



STUDY REPORT

AWARENESS ON ENVIRONMENTALLY SOUND SOLID WASTE MANAGEMENT BY COMMUNITIES AND MUNICIPALITIES IN KENYA

For the project

Sound Chemicals Management Mainstreaming and UPOPs reduction in Kenya,
Ministry of Environment and Natural Resources

BY

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ABBREVIATIONS

3R	Reduce, Recycle, Reuse
ASK	Agricultural Society of Kenya
BATs	Best Available Techniques
BEPs	Best Environmental Practices
C40	Carbon 40
CBOs	Community Based Organizations
CRT	Cathode Ray Tubes
DRC	Democratic Republic of Congo
EA	East Africa
EIA	Environmental impact assessments
EMCA	Environmental Management and Coordination Act,
ENRED	Environment, Natural Resources and Energy Department
ESM	Environmentally Sound Management
GEF	Global Environment Facility
GHG	Green House Gases
HCB	Hexachlorobenzene
ICT	Information Communication Technology
ISWM	Integrated Solid Waste Management
KAM	Kenya Association of Manufacturers
KAM	Kenya Association of Manufacturers
KARA	Kenya Alliance of Residence Association
KIIs	Key Informant Interviews
KISWAMP	Kisumu Integrated Sustainable Waste Management Project
LDPE	Low Density Polyethylene
MEAs	Multilateral Environmental Agreements
MENR	Ministry of Environment and Natural Resources
MOH	Ministry of Health

NACOSTI	National Commission for Science, Technology and Innovation
NASWAMA	Nakuru Solid Waste Management
NEMA	National Environment Management Authority
NET Fund	National Environment Trust Fund
NGO	Non-Governmental Organization
NHIF	National Hospital Insurance Fund
NIP	National Implementation Plan
NSSF	National Social Security Fund
PCB	Polychlorinated biphenyls
PCDD	Polychlorinated dibenzodioxins
PCDF	Polychlorinated dibenzofurans
PERN	Potential Education Research Network
Prodoc	Project Document
SACCO	Savings and Credit Cooperative Society
SAICM	Strategic Approach to International Chemicals Management
SPSS	Statistical Package for the Social Science
SWM	Solid Waste Management
TEQ	Total Equivalent
ToR	Terms of Reference
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment
UPOPs	Unintentionally Produced Persistent Organic Pollutants
USAID	United States Agency for International Development
WEEE	Waste Electrical and Electronic Equipment

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EXECUTIVE SUMMARY

The common practice in solid waste handling at source is to put all in a bin or any container, which is then collected by either municipal actors or their licensed agents. The waste is then taken to dumpsites and destroyed mainly through open burning. A long side delivery of waste to the dumpsite where it is burnt, individuals scavenge on materials that have some economic potential such as plastics, paper, glass, metal etc. Such recovery activities take place along the management chain as well as at the dumpsite by communities.

This report presents findings of the study on Awareness of Environmentally Sound Solid Waste Management by communities and municipalities in the counties of Kisumu, Mombasa, Nairobi and Nakuru. The study was commissioned by United Nations Development Programme (UNDP) as part of implementation of the project “Sound Chemicals Management Mainstreaming and UPOPs reduction in Kenya” which aim to mainstream sound chemicals management and reduction of unintentionally produced persistent organic pollutants (U-POPs) from open burning of waste and thermal disposal of health care waste. The project is funded by Global Environment Facility (GEF) and implemented by Ministry of Environment and Natural Resources (MENR) in collaboration with other government agencies (Ministry of Health and National Environment Management Authority), civil society organizations and private sector including Kenya Association of Manufacturers (KAM), Green Belt Movement and Kenya Disaster Concern.

The main objective of the study was to assess awareness on environmentally sound solid waste management by communities and municipalities in the four counties and also to identify current issues in reduction, re-use and recycling (3Rs) value chain and potential economic provisions for communities’ incentives to perform upstream waste management in order to avoid environmental pollution.

The study that was conducted in Kisumu, Mombasa, Nairobi and Nakuru counties, employed a structured data gathering process that included literature and desk reviews, key informant interviews (KIIs), observations and questionnaire administration. Face to face questionnaire captured various aspects of the study and was administered to non-state actors mainly involved in promotion of 3R and its related activities in the targeted counties. The respondents to the questionnaire were sampled through references provided in every County where it was applicable and through other existing networks of organizations who have been dealing in solid waste management activities in those particular counties and reached out to many diverse actors as possible.

The questionnaire responses were processed using Statistical Package for the Social Science (SPSS) software after validation and coding into various useful themes in line with the ToRs. Qualitative data (KIIs) were triangulated and analysed based on code book developed from the interviewee responses and are the basis for the detailed explanation of the quantitative aspects of results in this report. Results were then summarized according to the structure and flow of the study terms of reference and objectives.

The analysis on institutional, policy and legal frameworks governing sound solid waste management in Kenya indicates that County Governmental are the constitutional actors. However, there are policies, strategies/plans and legislations related to the sound management of solid waste at both levels of Governments. While Counties have legislated on Solid Waste Management Acts besides other plans, National Government has a number of policies as well as legislations governing sound management of

solid waste. The key ones include the Constitution of Kenya, 2010, Vision 2030, Sessional Paper Number 10 on the National Environment Policy. Others are; Environmental Management and Coordination Act, (EMCA) 1999, Public Health Act 2012 and the County Government Act, 2012. There are also several regulations relevant to sound management of waste which have been promulgated under EMCA. Such include Environmental Management and Coordination Act (Waste Management) Regulations, 2006, The Environmental Management and Coordination Act (Environmental Impact Assessment and Audit) Regulations, 2003 and Environmental Management and Coordination Act (Air Quality) Regulations, 2014 with other related drafts still in the pipeline.

Despite this legislative development, many of them if not all, have not been aligned to the requirements of the Stockholm Convention on open burning of waste. The National Environment Management Authority Waste Management Regulations are still very much focusing on operational compliance requirement that only ensures no pollution of the environment while transporting waste. The Air Quality Waste Regulations provides levels of emissions of related chemicals some of which listed in Annex C of the Stockholm Convention but the connection of such with municipal waste operations have not been brought to the attention of County Governments who are the principal actors in solid waste management.

Concerning solid waste management (SWM) operations at the counties, all have created departments of environment to steer them. However, none of the counties has moved out deliberately to steer clear an integrated solid waste management system that is all inclusive and addresses all elements of management including promotion of waste reduction, waste re-use and recycling/composting viewed under the Stockholm Convention guidelines as the best management approach to stop open burning. Nairobi County has an elaborate SWM plan that prioritizes waste reduction, recovery, re-use and recycling/composting but there has been consistent lack of political good will to implement the plan. The National Government may use its ratification of the Stockholm Convention on stopping of open burning of waste to push for development of Integrated Solid Waste Management (ISWM) systems in counties which do not have it yet and further push for their implementation. This is necessary since all the counties operate open dump sites with waste material recovery activities being conducted by informal actors who have established linkages with private production industries who use such waste materials as raw materials for new products.

County Governments have also enacted SWM Acts which in letter talks of different waste streams and their separation. However, such Acts have not been operationalized by regulations to ensure introduction/support of 3R activities conducted by informal actors even as the County Governments lack adequate capacity to realize over 50% waste collection and disposal within their jurisdictions.

3R promotion and its related activities: the findings of this assessment indicate that the 3R activities that are conducted are by non-state actors mainly as Community Based Organizations (CBOs) or individuals. These actors mainly conduct value addition activities of waste separation into types, bulking and selling to middle men or manufacturers located in the major towns of Kenya including Nairobi, Kisumu, Mombasa, Nakuru, Eldoret and Thika. Plastic waste both hard and soft and paper waste are the major streams that actors dealt in. Organic waste is generally the major stream in municipal waste however composting activities are very few and are conducted at very low levels.

Very limited final product activities are conducted by non-state actors and the artefacts made also take very little quantities of waste. While this may be the case, the actors have developed market networks

including international ones with online marketing strategy to further reach out to more consumers of their products. Products made include necklaces, earrings, marts and handbags. These products mainly take paper and plastic wastes. Final product making was common in Kisumu, Nakuru and Mombasa where groups making such artefacts are mothers and fathers of either physically or mentally challenged children within a community.

While paper and plastic waste remains the dominant streams of waste that actors dealt in, Nairobi actors have developed enormous capacity to handle huge quantities of such waste up to 500 tons at times by an individual actor. Still in Nairobi, sorting of waste streams is extensive to the extent that some actors are separating almost all waste streams and selling except for the diapers which so far they have not gotten a market.

The non-state actors across the four counties alluded to the fact that a market exists for waste materials except that prices of waste materials cannot be pre-determined and keeps on fluctuating. While this is the case, many of the non-state actors have been motivated into waste material recovery activities since such creates employment opportunities especially for the youth. Environmental motivation was also highlighted while many actors also appeared to be aware that burning of waste is detrimental to their health as well as the environment.

While there are actors who have conducted 3R activities in the four counties for over ten (10) with others still emerging as recent as in 2017, a number of challenges still stand on their way to effective contribution towards stopping of open burning of waste. The cost of doing business of value addition is expensive both in terms of ensuring compliance with quality requirements as well as regulatory requirements. Acquisition of regulatory requirements is marred with difficulties and harassment by County officials yet financial resources to enable non-state actors to acquire hi-technology equipment that can improve efficiency and ensure increased capacity is also hard to come by. Responsive policies to support 3R activities also lack in the Counties yet appropriate and adequate working stations/sites have also not been identified by County Government. Actors rented working areas at exorbitant prices while others squatted on areas which did not belong to them. Given the voluminous nature of waste, transport also appeared as a big challenge for effective transfer of waste amongst actors.

This assessment therefore makes two categories of recommendations: those that are general and those that are county specific: -

General recommendations:

1. There is need for review of the specific legislations and regulations to outlaw open burning of waste as currently there are no specific mention on open burning in the waste management, air quality regulations and public health act. Further, the County SWM Acts needs urgent reviews to also be in line with some of the aspirations contained in the County Government Act section 120 that calls for the promotion of economic instruments for waste recycling.
2. There is urgent need for the ministry of environment to and reach out to the County Governments to create awareness and to popularize the requirements of the Stockholm Convention on open burning that happens sporadically mainly at dumpsites and this assessment revealed that there is no existing structure of engagement between the two levels of governments as far as multi-lateral environment agreements are concerned. In this particular case, it is very urgent since County Governments are the

principal actors on solid waste management issues. The Council of Governors forum is a suitable entry point for the creation of awareness amongst County Governments in respect to the requirement on open burning of waste.

3. County Governments are hardly doing enough for solid waste management in general and promotion of 3R in particular. The first step towards stopping of open burning is for the County Governments to develop and finance waste management strategies that prioritizes promotion of 3R. Such strategies would compel County Governments to map and organize the waste pickers at their designated dumpsites. This would enable monitoring of what they are doing as they conduct their material recovery. Material recovery at the dumpsites is rampant thus the justification as an entry point. This should then be followed with awareness creation on the implications of open burning of waste to the health of informal actors recovering wastes at the dump sites. Alongside this, there is need to secure the dump sites with a fence and start to monitor both emissions and leachates arising as these are crucial indicators to monitor health and environmental pollution exposures respectively.

4. There is need for urgent collaboration between research institutions including Kenya Medical Research Institute, Kenya Industrial Research and Development, the Universities and non-state actors especially the informal ones to bridge the gap between their innovations and technology. None of the actors in whichever County they operated had any collaboration with either the university or any other research institutions yet they are key in incubation of any of the products being made out of waste materials and even bringing to the fore some of the health implications of open burning in particular and handling of waste in general.

5. It is imperative that if open burning is to stop then the County Governments must urgently prioritize space allocation and working stations for non-state actors even if they are to start with a few of them in every County. This way, the counties would then compel the 3R promoters to be documenting waste streams dealt in and their quantities. As of now, there is no systematic data collection by non-state actors a situation that denies any waste management system to ascertain the exact amount of waste recovered leading to stoppage of open burning. In tandem with this, the Ministry of Environment and Natural Resources should sieve out best available technologies and environmental practices in promotion of 3R and its related activities and implement a program that would expose this group of non-state actors on a periodic basis to such.

6. At the moment, very few non-state actors are keeping any useful data in regard to how much waste and streams they handle. This situation applies also to the incomes that accrue from 3R promotion activities. It is therefore urgent that a template for self-monitoring and assessment is developed as a starting point that can standardize information arising from these actors. Such information is key to reporting the progress of open burning of waste in Kenya and would be useful to assist County Government in future planning of solid waste management infrastructure to be developed.

County specific recommendations:

Nakuru County: NASWAMA may be the entry point for promotion of 3R activities in Nakuru since it brings together all the CBOs who are licensed to collect, transport and dispose of waste in Nakuru County. However, there will be need to re-orient the activities of NASWAMA towards 3R promotion and further train the actors since at the moment, the members are only involved in waste collection and disposal. In addition, the County Government will have to formalize NASWAMA activities and view

the SACCO as the voice through which the numerous CBOs channel their concerns to the County. Furthermore, the SACCO can then be the link between the actors promoting 3R activities and the recycling industries like the Nakuru Plastics. Also, the Nakuru Go Green which is a Self-Help Group of 29 people and is producing compost out of barley husks, maize residues and other organic waste can be the entry point for any 3R related activities promotion in respect of organic waste. Nakuru County is the Country's bread basket and agricultural waste in the form of organics must be well managed.

Kisumu County: Bamato Environment and Sanitation Initiative is a well-established CBO SACCO with massive technological capacity for promotion of 3R. However, the SACCO appeared to be embroiled in competition with recycling industries. This tug of war can only be resolved by the County Government by limiting the operating licenses of the SACCO to semi processing of waste materials as opposed to final products making. It was also reiterated by the County NEMA Director that the SACCO has been supported for a long time by different organizations yet they seem not to be on any development path. It would therefore be necessary to train the SACCO members on entrepreneurial skills and also unlock the bottleneck around power supply to the SACCO facility. This is supported by the fact that the area where the SACCO is located is not an industrial area, small and is only rented.

Also, there is the Kisumu Solid Waste Management Plan that is being spearheaded by the French Government. It would be useful to explore possibilities of creating an urban nexus by anchoring the agenda for stoppage of open burning of waste and diffusion of best environmental practices through such programmes.

Nairobi County: non-state actors involved in 3R and its related activities in Nairobi appear to have invested a lot of financial resources in their activities and handle/divert huge amounts of waste from open burning. They have also developed a good rapport with County Government Department of Environment. Such relationship would go a long way in ensuring that much waste is diverted from open burning if the County Government can fast-track site allocation for them even if every sub-county could have one site to assemble all 3R promotion and its related activities actors. This would also serve as a step towards the realization of the key milestones contained in the County's Integrated Solid Waste Management Plan. Taka Taka Solution, WEEE Centre, December Waste Paper and Kleanbira Youth Group are some of the non-state actors whom this project could start with for the next phase of capacity building so that they can serve as trainers of trainers for actors within Nairobi and in other counties. These groups are located in different sub-counties which bring in diversity of experiences from different local contexts.

Nairobi also has a number of initiatives with other bilateral partners through which an urban nexus could be created to infuse the agenda for stoppage of open burning of waste. It would be a step in the right direction to explore such possibilities in the next stage of this project.

Mombasa County: There is need for very targeted training and capacity building for non-state actors involved in 3R and its related activities as their engagement in these activities are still very low: they handle very limited quantities of waste and those who do, only do it as a secondary undertaking not a primary concern. The same training should also be conducted for the County officials who apparently do not even know the operation locations of the non-state actors on 3R promotion and its related activities, yet these actors when well equipped with knowledge stand to divert huge quantities of waste from open burning. The level of open burning at collection centres in Mombasa County needs to be

addressed urgently and specifically awareness creation on the implications of open burning and the possible penalties to be levelled against those who conduct such activities.

In conclusion, it is noted that Green Belt Movement and Kenya Disaster Concern would be the key organizations in rolling out awareness programme on 3R and its related activities for this project. The medium of such awareness programme can take any form as the strategy would be dependent on the resources are available. Nonetheless in a County like Mombasa where awareness on promotion of 3R and its related activities is very low, there would be need for combined print and electronic mediums of awareness creation with probably more on electronic media. Further, **Annex 6.1** has isolated some follow up activities that the project can still fast-track and make the cornerstones to building capacity and awareness creation for better reporting of 3R activities for the country towards conformity to the Stockholm Convention guidelines.

CHAPTER ONE: PROJECT BACKGROUND AND INTRODUCTION

1.1. Project Background

The Kenya Government through the Ministry of Environment and Natural Resources (MENR) is implementing a project “Sound Chemicals Management Mainstreaming and UPOPs reduction in Kenya” in the counties of Kisumu, Mombasa, Nairobi and Nakuru. The project is funded by the Global Environment Facility (GEF) and is implemented by United Nations Development Programme (UNDP) together with MENR. However, implementation of the project is carried out through collaboration with other government agencies, civil society organizations and private sector. They include Ministry of Health, National Environment Management Authority (NEMA), Kenya Association of Manufacturers (KAM), Greenbelt Movement and Kenya Disaster Concern.

The project aims to mainstream sound chemicals management and reduction of unintentionally produced persistent organic pollutants (U-POPs) from open burning of waste and thermal disposal of health care waste. Further, the project targets to reduce release of U-POPs and other substances of concern and the related health risks, through the implementation of environmentally sound management of municipal and healthcare wastes, awareness on POPs, improving the regulatory system and implementation of an integrated institutional and regulatory framework covering management of and reporting on POPs as well as establishing the capacity for safe handling, transportation and improved disposal of POPs-containing or POPs-generating waste. The goal of the project is to protect human health and the environment by avoiding the release of POPs to the environment and preventing people’s exposure to POPs.

This is in accordance with the Stockholm Convention on Persistent Organic Pollutants (POPs), a global treaty to protect human health and the environment from POPs. Article 5 of the Convention outlines measures to reduce the total releases of POPs derived from the anthropogenic sources, as listed in annex C¹ with the goal of their continuing minimization and where feasible, ultimate elimination to protect human health and the environment. Annex C part III stipulates open burning of waste which includes burning at landfill sites and backyard burning as a significant source of unintentionally produced POPs (UPOPs). Kenya is a party to the Stockholm Convention and to a number of other agreements and instruments that also address different aspects of a range of risks caused by hazardous chemicals over their life cycle related to POPs. Some of those agreements include the Basel Convention on the Control of Trans Boundary Movements of Hazardous Wastes and their Disposal and the Minamata Convention on Mercury.

Parties to the Stockholm Convention are required to adopt and implement measures among others; develop an action plan that characterize and address unintentionally produced chemicals (UPOPs), listed in annex C; promote the application of available, feasible and practical measures that can expeditiously achieve realistic and meaningful level of release reduction or source elimination of the chemicals; promote the development and use of modified materials, products and processes to prevent the formation and releases of UPOPs, taking into consideration the general guidance and guidelines on prevention and release reduction measures in Annex C as well as promote the use of best available techniques and best

¹ <http://chm.pops.int/>

environmental practices, for source categories listed in Part I and II of Annex C. The Conference of the Parties to the Stockholm Convention adopted general guidelines on best available techniques (BATs) and best environmental practices (BEPs)² in which Parties are encouraged to give priority to the consideration of approaches that prevent the formation and release of the chemicals listed in Part I of Annex C. The source categories of the chemicals are listed in Part II and III of the Annex C. Part II source categories include; waste incinerators among others; Open burning of waste, including burning of landfill sites among other sources are listed in part III of Annex C.

