is done? If yes, how do you do it?

Are there challenges encountered in your effort to reduce solid waste at source? If yes, what are they and how do you hope to overcome them.

Are there benefits you can attribute to these strategies of solid waste reduction at source? If yes, what are they?

**PUBLIC PARTICIPATION IN SOLID WASTE TRANSPORTATION**

Where do you dispose of the wastes you collect?

Are there requirements you are supposed to meet before disposing such waste? If yes, what are they?

Are there any challenges you encounter in the process of disposing off solid waste? If yes, what are they?

THANK YOU FOR YOUR COOPERATION

## APPENDIX V

### STRUCTURED OBSERVATION

#### IDENTIFICATION DATA

- a) Type of respondent
- b) Resident
- c) Market vendor
- d) Trader

Estateí .

-Presence of waste containers

-Types of containers

-neatness of environment

-Evidence of í .

-Innovative disposal

## APPENDIX VI: RESEARCH AUTHORIZATION



### NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471,  
2241349,3310571,2219420  
Fax: +254-20-318245,318249  
Email: dg@nacosti.go.ke  
Website: www.nacosti.go.ke  
when replying please quote

9<sup>th</sup> Floor, Utalii House  
Uhuru Highway  
P.O. Box 30623-00100  
NAIROBI-KENYA

Ref. No. **NACOSTI/P/16/61560/14439**

Date:

**6<sup>th</sup> December, 2016**


Godfrey Sikuku Wekesa  
University of Nairobi  
P.O. Box 30197-00100  
**NAIROBI.**

#### **RE: RESEARCH AUTHORIZATION**

Following your application for authority to carry out research on *“Influence of public participation on solid waste management in Kitale Town, Trans-Nzoia County, Kenya,”* I am pleased to inform you that you have been authorized to undertake research in **Trans Nzoia County** for the period ending **5<sup>th</sup> December, 2017.**

You are advised to report to **the County Commissioner and the County Director of Education, Trans Nzoia County,** before embarking on the research project.

On completion of the research, you are expected to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

  
**DR. STEPHEN K. KIBIRU, PhD.**  
**FOR: DIRECTOR-GENERAL/CEO**

Copy to:

The County Commissioner  
Trans Nzoia County.


The County Director of Education  
Trans Nzoia County.

National Commission for Science, Technology and Innovation is ISO 9001:2008 Certified


**APPENDIX VII: RESEARCH PERMIT**

**THIS IS TO CERTIFY THAT:**  
**MR. GODFREY SIKUKU WEKESA**  
**of UNIVERSITY OF NAIROBI , 4380-30200**  
**KITALE ,has been permitted to conduct**  
**research in Transnzoia County**  
**on the topic: INFLUENCE OF PUBLIC**  
**PARTICIPATION ON SOLID WASTE**  
**MANAGEMENT IN KITALE TOWN,**  
**TRANS-NZOIA COUNTY, KENYA**  
**for the period ending:**  
**5th December,2017**

**Permit No : NACOSTI/P/16/61560/14439**  
**Date Of Issue : 6th December,2016**  
**Fee Received :Ksh 1000**



**Applicant's Signature**



**Director General**  
**National Commission for Science,**  
**Technology & Innovation**