The guidance/guidelines document on part III source categories (a) on open burning; including burning of landfill sites states that open burning is an environmentally unacceptable process that generates chemicals listed in Annex C of the Stockholm Convention and numerous other pollutant products of incomplete combustion. It states that “although the Stockholm Convention is concerned with persistent organic pollutants such as polychlorinated dibenzo-p-dioxins (PCDD), polychlorinated dibenzofurans (PCDF), polychlorinated biphenyls (PCB) and hexachlorobenzene (HCB) as products of incomplete combustion, open burning is responsible for generation of toxic by-products of combustion well beyond the named chemicals. Other by-products include polycyclic aromatic hydrocarbons, particulate matter, benzene and carbon monoxide. Regardless of specific chemistry, smoke and unpleasant odours always accompany open burning, and are at best a nuisance and at worst a health hazard. Elimination of the persistent organic pollutants listed in the Stockholm Convention would not sufficiently improve the emissions from open burning to make it an environmentally preferred means of waste disposal. It is imperative that the focus of implementation of the Stockholm Convention be on establishing alternatives to open burning rather than simply trying to improve a bad practice.” The draft guidance to assist parties in developing efficient strategies for achieving the prevention and minimization of the generation of hazardous and other wastes and their disposal³ further affirms this trajectory.

In 2015, Kenya reviewed and updated its National Implementation Plan (NIP) of the Stockholm Convention, developed in 2007 after it ratified the Convention. Kenya’s NIP prioritized the practice of open burning of municipal waste and thermal disposal of health care waste as an issue requiring urgent attention. For instance, in 2012 open burning of waste and landfills generated 241.1 g TEQ/year, i.e. about 7% of the national releases.

The project has five main components as follows:

Component 1: Streamlining sound management of chemicals and waste into national and county development activities through capacity building of Ministry of Environment and Natural Resources (MENR), Ministry of Health (MOH), County Governments of Kisumu, Mombasa, Nairobi and Nakuru and the NGOs.

Component 2: Introducing environmentally sound management of health care waste in selected healthcare facilities; policy and strategic plans to prepare them to adopt BAT and BEP disposal.

² <http://chm.pops.int/Implementation/BATandBEP/BATBEPGuidelinesArticle5/tabid/187/Default.aspx>

³ UNEP/CHW.13/INF/11

Component 3: Demonstration of sound healthcare waste disposal technologies in a selected number of healthcare facilities in each county.

Component 4: Minimizing releases of unintentionally produced POPs from open burning of waste.

Component 5: Monitoring, learning, adaptive feedback, outreach and evaluation.

1.2. About the Study

In July 2017, United Nations Development Programme (UNDP) commissioned a consultancy for a study on Awareness of Environmentally Sound Solid Waste Management by communities and municipalities in the counties of Kisumu, Mombasa, Nairobi and Nakuru.

The study relates to component 4 of the project mentioned above “Minimizing releases of unintentionally produced POPs from open burning of wastes” from Health Care Waste and Municipal sectors. However, the study specifically focused on the municipal waste sector, whereby the intention is to reinforce 3Rs (Reduce, Reuse, Recycle) economy on the municipal waste streams by enhancing their upstream collection, ensuring the quality of recovered waste material and securing access to national market by promoting cooperation with domestic industries with a view to provide a valid alternative to the dumpsite economy. This will ultimately result in preventing the release of U-POPs and toxic substance in the environment by open burning of the waste streams.

The objective of the study therefore, was to assess the awareness on environmentally sound solid waste management by communities and municipalities in the four counties and to identify current issues in reduction, re-use and recycling (3Rs) value chain and potential economic provisions for communities’ incentives to perform upstream waste management in order to avoid environmental pollution.

The findings of this study will inform the project strategy on enhancing awareness on the management of municipal waste, for the general population, the communities operating on waste recycling, and the local environmental authorities focusing on the environmental, social and economic benefits of better management of municipal waste, based on the 3Rs.

Further, the study will contribute to the achievement of the envisaged project outcome of ensuring awareness raising and capacity strengthening on Environmentally Sound Management (ESM) of solid waste in Kenya through integration of the Stockholm Convention requirements to minimize releases of unintentionally produced POPs from open burning of waste in Kenya. The four counties of Kisumu, Mombasa, Nairobi and Nakuru have been chosen as good representation of the country given their socio-economic dynamics, municipal waste generation trends and dynamics and the emergence of innovations in the promotion of 3Rs activities by both the private and civil society actors.

This report therefore details findings of the study on awareness of Environmentally Sound Solid Waste Management by communities and municipalities of the representative counties.

1.3. Objectives of the Study

The specific objectives of the consultancy were to:

1. Document key actors/players (public and private) in waste management in Kisumu, Mombasa, Nairobi and Nakuru counties and their awareness and use levels of the 3Rs (Reduce, Reuse, Recycle).
2. Document the products of community waste recycling groups/operations and their possible use as raw materials in the industry/manufacturing value chains, and
3. Make recommendations on regulations and public education requirements for the adoption of 3Rs.

1.4. Study Scope

The scope of the assignment was to:

1. Document the stakeholders, both public and private authorities, active in solid waste issues including those carrying out specific mandates, mobilization of resources, defining institutional needs and responsibilities.
2. Document the waste management methods in practice/use and the awareness on and attempted use of 3Rs among the stakeholders, including gaps, challenges and opportunities for its adoption from their perspective.
3. Compile an inventory of products from group/community operatives and their potential re-use in industry/manufacturing value chains.
4. Assess initiatives that can promote partnership between informal sector/communities and private sector in the waste life cycle and re-use as raw material in industry/manufacturing.
5. Identify possible private sectors that the project can engage with recommendations on strategies to adopt for the follow-up.
6. Recommend strategies and awareness materials to be developed, both audio and video, for broadcasted), on 3Rs stressing the Stockholm convention objective that materials burnt in the open, can generate U-POPs and toxic substances.
7. Draft policy framework recommendations for the effective involvement of CBOs and informal groups to participation in the recycling and reuse of waste.
8. Draft special legal and economical provisions facilitating communities to perform upstream collection of recyclable waste and prevent unsafe dumping which will be endorsed at the proper level.
9. Provide advice and quality control for the design and implementation of an appropriate institutional involvement waste management that addresses project objectives.

CHAPTER TWO: STUDY APPROACH AND METHODOLOGY

2.1. Study Approach

The study began with inception and introductory meetings involving the consultant, UNDP officials and the project coordinator at the Ministry of Environment and Natural Resources. The meetings were to help clarify issues on the ToRs of the project and seek concurrence between the consultant and the project officials on the study approach and methodology. The meetings also provided the consultant with the client's expectations on the assignment.

2.2. Methodology

The study used a holistic methodology combining both quantitative and qualitative approaches drawing from primary and secondary sources of data. The study employed a participatory assessment including focus group discussions involving methodological triangulation of qualitative and quantitative approaches with follow ups. The study team included the consultant working jointly with the project team from the UNDP, Ministry of Environment and its partners (Green Belt Movement), County Governments of Kisumu, Nairobi, Mombasa and Nakuru and other stakeholders.

2.3. Data Collection

Three key approaches of data collection were used in the study as follows;

Literature and desk reviews: A wide variety of documents on the project and Stockholm Convention were reviewed and synthesized to generate data and information relevant to the assignment. Among the documents reviewed included the project document (Prodoc), National Implementation Plan of the Stockholm Convention for Kenya, Legal and Regulatory frameworks in Kenya related to Waste management such as the Waste management regulations of Kenya, waste management strategy and County Waste Management Laws, as well as Stockholm and Basel Convention technical guidelines among other relevant documents.

Key informant Interviews (KIIs): were held with a wide range of key project team (KAM and Greenbelt), stakeholders in solid waste management value chain among them County Government officials in the project target Counties, Departments of Environment and other government agencies in solid waste management, namely National Environment Management Authority.

Questionnaire administration: face to face questionnaire capturing various aspects of the study in line with the ToR was administered to non-state actors on solid waste management mainly those involved in promotion of 3R and its related activities in the targeted counties. The respondents to the questionnaire were identified through different methods based on local context. For example, in Nairobi where County Government has developed elaborate collaboration with the non-state actors especially CBOs, youth groups and some companies, County Environment Officers in different sub-counties purposively identified those actors with long standing history on 3R and its related activities as respondents. Based on analysis of the responses, a further follow up was made to actors dealing in different waste streams but with large quantities. For Nakuru, the workshop organized by Greenbelt Movement on awareness creation on 3R promotion provided a platform for engagement with solid waste management actors and

further administration of the questionnaire. Based on a quick analysis of the responses and further queries to the individuals during the workshop, a further follow up was also made on actors dealing in different waste streams. For Kisumu, identification of respondents was carried out through an inventory of non-state actors provided by Bamato Environment and Sanitation Initiative, a conglomeration of community based organizations in Kisumu. In Mombasa, identification of respondents was through World Vision, an international NGO which has a database of solid waste management actors in the County.

Field Observations: direct observations on SWM and 3R promotion activities were carried out in the four counties.

The above methodology enabled the consultant to collect and synthesize information on waste management and handling that informed the recommendations provided in this report which the project can leverage on to achieve the expected outcomes.

2.4. Sampling

Given that many County Governments have not developed any register or inventory on non-state actors in solid waste management except for those who are collecting, transporting and disposing without any value addition, it was imperative that the consultant maximized on the references that were provided in every County in order to reach out to many diverse actors as possible. In this respect, efforts were made to ensure that all who were provided with the questionnaire returned especially during the focus group meetings.

2.5. Data analysis

Quantitative data was entered into a database using access based data template. Thereafter, the data was analysed at the county levels using the Statistical Package for the Social Science (SPSS) software. The results are presented in the form of frequencies and percentages.

Qualitative data (KIIs) were triangulated and analysed based on code book developed from the interviewee responses and are the basis for the detailed explanation of the quantitative aspects of results in this report. The information includes the amount of waste dealt in per source, types of waste handled by actor category, frequency of waste type delivery, how much is charged per different waste type and how much is sold by different waste stream. Results were summarized according to the structure and flow of the study terms of reference and objectives.

CHAPTER THREE: POLICIES AND LEGISLATIVE FRAMEWORKS GOVERNING SOUND MANAGEMENT OF SOLID WASTE IN KENYA

Following the Rio Earth Summit of 1992 which contribute to raised understanding of the link between environment and development, Kenya initiated the development of a National Environment Action Plan which was completed in 1994. The plan recommended the need for a national policy and law on the environment. This policy process culminated in the sessional paper no. 6 on environment and development. This culminated in the formulation and enactment of the Environmental Management and Coordination Act (EMCA) of 1999, Kenya's first framework environmental law that was amended in 2015.

The Sessional Paper no. 6 and EMCA added to a number of other sectoral statutes on various facets of the environment. This conflicted and created overlaps in the environmental policies and laws thus hindering achievement of sustainable development objectives and the country's vision 2030. The promulgation of the Constitution of Kenya in 2010 and other new developments like climate change were important in further shaping Kenya's environmental policy and legislative development. In 2014, Kenya developed a new national policy on environment, Sessional Paper no. 10.

This chapter describes the national policies and legislations for the management of chemicals and waste in Kenya. The following are key policies and legislations relevant to the management of chemicals and waste

3.1 Constitution of Kenya (2010)

The constitution of Kenya, 2010 has profound implications for the management of environment including chemicals and solid waste at the national, regional and county levels. It shapes the laws, policies, institutions and processes by which environment governance including waste is managed in practice.

The preamble of constitution recognises the environment, as our heritage and calls for its sustenance for the benefit of future generations. Sustainable development is listed as one of the national values and principles of governance (Chapter 2 Part 10 (1)).

Article 42 on environment guarantees the right to a clean and healthy environment for all under the bill of rights which includes the rights to:

- I. To have environment protected for the benefit of present and future generations through legislative and other measures, particularly those contemplated in Article 69 and
- II. To have obligations relating to the environment fulfilled under Article 70

Article 69 (1) on obligations in respect of the environment bestows upon the state, the responsibility to:

- I. Ensure sustainable exploitation, utilization, management and conservation of natural resources and to ensure the equitable sharing of accruing benefits
- II. Encourage public participation in the management, protection and conservation of the environment

- III. Establish systems of environmental impact assessment, environmental audit and monitoring of the environment
- IV. Eliminate processes and activities that are likely to endanger the environment
- V. Utilise the environment and natural resources for the benefit of the people of Kenya

Article 69 (2) obligates the citizens to cooperate with the state organs and other persons to protect and conserve the environment and ensure ecologically sustainable development and use of natural resources.

Part 2 of the Fourth Schedule in the Constitution of Kenya explicitly provides that the County Governments shall be responsible for; refuse removal, refuse dumps and solid waste disposal. This therefore calls for the county governments to establish legal and institutional arrangements for sound management of solid waste. Under the County Government Act, 2012 public participation is encouraged as one of the principles of efficient and inclusive service delivery. This also gives room for empowerment of grassroots institutions for example community based organizations to take greater responsibility for governance in service delivery as opposed to the former constitutional arrangement where the central government played key role in delivery of services.

3.2 Vision 2030

Vision 2030 is the overall development blueprint for Kenya to achieve middle income economy by 2030. The social pillar aims at ensuring development in a clean and healthy environment. The second medium term plan, 2013-2017, targeted programmes and projects touching on waste management and pollution control such as research, legislation and viable technologies and enforcement of statutory mechanisms for the disposal of human and industrial waste as well as elimination of harmful emissions including those from factories.

Other issues targeted included finalisation of National Environment Policy, National Chemicals Management Policy, finalisation of National Urban Development Policy and Development of a framework to guide solid waste management in urban areas.

3.3 Sessional Paper No. 10 on the National Environment Policy, 2014

The national environment policy, 2014 give a framework to guide Kenya's efforts in addressing the growing environmental issues and challenges including urbanization, waste management, pollution, chemicals management amongst others.

To address the waste management challenges, the national government developed a waste management strategy in 2015 to guide sustainable solid waste management in Kenya and ensure a healthy, safe and secure environment for all. Key in the strategy is to ensure that waste management is addressed from the life cycle approach, which includes waste generation, collection, transportation, treatment and disposal. It designates various roles for the stakeholders in the implementation of the strategy. It also calls for the adoption of solid waste management hierarchy that prioritizes prevention, minimization, reuse, recycling, energy recovery and finally safe disposal.

In line with the solid waste management strategy and minimization of chemicals releases from waste to the environment, the national government has taken initiatives to implement the Strategic Approach to International Chemicals Management (SAICM). This includes development of chemicals profile, draft chemicals management policy and an inter-ministerial coordinating mechanism for implementation of SAICM towards sound management of chemicals and waste.

3.4 The Environmental Management and Coordination Act, 1999 (amended), 2015

The Act known as EMCA is the primary statute and framework law in Kenya on matters touching on the environment. The Act provides for the establishment of appropriate legal and institutional framework for management of environment and for matters connected therewith and incidental thereto. It establishes the National Environment Management Authority (NEMA) to provide overall supervision and coordination of matters touching on environment, in liaison with other lead agencies.

Section 3 of EMCA stipulates that every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment. EMCA, in its 13 interrelated parts, provide regulatory provisions at all levels of environmental management. The first four parts provide legislative guidelines on administrative and planning components of environmental management. They include; (II) General principles; (III) Administration; (IV) Environmental planning.

Parts five to eight focuses on on-field management of the environment, (V); Protection and conservation of the Environment; (VI) Environmental impact assessments (EIA); (VII) Environmental audit and monitoring and (VII) Environmental quality standards.

The last five parts of the Act regulate on enforcement of provisions outlined in the Act and recognition of international agreements along which the EMCA has been established. They are; (IX) Environmental Restoration orders, Environmental Easements; (X) Inspection, analysis and records; (XI) International Treaties, Conventions and Agreements; (XII) National Environment Tribunal and (XIII) Environmental Offences.

Part IV, on environmental standards covers management of waste and chemicals including industrial chemicals; hazardous wastes amongst others. It establishes a standards review and enforcement committee in Section 70 to among others, in consultation with the relevant lead agencies recommend to NEMA measures necessary to:

- I. Identify materials and processes that are dangerous to human health and the environment
 - i. Issue guidelines and prescribe measures for the management of the materials and processes identified under subsection (1)
 - ii. Prescribe standards for waste, their classification and analysis, and formulate and advise on standards of disposal methods and means for such which does not include open burning of wastes
or
 - iii. Issue regulations for the handling, storage, transportation, segregation and destruction of any waste

Section 87 (1) prohibits against dangerous handling and disposal of wastes. It states that no person shall discharge or dispose of any wastes, whether generated within or outside Kenya, in such manner as to cause pollution to the environment or ill health to any person.

EMCA establishes a legal framework for inter alia, the management of hazardous chemicals and waste by its very provisions or through the promulgation of subsidiary legislations such as:

- Environmental Management and Coordination Act (Waste Management) Regulations, 2006
- The Environmental Management and Coordination Act (Environmental Impact Assessment and Audit) Regulations, 2003
- Environmental Management and Coordination Act (Air Quality) Regulations, 2014

a) Environmental Management and Coordination (Waste Management) Regulations, 2006

Regulations guiding waste management are described in Legal Notice No. 121 of the Kenya Gazette Supplement No. 69 of September 2006. They offer legal provisions to streamline handling, transportation and disposal of a variety of wastes. The waste categories covered by the regulations are; Industrial wastes; Hazardous and toxic wastes; pesticides and toxic substances; biomedical wastes and radio-active substances.

These regulations outline requirements for handling, storing, transporting, and treatment/disposal of all waste categories as provided therein. It places emphasis on waste minimization, cleaner production and segregation of waste at source. Part II Section 5 of the act stipulates that “Any person whose activities generate waste, shall segregate such waste by separating hazardous waste from non-hazardous waste and shall dispose of such wastes in such facility as is provided for by the county governments”. Under the regulations, NEMA licenses transporters, incineration facilities, composers, recyclers and waste transfer stations.

b) The Environmental (Impact Assessment and Audit) Regulations, 2003 and amendment (2015)

The EIA regulations, 2003 gazetted under legal Notice number 101 offer legal guidance in conducting environmental impact assessment and audits. The purpose of the EIA is to ensure that decisions on proposed projects and activities are environmentally sustainable. It also guides policy makers, planners, stakeholders and government agencies to make environmentally and economically sustainable decisions.

Projects and activities to undergo EIA are listed in the second schedule of the regulations and are categorized into low, medium and high risks projects, as per the amendment of the regulations, gazetted in 2015. Waste disposal including (a) sewerage works and waste water treatment plants; (b) installation for disposal of industrial wastes; (c) installation of incinerators; (d) sanitary landfill sites; (e) hazardous wastes treatments or disposal facilities; (f) facilities involved in solid or liquid hazardous waste; (g) sludge treatment facility; (h) recycling of e -waste; (i) waste oil recycling facilities; (j) waste tyre processing and recycling facilities; and (k) commercial asbestos disposal site are categorized as high risks and require submission of environmental impact assessment study report (produced at the end of the environmental impact assessment study process).

Part II (7) states that a proponent shall prepare a project report stating the materials to be used, products and by-products, including waste to be generated by the project and the methods of their disposal. Part IV further states a proponent shall submit to the Authority, an environmental content of impact assessment study report incorporating but not limited to the following; environmental information on the products, by-products and waste generated by the project.

Part V provides for environmental audit and monitoring, an environmental audit report compiled under these Regulations shall contain an indication of the various materials, including non-manufactured materials, the final products, by-products and waste generated.

c) Environmental Management and Coordination Act (Air Quality) Regulations, 2014

The objective of these Regulations is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. It provides for the establishment of emission standards for various sources such as mobile sources as motor vehicles and stationary sources (e.g. generators) as outlined in the Environmental Management and Coordination Act, 1999.

Emission limits for various areas and facilities have been set. The regulation provides procedure for designating controlled areas, and the objectives of air quality management plans for such areas.

First schedule of the act lists ambient air quality tolerance limits. Part I of the second schedule stipulates priority air pollutants including dioxins and furans (PCDD and PCDF) among others. The third schedule sets emission limits for controlled and non-controlled facilities such as incinerators. Further, the regulation provides guidelines on air pollution monitoring parameters from stationery sources which include municipal and industrial incinerators.

The second schedule relates to priority air pollutants from mobile sources, greenhouse gases and general source pollutants which include dioxins and furans (PCDD and PCDF), mercury vapour, Lead and its compounds among others.

Part VIII section 38 of the regulations prohibits open burning of waste. It states that “No person shall cause or allow emissions of priority air pollutants set out under the Second Schedule from disposal of medical waste, domestic waste, plastics, tyres, industrial waste or other waste by open burning.”

3.5 Public Health Act, Revised Edition 2012 [1986]

The public health act provisions for securing and maintaining health in Kenya. Part IX regulates on sanitation and housing, granting health authorities powers to prevent or remedy any dangers to health arising from poor handling of sanitation issues as well as improper housing and nuisances arising there from.

Part IX, Section 115, of the Act states that no person/institution shall cause nuisance or condition liable to be injurious or dangerous to human health. Section 116 requires Local Authorities to take all lawful, necessary and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable to be injurious or dangerous to human health.

Such nuisance or condition are defined under section 118 as waste pipes, sewers, drains or refuse pits in such a state, situated or constructed as in the opinion of the medical officer of health to be offensive

or injurious to health. Any noxious matter or waste water flowing or discharged from any premises into a public street or into the gutter or side channel or watercourse, irrigation channel or bed not approved for discharge is also deemed as a nuisance. Other nuisances are accumulation of materials or refuse which in the opinion of the medical officer of health is likely to harbour rats or other vermin.

On the responsibility of local authorities (currently county governments), Part XI, Section 129, of the Act states in part “It shall be the duty of every local authority to take all lawful, necessary and reasonably practicable measures for preventing any pollution dangerous to health of any supply of water which the public within its district has a right to use and does use for drinking or domestic purposes....”

Part XII, Section 136, states that all collections of water, sewage, rubbish, refuse and other fluids which permits or facilitates the breeding or multiplication of pests shall be deemed nuisances and are liable to be dealt with in a manner provided by the Act.

3.6 The County Governments Act, 2012

This is an act of parliament which gives effect to chapter eleven of the constitution of Kenya to provide for County Governments ‘powers, functions and responsibilities to deliver services and for connected purposes.

Section 120, tariffs and pricing of public services, states that a tariff policy adopted by the County Governments or any agency delivering services in the County shall provide guidelines that include promotion of the economic, efficient, effective and sustainable use of resources, the recycling of waste, and other appropriate environmental objectives.

FINDINGS ON COUNTY SOLID WASTE MANAGEMENT SYSTEMS, 3R PROMOTION AND ITS RELATED ACTIVITIES

General Overview

The current population of Kenya is estimated at 48, 606,139 as at the year 2017, based on the latest United Nations estimates. It is estimated that 34.8% (i.e. 10 million) of the total population of Kenya reside in the urban centres with the largest five cities (Nairobi, Mombasa, Kisumu, Nakuru and Eldoret) accounting for a third of the urban population. The most recent UN estimates indicate that Kenya's urban population will expand to 38 million by the year 2030, accounting for 62.7 per cent of the national population.

This rapid urbanization is fuelled by factors such as rural-urban migration amongst others which has continued to strain the capacity of the urban centres' to provide critical services including solid waste to their residents. The scale of future urbanization will pose further socio-economic, environmental and institutional challenges for Kenyan urban areas.

According to the Kenya's vision 2030, alongside income inequality, unemployment and low savings, rapid urbanization is one of the country's four major challenges. Under the social pillar, solid waste management systems have been highlighted as major stumbling blocks to successful economic growth in the five major urban centres of Nairobi, Mombasa, Kisumu, Nakuru and Eldoret.

Initiatives to tighten the regulations to limit production and usage of environmentally-detrimental plastic bags have also been emphasized. Therefore, fast-tracking sustainable solid waste management system including resource recovery and abandoning of open dumpsites and burning of waste would go alongside in ensuring that better services are implemented in this sector. In this regard, Kenya's resolve towards this course is beginning to take shape with the enactment of a ban on plastics bags in the country which is expected to take effect in September 2017. This also includes efforts towards minimizing and eliminating unhealthy and unsustainable practices of waste management such as open burning aimed at reducing negative environmental and health impacts caused by such practices to the country.

The findings of this study are aimed at developing strategies towards effective public awareness and institutional capacity strengthening on environmentally sound solid waste management in four major urban cities of Kisumu, Nakuru, Nairobi, Mombasa and Kenya in general. Each county findings has been given a chapter on its own, covering the legal and regulatory frameworks as well as available institutional frameworks for solid waste management and promotion of 3Rs, other key actors/players such as NGOs, CBOs involved in waste management value chain and their socio demographic characteristics, waste management practices and handling including attempts towards sound management of waste and reduction of open burning and lastly, challenges in waste management and promotion of 3Rs in the four counties.

CHAPTER FIVE: NAKURU COUNTY

Nakuru County is located in the Rift Valley Region of Kenya. It's the fourth most populous county with a population of 2,046,395 people according to the 2009 Census County Population Projections and spans an area of 2,300km². Administratively, the county is divided into eleven (11) sub counties namely, Molo Njoro, Naivasha Gilgil, Kuresoi South, Kuresoi North, Subukia, Rongai, Bahati, Nakuru Town West and Nakuru Town East.

5.1 Institutional and Legal framework for solid waste management

The department of Environment, Natural Resources and Energy (ENRED) of Nakuru County Government has responsibility for waste management that includes collection, transfer and disposal in the county. Some of the activities include policy and strategy development, supervision of waste collection contracts, setting household waste collection charges, permitting waste management activities, commercial waste collection, and public spaces cleaning.

It was learnt from Key Informants during the field visit, that Nakuru County has developed a draft environment and conservation bill to operationalize its responsibility for waste management as contained in schedule four of the Constitution of Kenya, 2010. The draft bill proposes waste separation. Further, the bill allocates waste management responsibilities and powers to the various sub-county units. In the bill, household waste collection is outsourced to private waste collection companies. The bill is still to be debated at the County Assembly however, the NEMA County Director alluded to the fact that the bill was never consultative and therefore the national aspirations in regards to environmental matters including solid waste management may not have been streamlined in order not to create conflict. For example, County Governments are expected to establish environmental committees according to the revised EMCA yet such have not been done. Furthermore, their existence must be in harmony with the standing committees of the County Assemblies.

According to the existing arrangements, every sub county has an environment officer who oversees all waste related activities within the sub counties while reporting to the director of environment. The County currently operates with a lean fleet that only operates within the Central Business District. Such fleet is majorly complemented by contracted Community Based Organization (CBO) groups and have not even been licensed by NEMA according to the general waste management regulation. Within the County, there are a total of 40 number CBOs who have been contracted and appointed in varied proportions to collect, transport and dispose of solid waste. These CBOs have an umbrella body called Nakuru Solid Waste Management (NASWAMA) which champions their interest as well as engages with the County on issues that affect them. Despite this development, there are still individuals who engage in value addition activities on waste. These actors do not directly report to the County Government except that they are licensed by both the County Government and NEMA to conduct their business in waste management.

5.2 Waste Streams and Existing Waste Management Practices in Nakuru County

A feasibility study conducted by the World Bank in 2017⁴ estimates that Nakuru County generates an average of 513 tonnes of waste per day translating into 187,469 tonnes per year. It's estimated that 80% of this waste is biodegradable materials comprising of organic food, paper, cardboard, textiles among others mainly from residential areas. The rest (20%) of the waste is non-biodegradables comprising of plastics, glass, ferrous, non-ferrous, hazardous waste, and miscellaneous combustibles from commercial areas. It was further established that in the residential waste, organic food waste is the main category at 57% of the total waste. The commercial waste also comprises of organic waste predominately fruit and vegetable waste from wholesale markets. The remaining waste is made up of paper, cardboard, textiles and plastics.

The County Director of Environment places waste generation at 600 tonnes per day with a collection efficiency of about 50% and it comprises of both municipal and agricultural.

The capacity to manage waste by the county is still limited. ENRED provides commercial and some household waste collection, street cleaning services, household waste collection contract supervision, and landfill operations, regulation, stakeholder involvement and enforcement operating with two trucks and 140 staff only. According to the Director, ENRED, Nakuru County is divided into 40 units and each being managed by a contracted CBO. Given the fact that before the County Government, there were a number of CBOs involved in waste management, the current arrangement has left many of them out of business with the County. This situation appears to be creating serious conflicts where some CBOs with no formal contract with the County Government are operating illegally and are accused of open burning of waste since they would not dispose the waste at the county designated disposal site. According to the interviews conducted with the contracted CBOs, they are positive about waste separation that would encourage promotion of 3R, but they fail to do this as it would require them to have additional workforce.

The county does not have a proper waste disposal system. The main waste disposal site for the County is Gioto dumpsite which does not have any weighbridge to measure the waste as it gets to the dump site. According to the Director, weighbridge may not be very important since the CBOs get paid directly by the consumers of their services. The County Government estimates that Gioto dumpsite receives approximately 200 tonnes of waste per day with County Government only having three vehicles and some of the contracted CBOs especially those operating next to Gioto using handcarts and donkeys to transport waste. There are other small dumpsites in the sub-counties of Naivasha, Gilgil, Molo, and Mai Mahiu. However, in the 2017/2018 County Annual Development Plan, Nakuru intends to procure land and construct a landfill site. It is therefore expected that such facility would be constructed in such a way to incorporate the resource recovery activities of informal actors.

There are instances where medical wastes have been found dumped at Gioto dump site even though medical institutions are expected to have incineration facilities for disposal of medical waste. Whenever such have happened, follow ups have been made and one case has so far been prosecuted where the

⁴ Nakuru Integrated Solid Waste Management PPP Project: Feasibility Study Report and PPP Implementation Plan

owner of the facility was forced to clear the site of all medical waste, take it to an incineration plant and was still forced to make payment to the county government.

Findings of the feasibility study by the World Bank, 2017 found that Gioto dumpsite has extensive fires throughout the site. This clearly indicates that besides the commonly known sporadic fires of dumpsites, there are instances of open burning. Some of it is in search of copper wires in waste tyres. In all the mentioned disposal sites fires, windblown litter, dust, odour, scavenging animals, and pests are prevalent throughout the year.

However, KIIs interviewed (ENRED Director) said that the County had issued a directive outlawing open burning of waste. The official believes that some CBOs are still burning waste and the level of waste burning is approximated to 20%. The burning takes place at points of collection-transfer stations, at the dump site and at times on road sides.

5.3 3R Promotion and its Related Activities in Nakuru County

Nakuru County does not have any waste processing facility but a lot of waste recovery is done at Gioto dump site which serves Nakuru town and its environs. While the County does not have any official figure of those resourcing and recycling waste, some middle men have stationed waste pickers at the dump site who recover and supply to them wastes such as paper, plastic, bones and even organics. Other upcoming towns like Gilgil also have some open areas where waste is temporarily held before being transported to Gioto. Such areas have also served as grounds where valuable waste materials are recovered by pickers.

Since the current law in the County does not encourage waste separation, County officials interviewed informed that the practice has been that anybody participating in any waste recovery activity gets a license just like any other business within the County. There are a number of non-state actors involved in different value addition activities along the waste management chain in the County. However, this study found many of them being individuals. For example, a number of individuals are involved in waste plastic and paper recovery, bulking and selling to networks outside the County. Others make final products such as beads out of paper waste while others use organic waste for composting.

According to the KIIs interviewed Nakuru County does not have adequate technical capacity and infrastructure to facilitate 3Rs activities within the county. However, the County Government alludes to the fact that a good proposal has been made concerning promotion of 3R in the Feasibility Study Report by the World Bank. The Director of ENRED informed that they would try and establish sheds within the sub-counties to enable informal actors conduct material recovery in a friendly environment. In addition, the National Solid Waste Management Strategy, 2015 has been lauded by the Director, ENRED as a good development towards promotion of 3Rs. However, the County Government still lack technical, infrastructural and financial capacities to realize aspirations of the strategy especially those related to waste recovery.

The NEMA waste management regulations, 2006 have also been very instrumental in facilitating the County Government to bring on board non-state actors in waste collection and transportation. In

addition, the regulations have been useful in enforcement and prosecution of some of the offences related to solid waste management including illegal dumping of medical waste at the dump site.

Nonetheless, such regulations have not been effective in promotion of 3R and its related activities as demonstrated by the meagre number of private actors licensed so far by NEMA to conduct waste recycling even in the whole country.

5.4 Non-State Actors in solid waste management, 3R Promotion and its related activities in Nakuru County

Using a questionnaire, this study sought to ascertain a number of issues on non-state actor’s activities in relation to solid waste management. These included; nature of waste dealt in, sources of the waste, waste handling, supplier networks, quantity of waste handled, challenges faced and governance arrangements for better waste management.

Characteristics of the Study Respondents

This questionnaire was responded to by actors from the following sub-counties: Bahati, Nakuru North, Dundori, Gilgil, Nakuru Town East and Nakuru Town West. Data was collected from sixteen respondents of which ten were male and six female. The oldest organization for these non-state actors was started in 1979 while the youngest being in 2017. Many of the respondents have been involved in waste collection, transportation and disposal activities with a few (3) being involved in waste material recovery, limited value addition, selling and final product making. Besides, there was one actor involved in compost making and use in own farm.

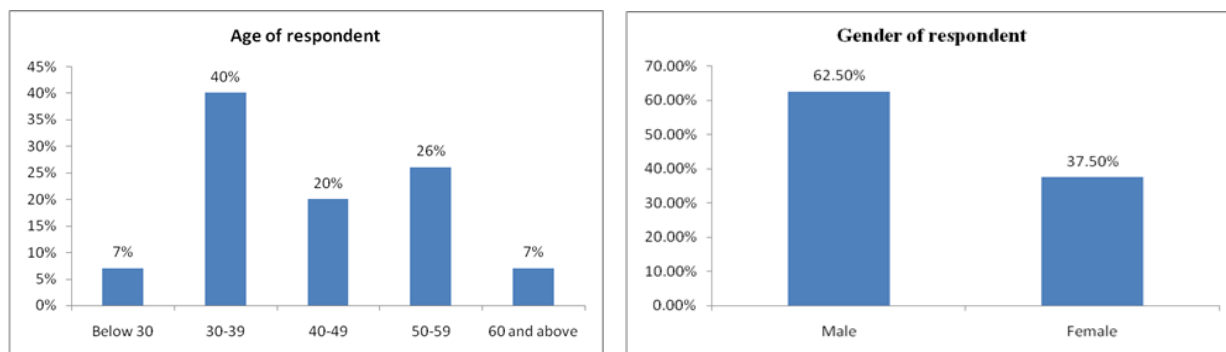


Figure 5.1: Age and Gender of respondents

The age range for the respondents was 26 years (youngest) and 62 years (oldest). The average age was 43 years, while most of the respondents (40%) were between the ages 30 to 39 as illustrated in Figure 5.1. This therefore means that those involved in waste management activities including 3R promotion in Nakuru are not within the youth category. In terms of gender, majority of the respondents were male. This also indicates that waste management activities are still dominated by male actors in the County.

From the respondents who were engaged during this study, 3R activities don’t appear very dominant. However, the few who engaged in such activities sorted and bulked waste for selling, others composted

organic waste and used in their farms while others made products such as beads used in earrings and necklaces like the one in Figure 5.2.



Figure 5.2 *Necklace made of beads*

For those who sorted and bulked, they sold to clients based in Kisumu, Nairobi and Eldoret indicating products being in high demand as: -

- Low Density Polyethylene (LDPE) used in making sheets
- Metals and hard plastic
- Boxes and polythene papers
- Organic waste

Table 5.1: Waste material and unit prices

Material	Buying Price (Kshs/Kg)	Selling Price (Kshs/Kg)
High density polyethylene	10	20
Low density polyethylene	15-18	25-26
Polypropylene	8	15
White paper	8	12
Brown paper	Not provided	50

Source: Constructed with information from the main actor in plastic and paper wastes

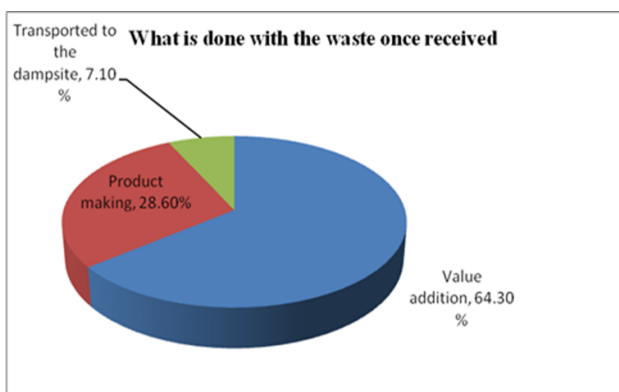


Figure 5.3: Waste handling

Even though these actors were unable to quantify the amount of waste dealt in, Figure 5.3 above, indicates that value addition is the main 3R activity as opposed to final product making.

For products which are made, they are sold both locally and internationally. Local buyers are located in Nakuru and Nairobi while for international, the group that is made of women, have a contract with a firm in the USA who takes the jewellerys 3 times in a year. The women group markets their products online (www.oasisjewelrydesigns.co.ke) as well as taking advantage of the County Agricultural Shows for exhibition. The monthly income for this group ranges between Ksh. 4,000 and 181,000.

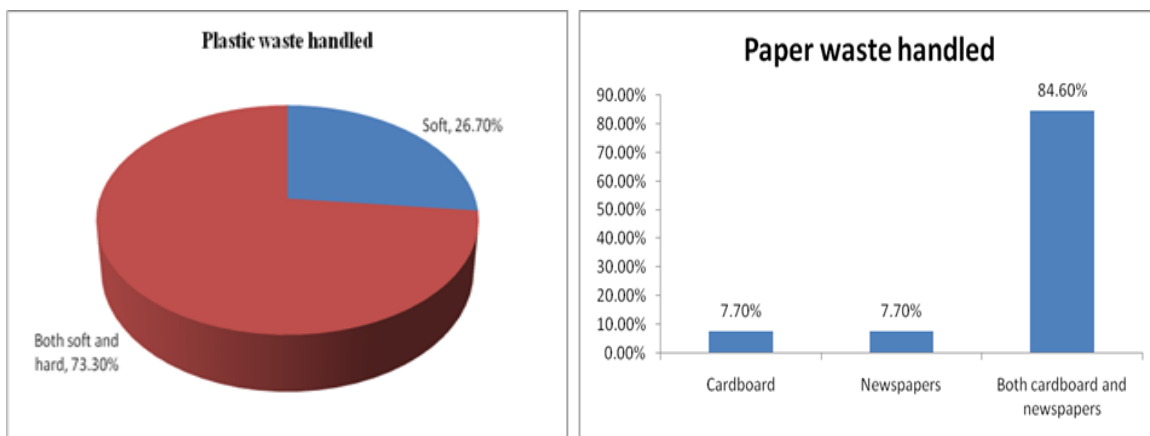


Figure 5.4: Plastic and Paper proportions of waste handled

As has been alluded to above, Nakuru respondents were mainly waste collectors and hardly dealt in 3R promotion. For the few who engaged in 3R activities, as illustrated in Figure 5.4 the dominant streams were plastics and paper with limited involvement organic waste. However, there is a group of 29 individuals calling itself, Nakuru Go Green Self-Help Group who collects barley husks, maize residues and other food waste and converts into compost. The Group could be pursued for further engagement concerning use of organic waste in large compost production.

In the case of plastics, majority handled both soft and hard plastics while the rest only engaged in soft plastics as illustrated in Figure 5.4 above. The selling price varied from Ksh 5-10 per kg. However, the main actor who started an individual business in 2002 handled more than 30 tonnes of plastic waste in a week with the main challenge being operating space since plastic wastes is voluminous and the County Government has not adopted a strategy of waste recovery promotion that would require them to locate working stations for non- state actors involved in 3R promotion. This actor operates just like any other business with all the necessary requirements such as single business permit, NEMA waste transportation license and still had to pay rent of Ksh. 30,000 per month.

For the few actors who handled paper waste, they engaged in both cardboard and newspaper waste as illustrated in Figure 5.4. There was only one actor who dealt in final product for paper which involved making of beads used for earrings and necklaces and mainly sold overseas. For the group who was involved in organic waste composting, they handled one tonne per month of waste.

As illustrated in Figure 5.5 below, many of the businesses operated on rented premises whose rents are said to be exorbitant. A significant number of these actors squated on premises that did not belong to them meaning their activities could be taken to be temporary. This situation may not be conducive for

further investment in their business and even for value addition activities in case some of these actors may be picked to further the agenda for 3R promotion leading to stopping of open burning of waste.

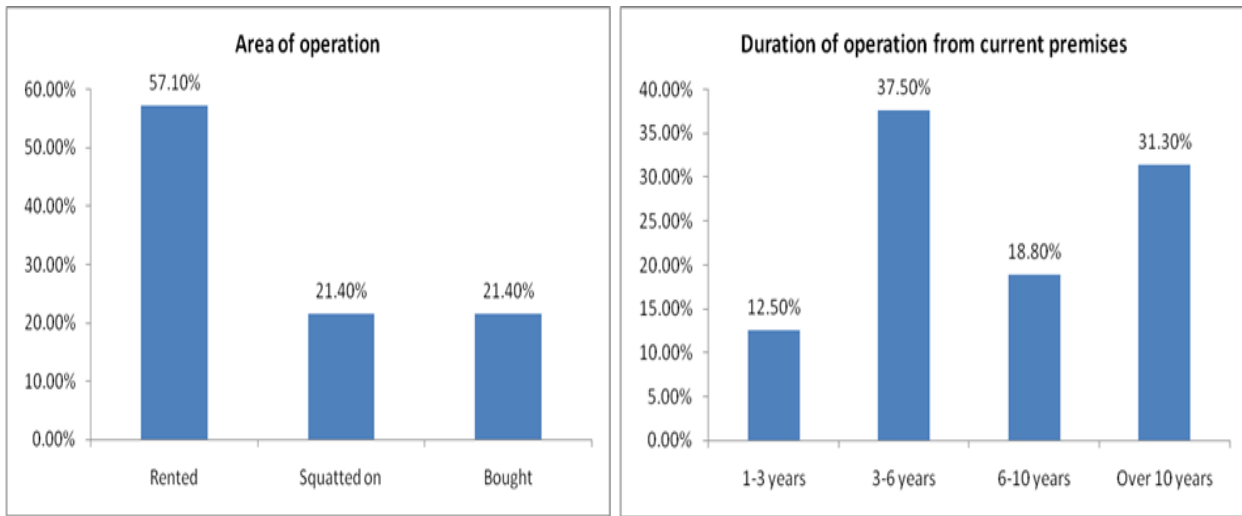


Figure 5.5: Area and Duration of operation

Figure 5.5 above shows that 56.3% of the actors have been in solid waste management business for between 3 to 10 years with a good number having been in business for over 10 years. The study found that the respondents have some operational licenses which includes; CBO certificates issued by Youth and Gender Services Ministry, single business license issued by the County Government and NEMA Waste Transportation License. The respondents each indicated that they handle an average of 78.5 tonnes per month and this is only in respect to waste collection and transportation. However, the waste which is handled is comingled including glass, plastics, paper, organic, metal and others with the main sources of waste being households, commercial places and institutions.

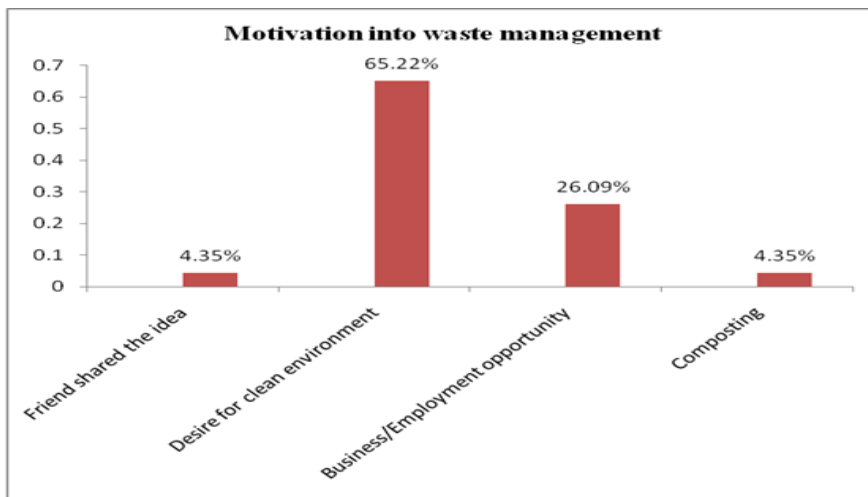


Figure 5.6: Motivation into waste management

Even though figure 5.6 above indicates over 60% of actors motivation to solid waste management is the desire for a clean environment, with only 26% of actors being economically motivated, this may not be true as almost all these actors only collect, transport and dispose at a fee.

Despite this level of waste handling where only limited 3R promotion is conducted, majority (76.6%) of respondents indicated that their employees are trained and possess various skills related to solid waste management. The skills include: bead-making which falls under value addition, composting, customer care, business skills, waste handling and separation. In addition, those employees are provided with protective clothing, an indication that respondents are aware of the health challenges associated with waste handling (See Figure 5.7).

In addition to this, there is one organization called Potential Education Research Network (PERN) based in Gilgil whose main activity is capacity building in environmental conservation, waste management and advocacy. This group would be better placed in future as an entry point to handle issues of environmental awareness creation or even conduct training for the non-state actors on 3R promotion and its related activities in order to advance towards stopping of open burning of waste.

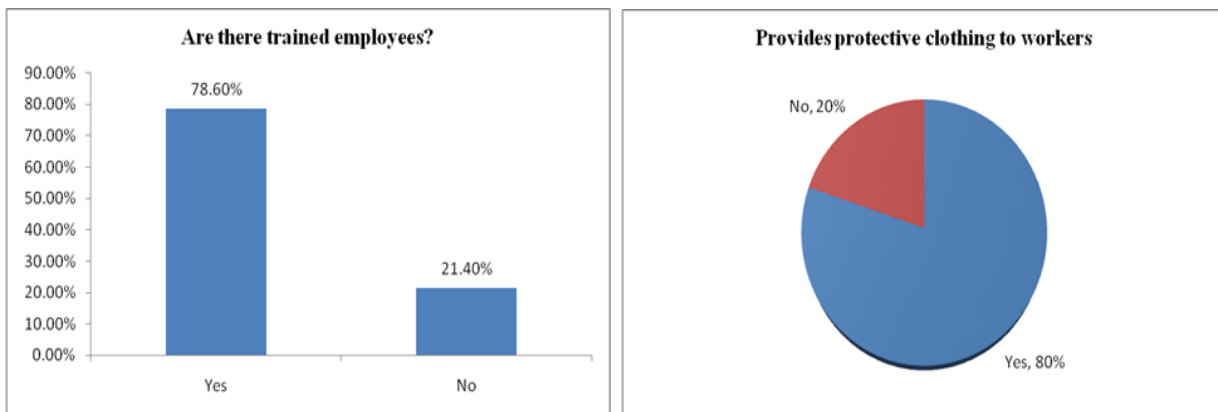


Figure 5.7: Training of employees and Provision of protective clothing

When asked if they were aware of the National Waste Management Strategy, almost all of them are aware of it and felt that they can play a number of roles in its implementation given the fact that NEMA has not come out to educate the public on the strategy’s requirement. Some of the areas they felt they could play a role included: -

- Expanded awareness creation to the communities given that they collect waste from them.
- Policy advocacy and influence so that County Government can develop corresponding policies to promote 3R activities.
- Community education in regard to waste separation and value for waste.
- Partnership with NEMA and County Government in order to ensure compliance.

5.5 Challenges of waste management, promotion of 3R and its related activities in Nakuru County

A number of challenges were highlighted by respondents and the County Government. In the case of the County Government, lack of sanitary landfill was singled out as being the key. Also, lack of capacity to roll out holistic solid waste management system that promotes 3R and other related waste management activities was also cited. Lack of a weighbridge at the dumpsite was also pointed out to be a hindrance to determining the life span of the existing waste disposal facility and even to know the quantities that have been disposed for better planning. Compounding this situation is the fact that the

dumpsite is not fenced so the spread of waste goes beyond its designated boundaries. This includes even the waste recovery activities conducted by the pickers at the dumpsite.

However, non-state actors highlighted exposure to dangerous objects as a result of non-separation of waste, difficulty to access disposal site by trucks during rainy season resulting in low collection and disposal performance. Also pointed out is the lack of adequate financial resources to enable them to procure environmentally sound waste collection equipment such as trucks as required under the waste management regulations. Awareness on waste handling by the public was also highlighted as a challenge since some consumers who are not willing to pay for waste collection charges would drop, litter or burn waste in the open. Instances of hazardous waste being found in the general were also highlighted as some of the challenges with the potential to harm and cause diseases to workers. Other challenges mentioned included high competition amongst waste collectors, inadequate finances to ensure compliance, lack of cooperation from clients leading to non-payments of waste collection services delivered and underpayment for the same by consumers.

However, respondents were able to list the following as possible solutions to their challenges: -

- Assistance by any organization including the county government and ministry of environment especially in furtherance of 3R activities including financial support for equipment and marketing of products
- Awareness creation on the public on how to handle waste including their additional responsibility towards waste management such as payments for any service
- Capacity building for non-state actors on promotion of 3Rs and how to harness their potential within an umbrella organization to further 3R activities
- Consistent enforcement by County Government officers would ensure that many illegalities in waste management including open burning is stopped or contained
- Creation of communal collection stations from where waste separation can be conducted if not from the point of generation

In conclusion, County Government was felt by majority (57.14%) to be better placed in solving some of the challenges mentioned above, followed by NEMA.

CHAPTER SIX: KISUMU COUNTY

Kisumu County is one of the 47 Counties in Kenya. It lies within longitudes 33° 20'E and 35° 20'E and latitudes 0° 20'South and 0° 50'South. The County is bordered by Homa Bay County to the South, Nandi County to the North East, Kericho County to the East, Vihiga County to the North West and Siaya County to the West. The County covers a total land area of 2,009.5 km² and another 567 km² covered by water.

According to the 2009 Population and Housing Census, the population of the County was estimated at 968,909 persons with 474,687 males and 494,222 females. In 2017, the population is estimated to be 1,145,747 persons. The County has seven sub-counties namely: Kisumu East, Kisumu West, Kisumu Central, Nyando, Seme, Nyakach and Muhoroni.

6.1 Institutional and legal framework for solid waste management

The Department of Environment is responsible for solid waste management in the County. In this respect, the County Executive Committee Member responsible for Environment provides the key policy direction and the Chief Officer is responsible for implementation of policies. As far as day to day operations of solid waste management is concerned, the County has recruited 5 Environment Officers and deployed them to every sub county to structure and supervise such operations. However, two sub-counties still do not have the officers, yet all generate waste and require its proper management. The County also works with some contracted waste collection and transportation actors. In addition, there are other non-state actors who conduct value addition activities on waste.

In order to operationalize its functions as contained in Kenya Constitution, the County Government developed the Kisumu County (Solid Waste Management) Act in 2015. The Act provides for a more effective and efficient management of solid waste with the goal of protecting the county's environment and public health.

The Act establishes an authority for administration of solid waste management in the County known as, Kisumu Solid Waste Board, with an overall responsibility to among others, regulate and supervise all solid waste management issues, develop policies promoting efficient management of solid waste and advise the County Government on policies to be followed with regard to waste management while ensuring their full implementation.

The Act further provides for recycling but does not give any provision for source separation of waste that would guarantee clean waste along the value chain. Some of the other issues addressed in the Act include; training, establishment and strengthening the private sector and development of pro-poor projects. The Act proposes different modes of public service providers (PSP) who should then conduct environmental education advocating for reduction of waste.

According to the Director of Environment, the County Government has adopted several capacity building approaches for the improvement of the regulatory environments for solid waste management through the Kisumu Integrated Sustainable Waste Management Project (KISWAMP) even though this document is still in its draft form. Some of the issues prioritized in the KISWAMP include enforcement of reviewed by-laws, fee collection for services provided, monitoring and evaluation systems, promotion

of private sector linkages among others. The County through the French Development Agency reviewed the KISWAMP to anchor the 3R principles in line with the National Solid Waste Management Strategy.

6.2 Waste Streams and Existing Waste Management Practices in Kisumu County

The County Government of Kisumu approximates that the total waste generation within the County is 500 tons per day despite them having no weighbridge to ascertain this. While there are a number of dumpsites in the upcoming trading centres like Ahero, Katito and Holo within the County, Kachok which is based in Kisumu City is the biggest dumpsite taking much of the waste generated within Kisumu City as well as from other areas like Ahero. The dumpsite which is located more or less within the Central Business District is not secure despite an attempt to erect a perimeter fence some two years ago. The site is also considered to be full besides lacking a weighbridge. Worse still, a study conducted by E-cue Associates Ltd in 2015 indicates high levels of pollution contributed by the dumpsite. While the study indicates soil pollution by inorganic pollutants, both surface and underground waters are polluted by both inorganic and organic substances. Further, the air quality around Kachok dumpsite is heavily polluted by high concentrations of particulate matter, Methane and hydrogen sulphide beyond the allowable limits. The study further indicates the same pollution has impacted on other facilities around the dumpsite.⁵

According to the KIIs interviewed, only about 150 tons of the waste is collected and disposed of everyday. It is therefore assumed that much of the waste which is uncollected degrades in the open environment especially in the markets located in other sub-counties far from Kisumu City. Concerning how much of waste could be burned in the open, the Director mentioned that about 20% could be burnt. Such burning takes place at the dumpsite, transfer points, streets sides, estates and in markets. In addition, some hospital waste especially from small clinics finds their way into the dump site. Pickers usually burn them and some are traced back to the owners of such clinics and are prosecuted.

There is no formal separation of waste but recovery of waste takes place at the Kachok dump site where about 70 young people are involved in recovery of different types of waste. They in turn sell to middlemen who have stationed their agents at the dump site. Kisumu County can be qualified as one of those with the longest waste recovery activities dating back to the late 70s.



Figure 6.1: Part of Kachok dump site

⁵ Decommissioning Audit of Kachok Dump Site in Kisumu City-Draft Final Report

6.3 3R Promotion and its Related Activities in Kisumu County

Kisumu County does not have adequate capacity for collection of waste and technical staff for the promotion of 3Rs and its related activities. According to the Director, the number of recyclers in the county is not known since the County issues recognition letters only to those who collect waste in general. Private actors who mainly collect waste are licensed while CBOs who are the major actors in 3R promotion and its related activities are largely informal but with long history in promotion of waste recycling. However, the County collaborate with NEMA on clean ups and with schools (environment clubs) on awareness to promote 3Rs as well as environmentally sound management of waste.

6.4 Non-State Actors in Solid Waste Management, 3R Promotion and its Related Activities in Kisumu County

Using a questionnaire, this study sought to ascertain a number of issues on non-state actor's activities in relation to solid waste management. These included; nature of waste dealt in, sources of the waste, waste handling, supplier networks, quantity of waste handled, challenges faced and governance arrangements for better waste management.

Characteristics of the Study Respondents

This questionnaire was responded to by actors from the following sub-counties: Kisumu Central, Kisumu East and Kisumu West. Data was collected from eighteen respondents of which thirteen were male and five female. The age range for the respondents was 23 years (youngest) and 59 years (oldest). The average age was 42 years. The oldest organization was started in 1979 while the youngest in 2017. This indicates the history of 3R activities in Kisumu is old while men still remain the dominant actors. All the respondents interviewed in Kisumu were in one way or another, involved in 3R and composting activities.

All the respondents engaged during this study engaged in activities related to 3R. Figure 6.2 shows that the majority (52.9%) are involved in value addition on the waste which was mainly source from households, waste pickers, industries and institutions. Respondents indicated various processes that form value-addition to the waste as some sort plastic waste and others organic waste to make local manure yet others have developed a niche in semi-processing using a variety of equipment.

Some other value addition activities mentioned included: -

- Sorting, grinding and bailing/packaging;
- Separate waste and sell to recyclers;
- Use metal to make monumental art pieces;
- Use part of scrap metal to make windows/gates;
- Use bones to make bone meal;
- Make white paper and brown paper cartons;
- For final products, add zips on bags and linings according to customer's taste;
- Make necklaces, earnings, marts and handbags from paper and plastic waste;
- Fencing poles, plates, hangers and basins.

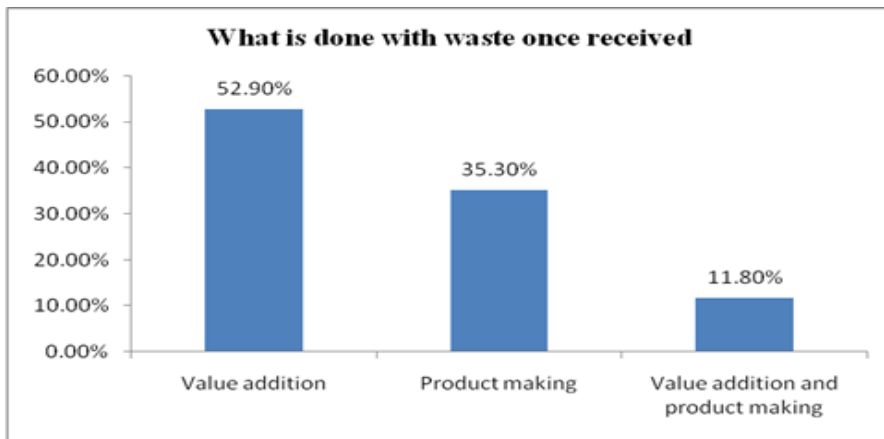


Figure 6.2: Waste handling

While value addition which is basically referred to as semi-processing is the dominant activity of actors in Kisumu County, others still ventured into final products mainly of waste plastics and paper. Bamato Environmental and Sanitation Initiative, is a long-standing CBO-SACCO that started in 1998 based in Nyalenda and has been supported by other organizations including the World Bank to procure machines that include grinders, agglomerators and extruders. The CBO-SACCO has for a long time been semi-processing hard plastics at a rate of 70 kg per hour selling at Ksh 35 per kg. Recently, they got involved in final product making venture that has severed the SACCO’s relationship with manufacturing industries who previously consumed their semi-processed plastic waste. There is a general feeling of competition amongst the industries since the SACCO acquired hi-tech machines that facilitate final product making. To counter this, the industries in Kisumu have since decided to offer better buying prices to waste pickers and middlemen rendering the SACCO almost non-functioning. Nonetheless, the SACCO has a large membership but at the time of this assessment, the active members were 26.

There are other two remarkable individuals/groups in Kisumu who deal in three different waste streams. A CBO group-Makawiri which uses paper waste and water hyacinth to make new paper products which include envelopes, gift papers and book covers. Makawiri has taken its activities a notch higher by creating a web-site –www.takawiri.org from where many of its final products are marketed. This is placing their products that are branded as environmentally friendly to the widest possible market. Already the group’s products have attracted one consumer from the USA with many other customers being national corporate organizations and tourists. The group at the moment handles up to 100 kg of waste paper (cardboard, newspaper) per day and 400 kg of water hyacinth per day with 1 kg of paper waste and hyacinth fibre giving 100 cards sold at Ksh 100 per card. With 3 employees at the moment, the average monthly income is Ksh 60,000.

Concerning the amount of waste material used for the different products, this varied from artefact to artefacts. This group has also been able to receive some support including funding from NACOSTI, NET Fund and the pollination project. Some of the funds have been used to purchase the existing machines and payment of rent since their activities are hosted on a rented property. Transportation of the waste paper from where sourced has been one of the main challenges as paper is voluminous and the group depends on hired transport.

An individual by the name Kibwobi located at Manyatta off Kibos road started activities of plastic waste recovery and semi-processing together with metal waste recovery in 2010 with a workforce of six (6)

employees. The individual handles between (700-1000) kg per day of waste materials. For plastics, the individual deals in both hard and soft plastic waste where the buying price is Ksh 10 per kg and selling the semi-processed materials at Ksh 25 per kg. At times, waste bones are also processed to make bone meal which is sold locally. The individual makes between Ksh 100,000-150,000 in total per month. Despite this huge handling waste capacity and installation of high tech equipment with big investment, permanent or reliable site for operation, high cost of power and compliance requirements still remain major challenges.

Composting of organic waste is not a major 3R related activity in Kisumu as the group involved handled only up to 200 kg per month of waste with compost usage being limited to a demonstration farm within the premises of the group. Another women group that supports children with disabilities and is based in Nyalenda used paper waste to make beads which are in turn used for necklace making while plastic waste especially the polythene was used for making handbags and baskets. This group only handled up to 20kg of waste per month with an average monthly income of Ksh 5,500.

Listed below are some of the products by the women group and one of TAKAWIRI member in the process of making material used in new paper artefacts.



Figure 6.3: Products made from plastic waste and paper waste being prepared as new material

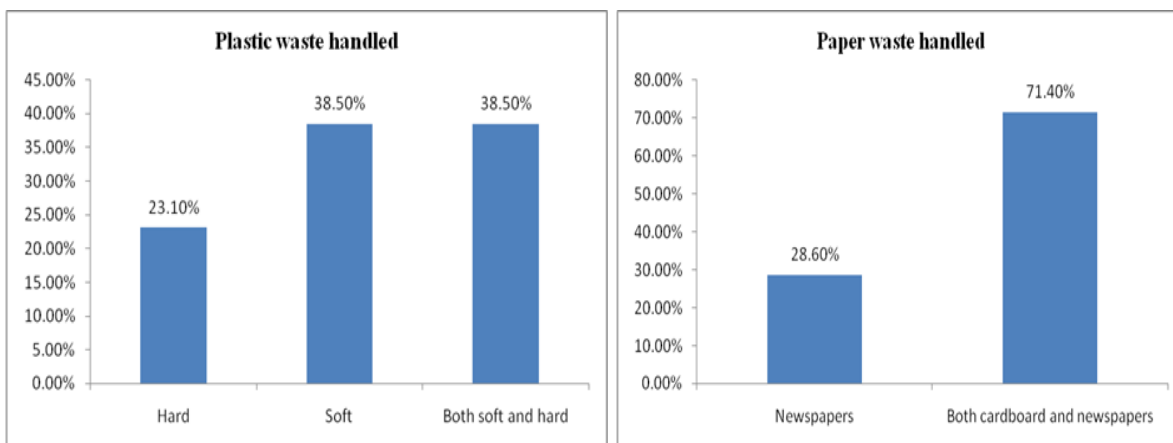


Figure 6.4: Plastic and Paper waste handled

Figure 6.4 shows that for the rest of the respondents, many handled soft and hard plastic waste almost in equal measure while for paper waste they dealt in both cardboard and newspapers also as their preference. This trend of engagement indicates that the demand of hard and soft in the case of plastic waste is the same. Equally in the case of waste paper, the same situation applies. The respondents also

indicated that they handle other wastes that included organics, glass waste, bones, clothes, e-waste, mattress, shoe-soles and sludge.

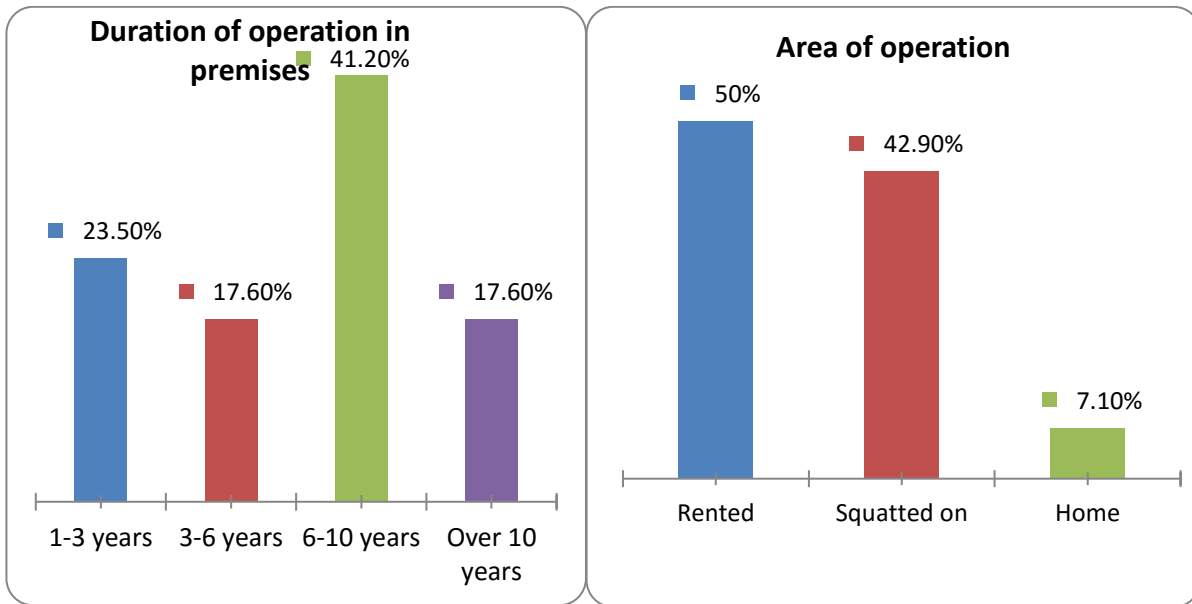


Figure 6.5: Duration and Area of operation

Figure 6.5 shows that close to half of the respondents have conducted 3R activities for between 6-10 years with a good percentage of 17 also having been in the business for over 10 years. Concerning areas of operation, half of the respondents indicated that they rented such premises but with hefty payments while close to half, also squatted on premises which were not theirs. This would imply that their operations are not very secure. Nonetheless, they still had to meet compliance requirement with many of them operating with licenses such as, CBO certificate, Environmental Impact Assessment License, Single Business Permit from the County Government, Letter of recognition especially from Environment Department and Waste Transporter License from NEMA. These in their view, are numerous requirements that demand a lot of money from them (ranging from Ksh 1,000- 20,000 each per year) yet 3R activities does not generate a lot of returns.

When asked what their motivation into 3R promotion and its related activities was, many mentioned the desire for a clean environment as well as the fact that waste material recovery activities presented business opportunity especially for those who are unemployed.

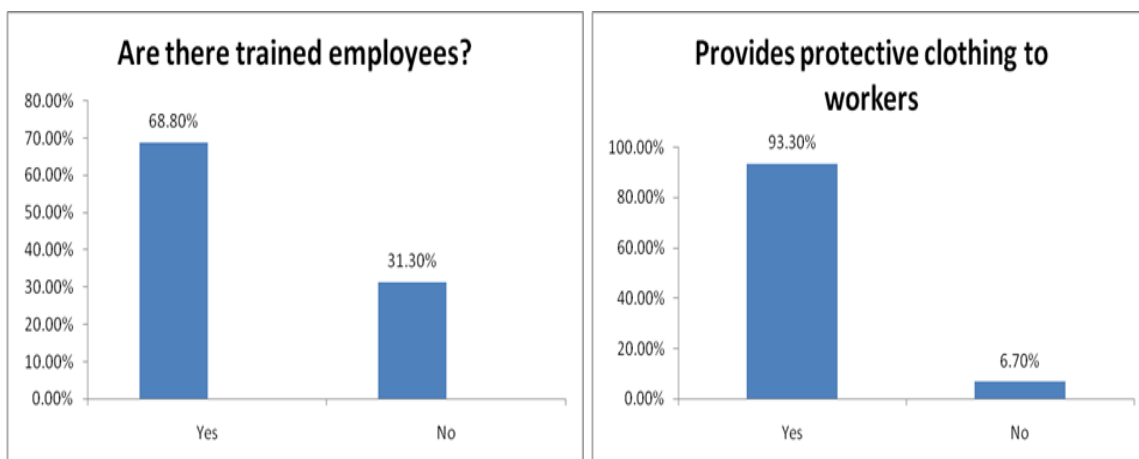


Figure 6.6: Training of employees and Provision of protective clothing

From Figure 6.6 above, majority (68.8 per cent) of the non-state actors in 3R promotion and its related activities are trained on various areas of solid waste management including waste sorting/separation and waste handling. They confirmed to be having skills such as artefact making from waste materials; business skills; Organizational skills; management skills; Personal hygiene knowledge, waste handling skills, pit emptying knowledge; preparation of raw materials, pulping, handmade paper making, making paper products like cards, paper bags; sorting out of various waste materials; recycling skills; poultry keeping; record keeping; group savings/loaning; Business and life skills. Much of the skills have been built through training supported by different organizations including, the County Government, Lake Victoria Environment Management Project, Shelter Forum, Swedish International Development Agency, USAID, NACOSTI, NET Fund and the Pollination Project which advocates for tree planting and good care of animals. These non-state actors also provided their employees with protective clothing at very high percentage implying that they are aware of the possible exposure to injuries and contagious diseases related to handling of waste.

6.5 Challenges on waste management, 3R Promotion and its related Activities in Kisumu County

From the interviews conducted, a number of challenges stand on the way to successful implementation of 3R and its related activities in the County of Kisumu. Such challenges include, lack of supportive policies that can enable the non-state actors to acquire suitable sites to conduct their activities. Many felt that the County Government should identify and designate sites where community waste can be separated, bulked and then sold to industries. In tandem with this, lack of adequate financial resources renders them to squat at non-designated sites where they are faced with frequent harassment by either the County Government or owners of such sites as well as exposure of their materials to natural environmental hazards such as fires and rains.

In Kisumu, there are a few industries recycling different types of waste and therefore much of the waste is transported to Nairobi. Even though there is high level of plastic waste semi-processing in the County, some waste is still transported to Nairobi in their bulky nature. This means that 3R actors are not assured of constant unit price for their waste as those who buy from them would always bring in issues of transportation to be determining the unit price. Unfair competition and frequent electrical surge was highlighted as another challenge confronting those who semi-process as well as lack of modern technologies to make their operations efficient. Lack of adequate market, especially for the finished products was also highlighted meaning that the public have not been very much engaged on products of waste being environmentally friendly.

Despite these arrays of challenges, the non-state actors could visualize their solutions. The County Government being the principal actor in solid waste management was seen to play a crucial role in providing financial support to enable non-state actors to acquire more efficient technologies as well as allocating open spaces with constructed shades for 3R activities. Nonetheless, these facilitation requirements could also be done both by the National and County Governments. Awareness creation on 3R activities and its products was also mentioned as this is viewed to be crucial in enlarging the marketing space especially for waste products. An art center within the County Government was also highlighted to be useful in displaying artefacts made from waste. Finally, non-state actors felt that through the Department of Environment, there should be revolving funds that those engaged in 3R and

related activities could access to enable them to expand and maintain their operations resulting in huge reduction of waste either burned in the open or taken to the dump site.

Many of the 3R actors lauded the ban on plastic bag usage but were a bit apprehensive on its successful enforcement given the fact that about 10 years ago, the same was declared and through concerted lobbying by the manufacturing industries, the decision was reversed. Nonetheless, there was a general feeling that such a ban would enable use of hard plastics which can be reused thereby delaying the release of much plastic bag waste to the environment. In addition, many saw the use of paper packaging to be picking up and therefore waste paper recycling would go up and create new business avenues for those who would have lost their business in waste polythene.

CHAPTER SEVEN: NAIROBI COUNTY

Nairobi City County is one of the 47 counties in Kenya. The County has a total population 4,253,330 according 2009 census projections and has total area of 696.1 Km². It borders Kiambu County to the North and West, Kajiado to the South and Machakos to the East. Nairobi City County is divided into seventeen sub-counties including Starehe, Kamukunji, Kasarani, Makadara, Embakasi, Langata, Westlands amongst others with 85 civic wards.

7.1 Institutional and Legal Framework for Solid Waste Management

The Department of Environment of Nairobi County Government is responsible for solid waste management. This responsibility is bestowed on the County Executive Committee Member for Environment, Water, Energy and Natural Resources whose main role is to provide policy direction. The day to day operations of solid waste management services is overseen by the Chief Officer for Environment with the support of sub-county environment officers who have been deployed in the seventeen sub counties. Also supporting the execution of this function is a section within Environment Department whose role is to ensure compliance and enforcement.

In terms of infrastructure for solid waste management, the County has got its own which comprises of a fleet of trucks, heavy equipment and disposal site. However, the services of waste collection and transportation are complemented by other non-state actors including private waste collection companies, youth groups and CBOs. Some of the non-state actors are also involved in promotion of 3R and its related activities. While the County Government has gone through a series of changes in terms of its day to day operations on solid waste management, two documents remain key to successful and sound management of waste in Nairobi. In 2010, the Integrated Solid Waste Management Plan (ISWMP) that was first formulated in 1998 was revised. The plan prioritizes eight programs that if implemented would address matters of solid waste management in a holistic manner. However, in reference to 3R promotion, three programs stand out as: -

1. Establishment of a final disposal facility to reduce on the secondary pollution of the environmental resources and decommissioning of the Dandora dumpsite;
2. Implementation of reuse, reduction and recycling (3R) of waste and establishment of immediate treatment facility to reduce waste amounts and their hazards
3. Implementation of private sector involvement promotion plan to ensure greater participation of other non-state actors in collection and transportation, intermediate treatment and land filling.

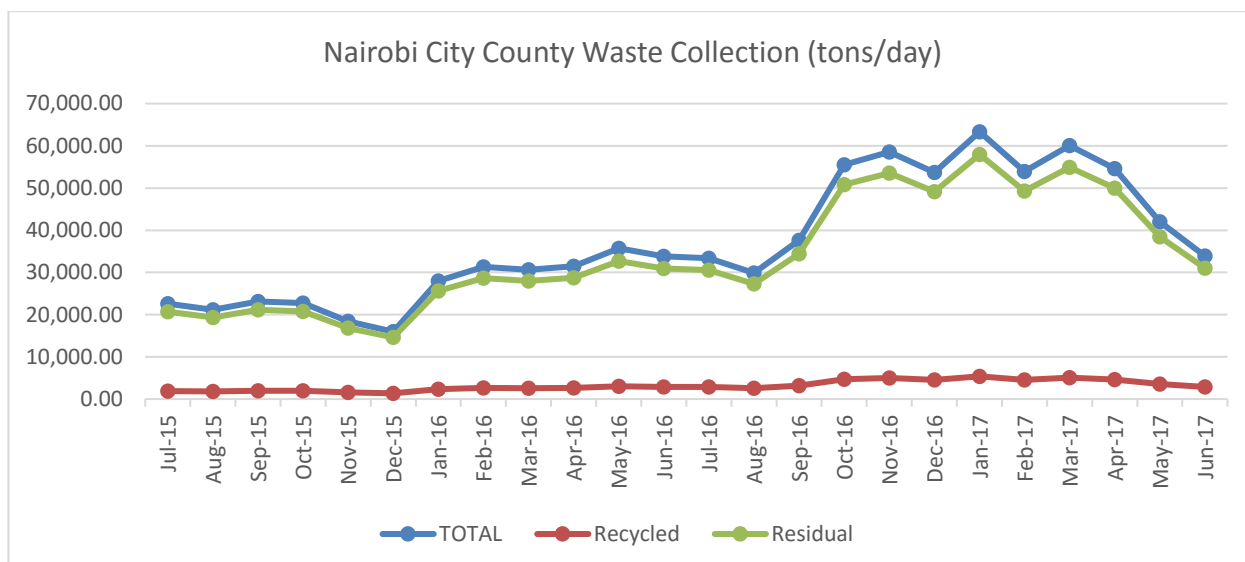
In addition to the plan, the County Government also has enacted the Nairobi City County Solid Waste Management (SWM) Act, 2015 to make provision for the management of solid waste in the County and for related matters.

The Act stipulates that solid waste management is a shared responsibility amongst all actors in the county including generators, owners and occupiers of premises and contracted service providers and others. Part II of the Act stipulates general provisions for solid waste management among others, material recovery (Section 9), categorization and handling (Section 10) and zoning (Section 11).

The Act provides a framework for public participation in the management and protection of environment and would be the basis for the implementation of the County’s integrated solid waste management plan. It further provides for and regulates the participation of various actors in solid waste management in the county. However, the County Annual Development Plan of 2017/2018 only highlight the pathetic situation of Dandora dump site without necessarily acknowledging the connection between 3R promotion and extension of the life span of the dump site for extended use.

7.2 Waste Streams and Existing Waste Management Practices in Nairobi County

The total waste generated by the County of Nairobi is estimated at 2,400 tons per day with an average disposal performance of 1,800 tons per day leaving just about 600 tons uncollected. However, the collection is dogged with a number of challenges including frequent strikes by hired contractors amongst others.



Source: Constructed with information from the Department of Environment

Figure 7.1: Nairobi City County Waste Collection Estimates, July 2015 to June 2017

According to Figure 7.1 above, there is no much difference between total waste collected and residual waste, meaning that waste recycling and recovery activities almost remain constant throughout the year at about 8% of the total waste generated.

When interviewed about knowledge on the implications of open burning, the Director of Environment informed that officers in the County particularly those at higher levels are aware of the implications of open burning but not those who have day to day encounter with waste such as sweepers, supervisors and some dump site staff. Open burning is however estimated at only about 5% of the waste with the rest left to degrade in the open. Intentional burning of waste is common especially when pickers look for metal that is found in tyre wastes. However, the interview with dumpsite manager indicated that many times, advice has been made to the pickers on the detrimental effect of waste burning to their health but not much has been achieved. Polythene is also burnt at times and cases of coughing and skin

diseases are common amongst waste pickers. The County does not have a systematic way of educating or sensitizing the pickers except for the one-off cautions which don't impact much.

Dandora dump site is the only designated disposal site despite many studies having found it to be full and polluting to the adjacent Nairobi River. The dumpsite is not fully secured with a perimeter wall and waste continues to sprawl even to the neighbouring estate of Dandora Phase V. Given that the County Government has hired private waste collection companies as its main agent in collection, transportation and disposal, in 2006, a weighbridge was installed at site to take quantities disposed in order to facilitate payments of such contractors by the County Government.



Figure 7.2: Tyre burning at Dandora dump site

Concerning waste separation, it's reported to be practised to some extent taking place in high and middle income residential neighbourhoods and within supermarkets. Also, some traders at open air markets do waste composting. All these waste separation activities happen under no regulation since the County Government has not developed regulations to operationalize the 2015 Act.

The County Government is reported to have a number of collaborations with organizations such as Kenya Alliance of Residence Association (KARA) on development of waste regulations, CBOs on waste collection and monthly clean ups, corporates on sensitization of the public, NEMA on compliance and enforcement, UNEP on research to reduce carbon emissions, Stockholm Environment Institute (SEI) on air quality which very much relates to the subject of open burning and C40 also on GHG emissions which focuses on capacity building for officers to collect data.

While the County Government appears to have a number of collaborations on different elements of waste management, the situation is reported to be different at the National level. An interview with the Deputy Director of Compliance and Enforcement at NEMA revealed that, there is no collaboration on the implementation of Multi-lateral Environment Agreements including the Stockholm Convention. According to the Deputy Director, not many technical people are even aware of what POPs are and therefore the need to demystify POPs at that level. Awareness is required across the board including for technical and non-technical people on waste management and even the Basel Convention. In her own words, "there is an urgent need to form a collaborative framework between the MENR and NEMA as far as development of regulations for the implementation of MEAs are concerned".

In her own words, “the air quality regulations were developed without due consideration of the Stockholm Convention on open burning of waste”. In this regard, there is need for its review to incorporate the Convention’s guidelines and standards. Further collaboration is required between the MENR and County Governments who are now the legally mandated institutions to deal with waste management matters. County Government do not know about POPs and those who are aware, are because of their interest but not as a duty to ensure stoppage of waste burning.

Some of the actors who conduct open burning of waste include Motor Garages and therefore there is need for awareness communication strategy that would also target these operators since they are notorious with burning of waste such as vehicle filters, napkins and rags. Burning of tyres is also rampant along road reserves by those who are looking for copper wire in the tyres. The process generates huge amounts of black smoke that is likely to be poisonous. Awareness creation that tyre waste can be used in the cement kilns as a source of fuel in a controlled environment that would ensure maximum burning is also required.

7.3 3R Promotion and its Related Activities in Nairobi County

Waste recovery activities in Nairobi County happens at the dumpsite, points of generation and other designated collection points. However, much is perceived to be at county’s dumpsite- Dandora.



Figure 7.3: Waste recovery at Dandora dump site

At Dandora, there are over 3,000 individuals recovering different waste streams. Some of them have been in these activities for over 30 years and are organized along 7 groups which are registered by Ministry of Youth and Gender Affairs. Nonetheless, all waste pickers are under one umbrella group called Nairobi Waste Pickers Association that is registered by the County Department of Environment. At the Dandora dump site, there are middle men whom pickers sell to directly with a daily earning of at least Ksh 300. In tandem with waste pickers’ activities, it is noted that the County has many waste recyclers and has attempted to develop a register for them but not in totality in order to capture their number. This hampers any possibility of knowing how much waste such actors manage to remove from the general waste stream. For those who have attained formal recognition, this has been done through licensing where a payment of Ksh 10,000 per year is made besides the NEMA transport license requirement. Despite these perceived exorbitant compliance requirements, it is in Nairobi where

individuals and CBO groups semi-process as much as over 500 tons of plastic waste per day making a huge contribution to stopping of open burning of waste. In addition, it is still in Nairobi County where all waste streams are resourced with only waste pampers still lacking market for re-use or recycling.

7.4 Non-State Actors Initiatives in Solid Waste Management and 3Rs Promotion and its Related Activities in Nairobi County

Just like in the cases of Nakuru and Kisumu which have been discussed in the previous chapters, using a questionnaire, this study sought to ascertain a number of issues related non-state actor’s activities in relation to solid waste management in Nairobi County. These included; nature of waste dealt in, sources of the waste, waste handling, supplier networks, quantity of waste handled, challenges faced and governance arrangements for better waste management.

Characteristics of the Study Respondents

Respondents from the following sub-counties were visited: Dagoretti North, Dagoretti South, Embakasi East, Embakasi North, Embakasi South, Kasarani, Lang’ata, Makadara, Kamukunji and Roysambu. All the respondents engaged in waste recovery and other value addition activities with a few being engaged in final product making which included beads for necklace and earrings.

Data was collected from twenty-three (23) respondents of which twenty were male and three were female. The age range for the respondents was 22 years (youngest) and 53 years (oldest) with Nairobi having recorded a number of young people being in waste material recovery activities as a means of employment. The oldest organization according to this study started its waste paper and plastic recovery activity in 1985 and is based in Shauri-Moyo, Kamukunji constituency. Entry into waste material recovery is recorded as recent as in 2016.

All other wastes including plastics, wood, cartons, white paper, newspaper/magazine, bones, shoe sole, hair piece, glass, bottles, polythene, food, textile, e-waste and metals are resourced in Nairobi County in varying capacities. However, paper and plastic wastes are more resourced in Nairobi followed by organic waste.

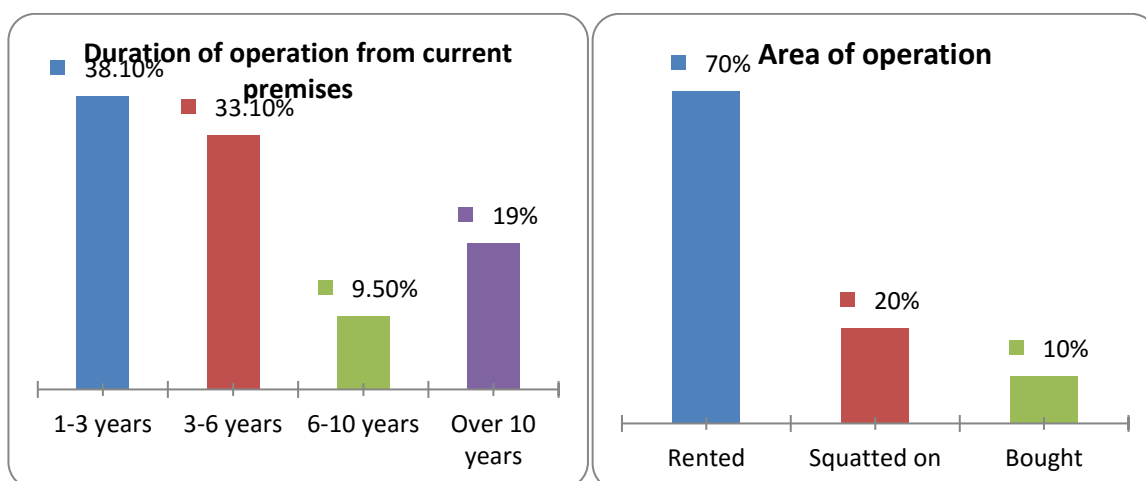


Figure 7.4: Duration and Area of operation

Even though many of the respondents have only been engaged on 3R promotion and its related activities for up to 6 years, Nairobi still has the longest history for these activities with close to 20% having been there for over 10 years (see Figure 7.4). Concerning their status of premises, majority (70%) have rented

sites with only 10% having bought and 20% squatting. The fact that majority are renting clearly demonstrate their eagerness to continue doing business on 3R and its related activities and the competitiveness of such activities as an alternative business venture.

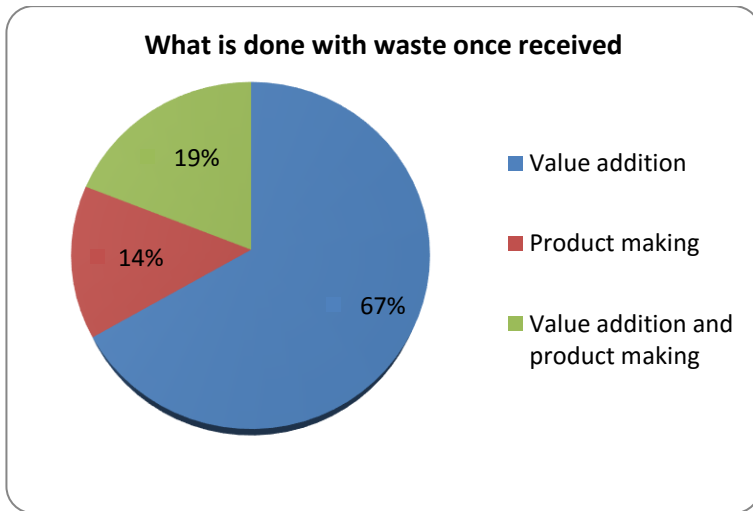


Figure 7.5: Waste handling

Value addition still remains the dominant activity many respondents engaged in. Such activities involved sorting, bulking, dismantling, semi-processing (shredding and grinding), using organic waste to rear pigs as well as to make compost manure for farming. Sources of waste include households, commercial establishments including supermarkets, institutions and waste pickers. Despite the fact that these non-state actors dealt in all waste streams, paper and plastics remain the dominant ones. Figure 7.6 below shows that majority handled both cardboard and newspapers when it came to paper and the same applied to plastic waste where majority handled both soft and hard plastics. In cases where it was a CBO or even individuals, these respondents conducted their activities with a workforce of between 10-30 people handling between 3- 900 tons per month.

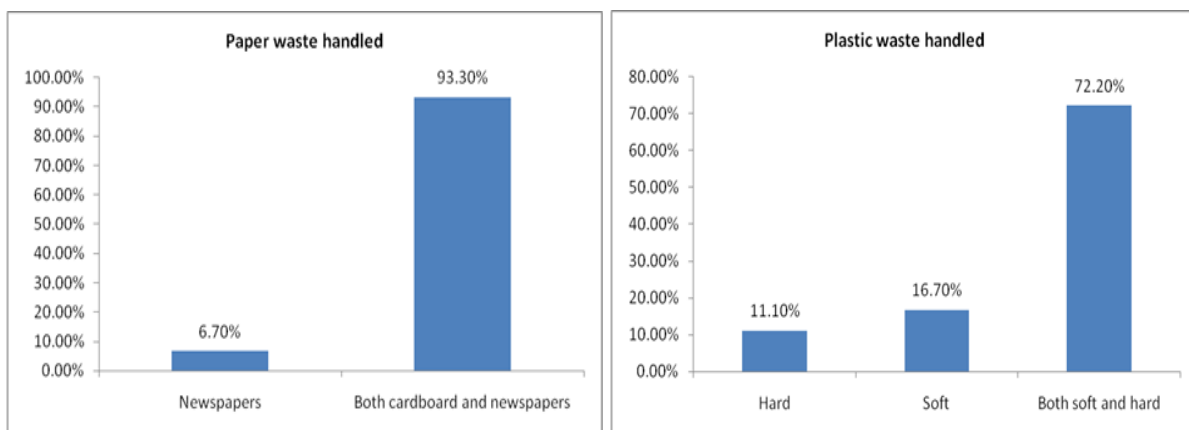


Figure 7.6: Paper and Plastic waste handled

In Nairobi, the same respondents who handled paper and plastic wastes still handled glass, metal and organic waste. When asked what motivated them into getting involved with solid waste management activities, many of the actors mentioned the desire to live in a clean environment as well as to earn some income. Highlights were on the fact that solid waste management presents a lucrative business opportunity. Concerning waste streams that are in high demand, the following were listed: -

- Metals
- Hard plastics
- Bags and sandals
- High Density Polyethylene
- Cardboards and,
- Organic waste

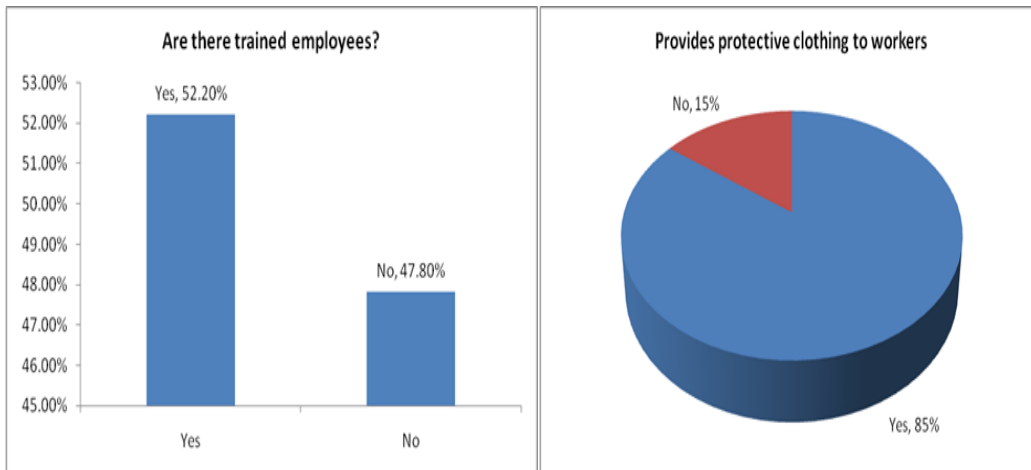


Figure 7.7: Training of employees and Provision of protective clothing

Many of those engaged in promotion of 3R and its related activities are trained (see Figure 7.7). They possess skills for waste sorting, basic artisan, communication, waste handling, first aid, health and safety, composting and recycling. The same actors, majority of whom are provided with protective clothing.

Follow up interviews were made with some particular actors in order to understand more details into their operations since it would be useful for the next stage of this project that already some actors have been identified who can champion 3R and its related activities to the extent that policy makers are able to fast-track requirement for some of them.

Taka Taka Solution Company

Taka Taka Solution is one of the major 3R actors dealing in waste collection and material recovery in Nairobi. The company which started its operations five (5) years ago and is based in Kangemi on a rented facility where rent is paid at Ksh 30,800 per month has a workforce of 30 earning between Ksh 500-1,200 per day. These employees are provided with protective clothing, have their medical bills paid and subscribe to NHIF as well as to NSSF. Whenever a new employee is recruited, they are taken through extensive tests and inoculated for tetanus besides first aid administration. The company sorts almost all waste that it collects from its clients before transporting the residuals to Dandora dump site. In a day, the company which has four (4) trucks and skip containers collects 4.5 tons of waste which is in turn subjected to sorting at the rented yard. It was revealed that the following waste streams once sorted are sold to different clients many of whom are based in Nairobi with a few in Thika Town who come for them as follows: -

Table 7.1: Waste material and unit prices

Waste stream	Price sold in Ksh/kg
Cartons	5-6
PET	11-13
LLDPE	5
Bio-LDPE	3-4
LDPE	17-19

Organic waste is sold every day and fetched upto Ksh 30,000.

The Operations Manager stated that sorting and selling of different waste materials has really boosted their monthly incomes from the waste collection fees paid by their clients. Before venturing into sorting and selling of different waste streams, the company's monthly income ranged between Ksh 150,000-250,000 but this has since improved to Ksh 400,000 per month. Nonetheless, compliance requirement which includes NEMA license which is paid at Ksh 30,000 per year and that of County Government at Ksh 19,000 per year besides waste transporter's licence which is per vehicle are reported to be very prohibitive to promotion of 3R activities. It was therefore felt that waiving taxes on 3R activities, creating awareness to change people's attitudes since neighbours do not approve of such activities and training of staff would go a long way in ensuring that the company handles more waste and in turn, reduce waste that could have otherwise been burnt. Lack of permanent premises is also a barrier to increased activities as most of the activities are done on temporary structures which are exposed to rains and even possible fires. Much of the sorting is still also done manually thereby lowering the scale of operations when it comes to how much waste can be sorted within a given time.

Makinika Youth Group

This is a Youth Group of over 20 members that started in 2013 and is based in Kasarani Constituency. Due to unemployment, many of them who have different skills including arts (music, drawing, e.t.c.) came together and started collecting organic waste from the households and sometimes from nearby collection points which they sort and sell to other customers while others they use on their farm which includes vegetables and pigs. This group was facilitated by the former Member of Parliament for the area and now has a permanent area of operation.



Figure 7.8: Some of the pigs kept by the group

The Group has always been supported by the County Government when it comes to transport of waste. However due to the inconsistency of such support, they are of the view that if supported by transport, they would be able to collect more waste from the households which are less contaminated in order to raise more pigs as well as increase their sales of food waste to other farmers since food waste is in high demand. A visit at their yard indicated that the youth group has a variety of talents as others were singing and recording their music while others were busy washing cars and others on the farm either feeding the pigs or weeding some of the vegetables that they also keep.

December Waste Paper

December Waste Paper started in 1985 as a family business of waste paper and later plastics in Shauri Moyo in Kumukunji Constituency. The company which has a total of 4 permanent employees with over 20 casuals handles over 30 tons of waste material in a month. Besides sorting, bulking and selling, the company has installed heavy duty washing, grinding and extrusion machines for plastic waste and handles both soft and hard plastics. The company's sources of waste include industries, supermarkets, other institutions and waste pickers. The value-added waste is then supplied to recycling industries based in Nairobi at unit prices that range between Ksh 10-25 per kg depending on the nature of value addition advanced. A few times the company has also ventured into polythene sheet making. Concerning semi-processing of plastic waste, the company can sometimes crush up-to 1,000 tons in a batch system within 24 hrs. Such semi-processed materials are then sold at Ksh 35 per kg and such operations only happen whenever there is a big order from a plastic waste recycling industry.



Figure 7.9: Part of waste and machinery at December Waste Paper Company yard

Some of the challenges mentioned included permanent working areas for those promoting waste recycling. The Company has been renting their working area which they share with those repairing vehicles and this arrangement does not leave them room to expand their capacity even if they wanted to scale up operations. Licenses were highlighted to be numerous and expensive yet the activities on promotion of 3R complement the County Government efforts and further create employment opportunity to many youth and women. Operational yards were highlighted to be a positive development if the County Government can consider a few in every sub-county. The same situation applies for Kleanbira which is a CBO of youth based in Lang'ata Sub-County and is engaged in waste material recovery as well as collection and transportation.

Waste Electrical and Electronic Equipment (WEEE) Centre

Interviews were conducted with the General Manager and Manager which highlighted that the Centre began as a department within the charitable, non-governmental organization, **Computers for Schools Kenya (CFSK)** in 2002. CFSK's mission is to empower young Kenyans for life in a knowledge based society by facilitating the development of ICT infrastructure and capacity. This is done through distribution of high-end reconditioned computers to learning institutions as well as to communities for information and resource access centres. The centre offers the service of awareness creation (training) and safe disposal of electrical and electronic waste (e-Waste) in accordance with the National Environment Management Authority (NEMA) waste regulations and WEEE regulations that is protective to both the environment and public health. WEEE Centre is now a limited liability company and so far, has trained 5 African Countries within EA on handling of E-waste, collection, transportation and storage. The Company has expertise in training where they have trained corporates and universities within Kenya, Uganda, Tanzania, Rwanda, Burundi and Madagascar. In furtherance of their expertise in training, the centre has also developed some agreement to train, equip and network participants from Ethiopia, Cameroon, Nigeria, Ghana, Liberia, Zambia and the DRC.

In Kenya, the corporate organizations which have been trained include Safari-com, Kenya Airways, Unilever and Computer Aid. So far, the centre that is based in Embakasi East is the only one of its kind in Africa and has only handled E-waste from corporate and institutions, yet there is a large volume of household waste that is not being addressed. It would be important that household bulky waste like washing machines, microwaves and even personal ones like the cell phones are taken to the company as it has adequate capacity to dismantle, separate and isolate the e-waste. The company has three machines one for dismantling of Cathode Ray Tubes (CRT) called CRT curter, a plastic shredder and copper stripper. According to the Manager, Kenya is the only country in Africa with a CRT curter. While the centre does dismantling of WEEE, much of it is treated outside Kenya in countries where there is technology for treatment and safe disposal of hazardous waste. The wastes that include batteries are then shipped to countries including the Netherlands, Norway and Belgium where they can safely be treated.

According to the General Manager, the company which has invested much in technical training of its 30-staff including handling and processing of electronic waste has adequate capacity for handling all the e-waste in the country and still be able to facilitate African countries in establishing similar centres. In Kenya, WEEE centre operations are organized along 3 regions with Nairobi leading followed by Mombasa and Kisumu. In these regions, there is adequate training, transportation and storage to ensure that WEEE is handled properly. It is therefore the wish of the Manager that the E-waste regulations that are still in their draft form are fast-tracked and awareness is created on the same so that the public can know their responsibilities, how to handle E-waste at the point of generation, where to take such waste as opposed to the current situation where many Kenyan are not even aware of the existence of the WEEE centre in Nairobi. The company is grateful that the Government facilitated land acquisition from where it currently operates. Other organizations have also been supportive to the company especially those who sponsor specific awareness campaigns however, such partnerships have not been structured on long term bases. Concerning where their buyers are located, they are within Kenya as well as outside depending on waste materials required.

As far as compliance is concerned, it is unfortunate that this is the first ever facility to handle E-waste in Kenya yet it is required to pay very heavily for compliance. For example, the Company pays NEMA

e-waste recycling facility license at Ksh 33,000 per year, NEMA export license at Ksh 43,000 per consignment per year, NEMA waste transport license at Ksh 8,000 per vehicle per year. In addition, the company still has to pay for Occupational, Safety and Health certificate at Ksh 5,000 per year, County Government Single Business Permit at Ksh 30,000 per year, County Government Fire Prevention Certificate at Ksh 6, 000 per year and, County Government Vehicle Branding Permit at Ksh 18,200 per vehicle per year.



Figure 7.10: E-waste dismantling and some of the products

7.5 Challenges on Waste Management and Promotion of 3Rs and its related Activities in Nairobi County

During the focus group meeting, a number challenges were shared to be confronting promotion of 3R and its related activities. Many felt that the cost of doing business of value addition is expensive both in terms of ensuring compliance with quality requirements as well as regulatory requirements. Acquisition of regulatory requirements was also reported to be dogged with difficulties and harassment by County officials yet financial resources to enable them to acquire hi-technology equipment that can improve efficiency and ensure increased capacity is also hard to come by.

Many people working with waste are not highly regarded in the society. The lack of positive attitude towards these actors is likely to impact on their continuity with waste management activities whenever other employment opportunity other than in waste management arises. Operating sites is also a potential barrier in Nairobi towards effective contribution to promotion of 3R activities. Even though many reported to be working with protective clothing, they are still exposed to hazards and injuries in the course of their operations. There is still also lack of supportive regulatory framework for effective involvement in 3R promotion and its related activities. Market prices for different waste streams cannot be pre-determined and many at times, value added waste is rejected by recycling industries or offered very low prices without any proper guidance as to where these non-state actors can seek redress.

It was also highly felt that with the current low tipping fees at the dump site and the lack of stringent enforcement on where waste is disposed, 3R activities cannot be a popular option for waste management and burning of the same is not likely to decline.

Kenya does not generate economically viable e-waste yet it is the most expensive to process and dispose. This is due to its embedment with heavy and precious metals which are not economically viable to

extract from small quantities with high level technology. In addition, the Kenyan law on E-waste is not in tandem with the Bamako Convention that encourages parties and other African states to likewise create and adopt legislation for individual producer responsibility in the collection and environmentally sound recycling of domestic arising of e-Waste in the Continent of Africa. It is therefore expected that when the E-waste bill will be passed, it would allow entry of E-waste from other neighbouring countries to enable the WEEE centre to operate effectively and ensure even collection of domestic E-waste.

There is also lack of adequate awareness on the polluter pays principle or on generators responsibility towards waste management. This has made it difficult for the generators to appreciate waste recovery, re-use and recycling. Equally, some waste such as paper, plastics and even the bulky ones which are voluminous require heavy collection infrastructure to transfer then to the centres for value addition. This can only be realized when waste generators pay fees that are commensurate to the waste generated, a condition which has not been addressed even in Nairobi.

Tyre and rubber waste have always been burnt in the open environment especially during demonstrations and by those searching for precious metal in tyre waste. This is happening since there is no adequate awareness on the energy potential in tyre waste that can be used in burning chambers with high energy demand like the cement kilns. Equally, not much awareness has been created on the re-use potential of these waste materials and further ensures suitable branding and effective marketing of such products.

In the views of the respondents, some of these challenges can be addressed as follows: -

- County Government and the National Government to formulate a platform of collaboration where different solutions can be shared and policy direction is forged in order to formalize the existing 3R and its related activities.
- Awareness creation and sensitization should be conducted to all related actors so that everyone is aware and clear of the Government policy as far as open burning of waste is concerned.
- Public-Private People partnerships would ensure complementation of the various actors in 3R activities since they all have different expertise, resources and capacity
- Financial support in the form of green fund that can be advanced to those who have attained some level of 3R promotion activities.
- The County Government to fast-track the implementation of integrated solid waste management that calls for allocation of working stations for non-state actors in 3R promotion.
- Formation of umbrella organizations for different waste streams so that through scheduled meetings, they are able to appraise, bench mark and get to learn from one another on a number of issues including market prices for different products and what type of waste materials are in demand and by who amongst other things.

CHAPTER EIGHT: MOMBASA COUNTY

Mombasa County is one of the 47 counties in the Republic of Kenya, created by the Constitution of Kenya, 2010. Situated on the Indian Ocean, Mombasa is Kenya's second City and home to approximately 1.1 million people. It is the most prominent trading hub in East Africa and the second largest in Sub-Saharan Africa. The city lies within an area of approximately 294.7km², with a calculated density of 5,224/km², split into four distinct geographical areas comprising Mombasa Island, Mainland North, West Mainland and South Mainland. Mombasa Island is separated from the mainland by inlets to the sea, though is linked to the West and to the North by a causeway and a bridge respectively.

8.1 Institutional and Legal Framework for Solid Waste Management

Mombasa County has a department of Environment. However, this department has been dogged with a lot of confusion on its placement within the County government. At the onset of devolution, the department was under the wider sector of Environment, Water and Natural Resources with policy guidance falling under a corresponding County Executive Committee member. Nonetheless, during this study the department was found to have recently been placed under the sector of trade where the day to day operations of solid waste management is organized and implemented under the Chief Officer of Trade. It was also found out that the County just recruited a new Director of Environment after being without one for a long time.

Under the Director of Environment, there is a manager in charge of operations who oversees waste collection, transportation and disposal on a day to day basis. Concerning these operations, the County is divided into four zones with superintendents supervising each zone. The County has not yet recruited any environment officers to oversee environmental as well as solid waste management functions at its various sub counties.

Even though the County appears to have so many initiatives around solid waste management it has not come out deliberately to develop a solid waste management blue print that can embrace and guide all solid waste management activities and their actors. However, a number of initiatives have been developed and they include:

1. Standard Operating Procedures for Recycling and Solid Waste Collection in High Density and Un-serviced areas.
2. Service Level Agreement for Recycling and Solid Waste Collection Services in Mombasa County.
3. Guidelines and Capacity Building Framework for Waste Collection in High Density & Un-serviced Areas in Mombasa County.

Besides the above, the County has a Draft Bill, the Mombasa County Waste Management 2016 that will be the legal framework guiding solid waste management once enacted.

In the Bill, Part IV outlines waste management measures and section 17 makes provisions for the reduction, re-use, recycling and recovery of waste. Its states that any person who undertakes an activity involving the reduction, re-use, recycling or recovery of waste must, before undertaking that activity, ensure that the reduction, re-use, recycling or recovery of the waste: -

- a) Uses less natural resources than disposal of such waste; and
- b) To the extent that it is possible, is less harmful to the environment than the disposal of such waste.

Section 18 goes further and make provisions for the principle of extended producer responsibility. It calls on the County Executive Member to specify:

- a) the requirements in respect of the implementation and operation of an extended producer responsibility programme, including the requirements for the reduction, re-use, recycling, recovery, treatment and disposal of waste;
- b) the financial arrangements of a waste minimisation programme, with the concurrence of the Executive Member of Finance;
- c) the institutional arrangements for the administration of a waste minimisation programme;
- d) the percentage of products that must be recovered under a waste minimisation programme;
- e) the labelling requirements in respect of waste;
- f) that the producer of a product or class of products identified in that notice must carry out a life cycle assessment in relation to the product, in such manner or in accordance with such standards or procedures as may be prescribed; and
- g) the requirements that must be complied with in respect of the design, composition or production of a product or packaging, including a requirement that—
- h) clean production measures be implemented;
- i) the composition, volume or weight of packaging be restricted; and
- j) Packaging be designed so that it can be reduced, re-used, recycled or recovered.

Other measures covered by the Bill include: priority wastes, Storage, collection and transportation of waste, treatment, processing and disposal of waste among others.

On the treatment of waste, the Bill makes prohibitions for treatment and disposal of wastes. Section 25 states that No person may—

- a) Dispose of waste, or knowingly or negligently cause or permit waste to be disposed of, in or on any land, waterbody or at any facility unless the disposal of that waste is authorised by law; or
- b) Dispose of waste in a manner that is likely to cause pollution of the environment or harm to health and well-being.

8.2 Waste Streams and Existing Waste Management Practices in Mombasa County

It is estimated that Mombasa County produces 875 tonnes of municipal solid waste per day. This is according to findings of a waste characterization study commissioned by Mombasa County in 2015⁶. Out of this, about 460 tonnes of the waste is collected and disposed of implying that close to 50% of the daily generation is left in the open environment. In some parts of the County, according to the study, nearly 90% of solid waste is disposed of informally (e.g. burning, burying, illegal dumping) creating

⁶ Waste Characterization Study, March 2015

significant environmental risks. However, the informal disposal activities also create opportunities for job creation and income generation especially for waste informal groups who continue to resource valuable waste from such sites.

Mombasa has three dump sites namely Mwakirunge, Chanda and Kibarani with the latter being more used one because of its proximity to the major waste catchment areas of the County. The same study that was conducted in 2015 estimates waste recovery, its associated value addition activities and recycling at 4.9%. However, it is also noted that it is in Mombasa that the largest cement producing company in Kenya, uses tyre waste as part of its fuel in the kilns.

From the KIIs open burning is prohibited however; it takes place at the dumpsites, collection points and sometimes on street sides. Even though during this assessment a number of open burning of waste was witnessed especially at collection points, the operations manager estimates that burning of waste happens at about 10% in the County.



Figure 8.1: Waste burning at collection point and at Kibarani dump site

Mombasa, more than any other County appears to have a lot of waste collection equipment including a fleet of 83 trucks and a number of heavy equipment. In their 2016/2017 County Annual Development Plan, the County highlights removal of waste from strategic places no wonder a large fleet has been assembled for the same. Some of the fleet are as show in the Figure 8.2 below.



Figure 8.2: Waste collection equipment and vehicles at the County Yard

Despite the County having procured a number of waste collection trucks and equipment, there is still a lot of accumulations at the collection points with delayed collection attracting a number of informal waste recovery activities and open burning at those temporary collection areas. It is understood that waste collection, transportation and disposal is mainly done by the County Government with CBOs being agents for primary collection where generators make payments to them. For primary waste collection, CBO groups use home-made hand carts. It was not easy for the operation's manager to ascertain the number of CBO groups conducting primary waste collection though they are in all the four (4) operations zones in varied numbers. Even though the CBOs conduct primary waste collection where they are in immediate contact with waste from the source, very few of them are engaged in recovery activities. Nonetheless and just like in the other counties, different waste streams including plastic, organics, paper, metal, glass, cardboard are resourced mainly from households, schools and churches, industries and from other institutions.

Concerning waste separation, there is no formal arrangement except for a few community based groups and individuals who pick different waste streams at points of collection and at the disposal sites.

Mombasa County does not appear to have adequate capacity for solid waste management. This is in terms of human resource. At the time of this assessment, Director of Environment had just been recruited and was not in a position to provide any information regarding waste management operations. It was also not possible to reach out to the Chief Officer who according to the information from the Director, could be in a position to share the draft bill that the County had developed to guide solid waste management operations. The Operations Manager who apparently has been in the County for over 10 years also could not provide any information regarding their operations as well as future plans for waste management activities. Even though the Operations Manager organized for a meeting during the assessment, such meeting was attended mainly by students who are on attachment from Universities.

8.3 3R Promotion and its Related Activities in Mombasa County

From the interview conducted with Operations Manager, it was understood that once the Solid Waste Management Bill is passed, there would be a formal way in dealing with non-state actors on waste recovery and other value addition activities since the Bill promotes waste reduction, re-use and recycling amongst other issues. A number of those currently engaged in 3R activities are the CBOs who are also facilitating primary waste collection and transferring to collection centres. The County Government through various processes have in the past developed a number of other documents which would facilitate 3R promotion including, standard operating procedures for recycling and solid waste collection in high density areas, the service level agreement for recycling and solid waste collection, the Green City's Act and the Waste Characterization Study but up to the time of this assessment, none is being referred to in the officials' day to day operations. Furthermore, the County appears to operate with a very lean and non-technical staff for solid waste management who may not really be able to push the agenda for 3R to the next level in the County.

8.4 Non-State Actors in Solid Waste Management, 3R Promotion and its Related Activities in Mombasa County

Using the same questionnaire administered to respondents from the other three (3) already discussed counties, this study sought to ascertain a number of issues related non-state actor's activities in relation to solid waste management in Mombasa County. These included; nature of waste dealt in, sources of the waste, waste handling, supplier networks, quantity of waste handled, challenges faced and governance arrangements for better waste management.

Characteristics of the Study Respondents

Given the fact that the entry point for Mombasa fieldwork activities on 3R promotion and its related activities was guided by World Vision, an organization that has worked for a long time with non-state actors on this subject, data collection took place in the sub-counties of Changamwe and Jomvu. The other sub-counties could also be having some actors on 3R promotion according to information obtained from the SWM-Operations Manager of Mombasa County but nobody had actual information on any group.

There were 17 respondents to the questionnaire with majority (76%) being male and (24 %) female. This trend appears similar to the other counties where men are more involved in 3R promotion and its related activities. The age distribution ranged between 23 years, being the youngest and 51 years being the oldest. While some of these groups have been in existence since 2007 yet others came into existence in 2017.

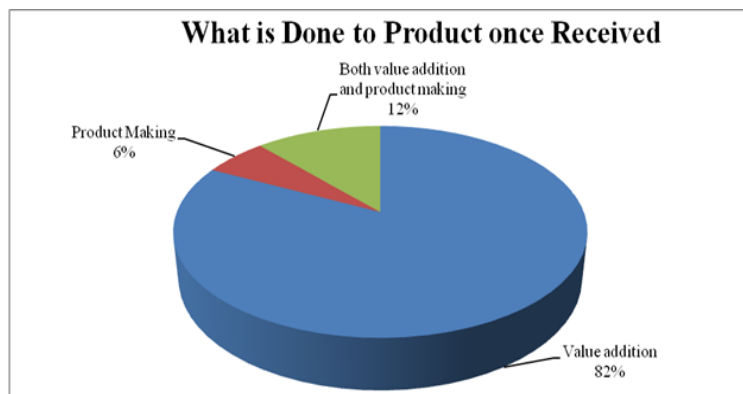


Figure 8.3: Waste handling

From Figure 8.3, majority of these non-state actors conduct value addition mainly sorting to waste once received. Only a few make final products which include, beads used in jewellerys such as necklaces, earrings and mats. The most practiced value addition activity is sorting waste into different streams, colour and type. There is also limited re-use where waste bottles are used to plant seedlings and broken buckets used as waste bins.

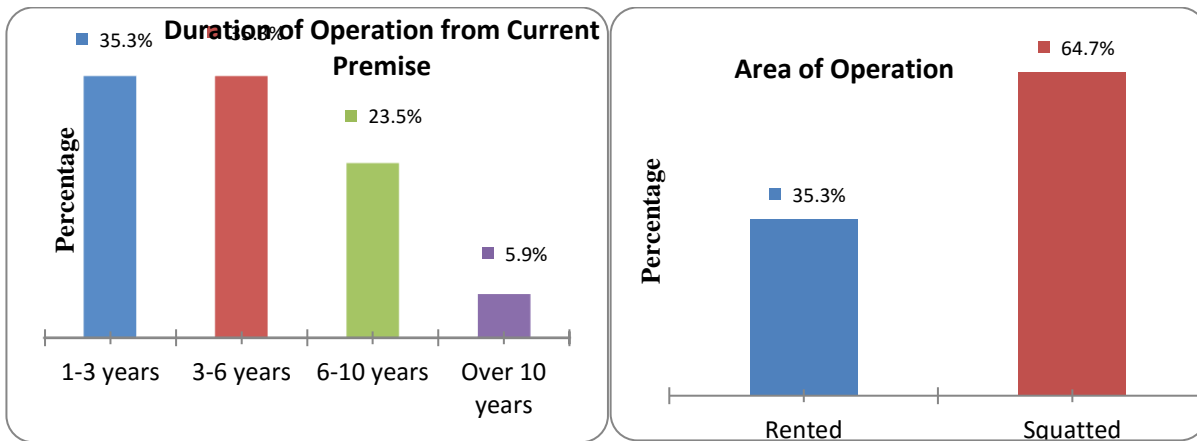


Figure 8.4: Duration and Area of operation

In Mombasa, many of the non-state actors have only conducted 3R activities for between 1-6 years with only about 6% having been in these activities for over 10 years. This is unlike in the other counties where waste recovery activities started almost over three (3) decades ago. When it comes to which waste stream is in high demand, the following were listed in this order with actors handling between 80-9,600 kg per month: -

- Hard plastic
- Plastic bottles
- Organics
- Metals
- Paper

Majority of the actors earned only between Ksh 5,000-10,000 per month. However, given that they also conduct primary waste collection where residents pay them for such services their monthly returns are higher.

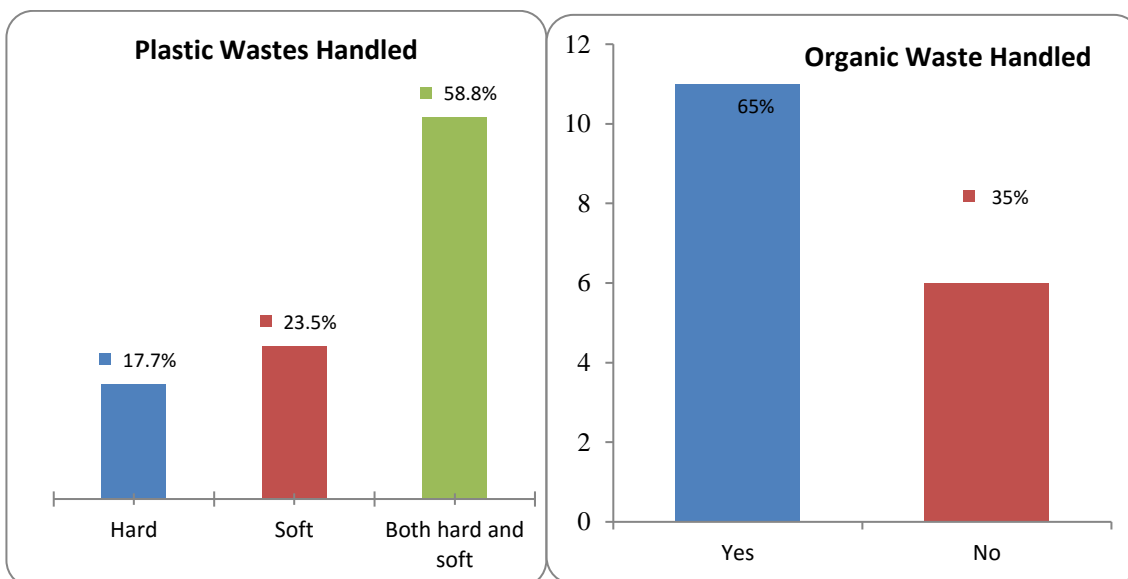


Figure 8.5: Plastic and Organic waste handled

Figure 8.5 above, shows that majority (58.8%) of the non-state actors handled both hard and soft plastics with only about 17.7 % handling only hard plastics. This is the common trend that is happening also in the other three counties already discussed. Hard plastics are sold for Ksh. 15 per kg while soft plastics go for Ksh. 7 per kg. While Mbuyuni Youth Group, one of the main groups dealing in hard plastics decreed lack of market for their plastic waste, Mombasa County has one of the oldest plastic recycling industry called, Modern Soap Limited which handles up-to 120 tons of all plastic polymer wastes except for the Polyvinyl Chloride. It would be important that a forum is created especially by the County Government where recycling industries can be introduced to informal actors.

Both cardboard and newspapers is sold for Ksh. 20 per kg the same as glass. Even though these are the prices that some of the actors listed, many could not confidently speak about the unit prices for the different wastes they sold despite the fact that much of their waste was bought by middle men just within their areas of operations. For those who made final products, necklaces are sold for Ksh 200 per piece and charcoal briquette is Ksh 40 per kg.

When asked what motivated them into value addition activities on solid waste, many mention both income generation as well as to ensure a clean environment. Many who mentioned income generation reiterated lack of employment opportunities to be the driving factor. Many operated without any license except for a permit letter given by the County Government. The lack of operating license for these non-state actors either indicates the good will that the County Government has advanced to them to promote their collaboration or it may also mean that their 3R promotion and related activities are still at very infancy stages.

Many of these actors did not collaborate with any organization. However, they received support in the form of working tools and equipment, trainings, linkage to the markets, protective clothing and some funds mainly from World Vision. NEMA and the Governor’s office also provided some support in the forms mentioned above once in a while. However, many still got trainings and operated with protective clothing implying that they are aware of the health exposures to waste management.

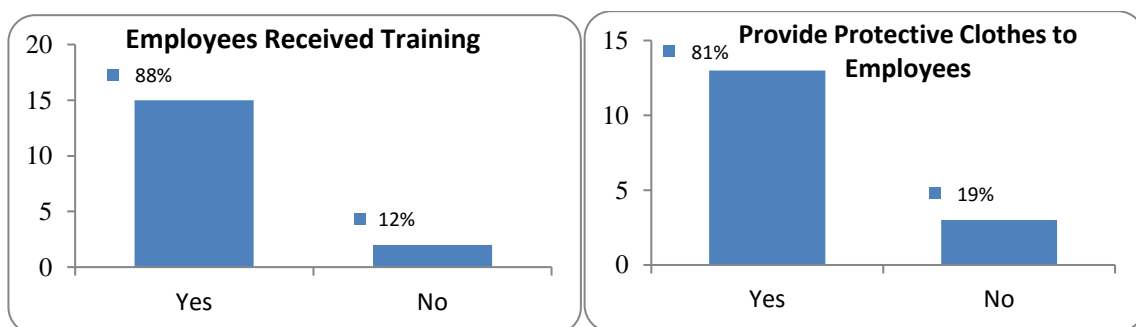


Figure 8.6: Training of employees and Provision of protective clothing

Concerning awareness on the National Solid Waste Management Strategy, majority are aware of its development but are still eager to be taken through the requirements and how such a strategy can benefit their activities. On the ban of plastic waste especially the carrier bags, many felt it would be good for the environment but wondered what would be done by the already existing waste in the environment. Of course, there are those who feel that the use of plastic bags has permeated the society and changing shopping habits would take long to benefit a clean environment. In addition, waste at the point of

generation is mainly contained in liner bags and many felt that if liner bags are also banned then, operations of waste collection would be hampered.

Follow ups were made on particular non-state actors in order to ascertain in depth information regarding their use of waste.

Bamburi Portland cement

Interview was conducted with the Environment and Safety Manager of the Company who informed that tyre waste is used as part of the energy feeding to the cement kiln. However, such tyre waste is sourced from the company clients as opposed from any non-state actors who resource materials from waste. When asked why they do not open up waste usage in their production, the Manager informed that there is the capacity to even use more waste tyre but due to transportation costs, they prefer to receive such waste from clients whenever they come to collect cement. This implies that if tyre waste is to be received in Kenya's major cement producing companies then the logistics for delivery must be worked out.

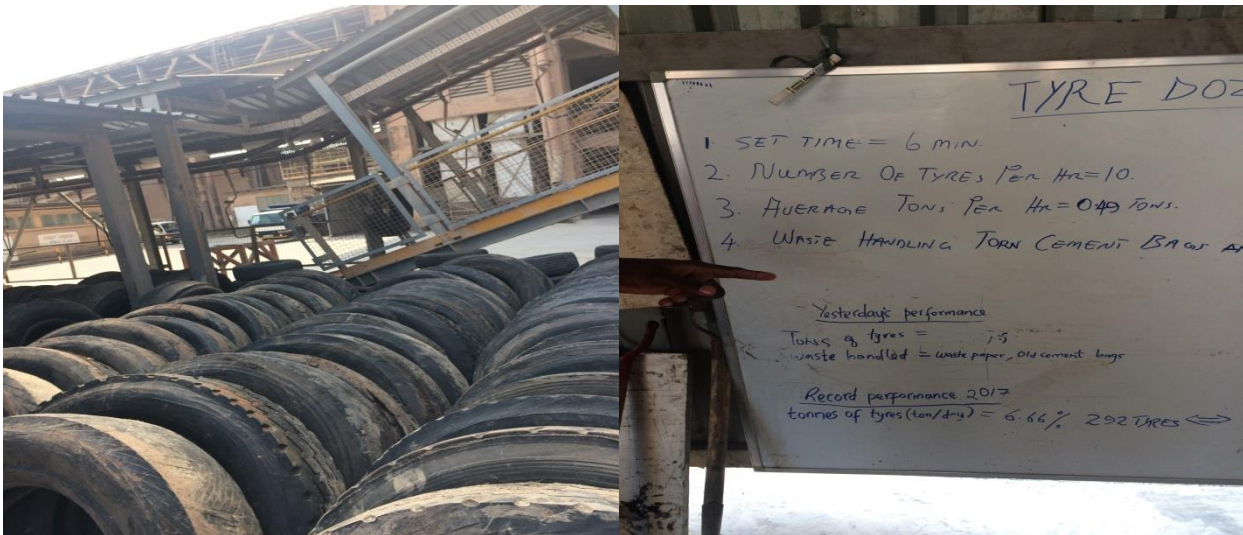


Figure 8.7: Tyre waste and dozing schedule at Bamburi Cement

Another follow up was made on a group of mothers with children with disability who use both plastic-polythene and paper to make artefacts such as door mats and beads for jewellery. This group is hosted in one of the primary schools in Jomvu sub-county where through collaboration with the school principle, they are able to assemble waste from the school and use it for making their products. It is also within this school that their children who are mainly of autism condition and dedicated a special class and teacher to ensure that despite their conditions, they gain some life skills that can enable them take care of their hygiene and others.



Figure 8.8: A parent making door mat and Autism children in class

The groups which were followed up dealt in organic waste and hard plastic. For the organic waste group, a visit to the site did not indicate much activities implying that such compost materials made are only used in own farm which also did not appear to have a variety of crops.

For the hard-plastic group, the group called, Mombasa West Mazingira Alliance with membership of 15 people have scaled up their activities to the extent that they even have a site which has been allocated to them through the area Member of County Assembly. This group has also benefitted from a donation of a tri-cycle from a well-wisher.



Figure 8.9: Donated tri-cycle at site

The same group conducts primary waste collection and interview with the Secretary indicated that residents have become familiar with their waste recovery activities and many times they find hard plastics have been isolated for them especially in areas where they conduct primary waste collection. From selling of hard plastics, the group is able to add an additional income of at least Ksh 15,000 every month. They are well organized but require more market linkage with the major plastic recycling industries.

8.5 Challenges on waste management and Promotion of 3R and its Related Activities in Mombasa County

During a focus group discussion, a number of challenges were shared to be confronting non-state actors in their way to promotion of 3R and its related activities. They included: -

- Lack of an all-inclusive and proper waste management policy.
- Non-separation of waste leading to heavy contamination.
- Lack of proper machines and equipment to enhance efficiency.
- Lack of adequate space for sorting out waste as well as for storage.
- Fluctuating unit prices for different waste streams.
- Lack of proper and adequate transport.
- Lack of relevant and focused training targeting 3R and its related activities.

In the same vein, the non-state actors were able to make proposals on how such challenges can be overcome. The proposals included: -

- Formulation of a waste management policy that it is inclusive.
- Create awareness among communities on the need to sort out waste and the value for different waste streams.
- Dedicated transport for non-state actors by the County Government to mobilise waste in the whole County for recycling.
- Zoning Mombasa County and allocating working areas for actors handling different waste streams.
- More support for non-state actors in regard to the right working tools and protective clothing.

In all these proposals, the County Government is viewed to be the principal actors followed by the Ministry of Environment and Natural Resources. Others include corporate organizations and the local area leadership.

CHAPTER NINE: STUDY SYNTHESIS, CONCLUSIONS AND RECOMENDATIONS

Based on the analysis, the study draws lessons and challenges that can be leveraged upon by the project, as discussed below.

9.1 Policy, Legislation and Economic Incentives

Key milestones have been achieved in formulation of laws and regulations on solid waste management in Kenya by National and County Governments. However, these laws have not been streamlined with the requirements of the Stockholm Convention particularly to stop open burning of waste. Provisions have been made on promotion of 3Rs by specific County laws without express mention of open burning. Furthermore, such Acts have not provided linkages of 3R promotion and its related activities to stopping the practice of open burning. For example, the County Government Act Section 120, states that a tariff policy adopted by the County Governments or any agency delivering services in the County shall provide guidelines that include promotion of the economic, efficient, effective and sustainable use of resources, the recycling of waste, and other appropriate environmental objectives but these issues have not been addressed in the various County SWM Acts.

The provision in the County Government Act requires that regulations are developed that would provide a framework for economic instruments to support 3R promotion and its related activities and equally have structures of punishment for those who act otherwise. To further demonstrate the mismatch, none of the Counties studied except for Nairobi, has a section within Environment Department for compliance and enforcement. The other counties depended on the support of inspectorate departments headed by different heads with no direct reporting to environment on issues of environmental enforcement. Again, even for Nairobi, no regulations for its SWM Act has been formulated to provide for economic instruments for promotion of 3R and its related activities.

Awareness Creation

All counties appeared to be aware of the implications of open burning and even the steps national government has taken towards waste management like development of a national waste management strategy. These actors still concur that paper and plastic waste are the dominant waste streams resourced across the counties. However, they still appeared to be at different levels of awareness therefore, it would be necessary as a follow up to this assessment to develop tailor made awareness programs that are specific to the actors' additional needs. For example, Nairobi seem to be at higher level where almost all waste streams are resourced, it would therefore be useful if such actors were facilitated to demonstrate the value of those other waste streams to their counterparts in other counties. This would facilitate closing the gap on these disparities of awareness leading to more positive contribution towards stopping open burning and further boost their confidence in 3R related activities.

Kisumu appears to be ahead as far as formation and organization of the non-state actors is concerned since many of the actors interviewed are members of an umbrella association. Such organization would be useful in coalescing their issues in order to attract policy attention, likely to lead to standardization of unit prices of waste materials and products among other things. It would be useful also as a follow up to this assessment for the non-state actors especially the informal ones from other counties to learn the benefits of such umbrella organizations' to the members.

Much of the waste the non-state actors resourced in comingled forms and little separation from source appears to happen across the four counties. The public who are the waste generators still do not know the value of waste nor are they aware of where such waste can be sold. Awareness should therefore be created on the public on value of waste streams, where their markets are, what new products can be made from such wastes, locations for demonstrations and more importantly waste separation at source.

Besides, waste management has gender dimension. Much of the waste management activities from the point of generation are either actualised by women or children who are sent to drop the waste at points of collection. Consequently, awareness creation for example, should be designed in such a way that it introduces waste management separation at the point of generation and presents incentives that are attractive to women including provision of different colour coded containers that can be used to place different waste streams. For the children, they are better placed to up take any new dimension of habits. In this context, waste separation should be introduced in schools as an entry point to promotion of 3R. Equally, sound management of solid waste should be taught in school as part of the social science orientation. Still relevant within the school set up, is the creation of awareness so that schools can set up environmental guardians, camps and exhibitions.

Alongside the above, awareness level in regard to waste management and open burning of waste is still very low amongst the general population. Consequently, Green Belt Movement who is one of the collaborators in this project should move with speed to roll out awareness creation programme using different media modes and focusing on specific groups of the population in the counties.

Plastic bag ban was recently affected in Kenya and key informants were asked about the effect of the ban which they all appreciated as far as maintaining a clean environment is concerned. It would be useful if the Ministry of Environment would employ a similar strategy to bring out the ills of open burning of waste so that change in habits of different groups synonymous with burning of waste can be achieved.

Training & self-monitoring: it appears that in almost all the counties, the workers of the non-state actors have been trained in some form of waste management and have gained skills for general waste handling and financial management. While this is a good step towards their capacity development, it would add more to promotion of 3R and its related activities if these actors focused their trainings on particular waste streams of their interest. This way they would be able to gain in-depth knowledge and skills that would enable them to maximize the material output of that particular waste stream and further enable them to be trainers of other actors in other counties. In addition, many of the non-state actors kept any record of their activities it would be a step in the right direction to develop a self-assessment tool that they can use for monitoring their performance in 3R activities.

Pollution arising from the dump sites: A study done on Kachok dump site in Kisumu indicates high levels of pollution to the near-by streams. Such streams drain into Lake Victoria leading to its pollution. Equally, burning of waste at Kachok dump site reveal emission of pollutants including particulate matter, methane gas and hydrogen sulphide in high concentrations beyond the allowable limits. If these study findings are anything to go by, then Nairobi River that is adjacent to Dandora dumpsite in Nairobi, Makupa Creek adjacent to Kibarani in Mombasa and Lake Nakuru adjacent to Gioto dumpsite in Nakuru are all polluted. The dumpsite areas are also polluted with emissions arising from open burning of waste at sites. It would therefore be necessary that County Governments initiate monitoring activities on

leachate arising from the dumpsites as well as emissions around the dumpsites. Data from such monitoring activities would be useful to inform interventions measures towards management of dumpsite facilities to ensure compliance with the Stockholm Convention on open burning of waste. Furthermore, burning of waste to reduce volume especially from the Kachok dumpsite should stop forthwith.

9.2 Institutional involvement and Governance Issues

Private sector involvement and partnerships: from the whole of this study, it comes out clearly that public institutions are key in institutional arrangements and sometimes service provisions. This service provision has mainly evolved in meeting the objectives of waste collection and disposal. However, non-state actors which includes individual entrepreneurs, community based groups, private sector happen to be the trajectory promoting 3R and its related activities. Individual entrepreneurs and CBO groups can only do value addition on waste to some extent due to their limited technological capacity and financial resources to enable them to acquire such technologies. The private sector has shown to have the capacity to engage new products making out of waste and in this respect, it would be key to develop a framework that would ensure open and level playing field for these actors to engage with private sector. For example, the unit price for different waste streams that ends up at the industry is only determined by the private sector yet it would boost the morale of the informal actors who add some value to waste and ensure their continuity with this business if they participated in discussions around determination of such unit prices. Kenya Association of Manufactures which is the umbrella body of all manufacturers is better positioned to mid wife this arrangement. This is particularly so for a number of individuals and CBO groups who dealt in paper and plastic waste since these wastes end up in the production sector in large quantities.

For those who engaged in final products making including beads, jewels, mats and others, they did not appear to have either inter or intra county umbrella body through which they could market their products either locally or internationally. Each of them in different counties appeared to have their own strategies for marketing their products including exhibiting at the County Agricultural Society of Kenya (ASK) shows and online platforms besides local markets. It would boost the status of such products if KAM created a platform where the actors and the products can be registered and provided with linkages to other markets. In addition, KAM is better placed to access relevant technologies at the international market that would facilitate standardization of such local products resulting into easy access to international markets. Equally, Kenya Bureau of Standards would play a useful role in ensuring that products made of waste materials achieve standardization in order for such to competitively access the market.

In addition, there is need to ensure extension of corporate social responsibility amongst product manufacturers. Such extended responsibilities can go alongside in supporting the value addition activities of the informal waste management actors.

9.3 General recommendations

1. There is need for review of the specific legislations and regulations to outlaw open burning of waste as currently there are no specific mention on open burning in the waste management, air quality regulations and public health act. Further, the County SWM Acts needs urgent reviews to also be in line

with some of the aspirations contained in the County Government Act section 120 that calls for the promotion of economic instruments for waste recycling.

2. There is an urgent need for the ministry of environment to reach out to the County Governments to make them aware and to popularize the requirements of the Stockholm Convention on open burning as this happens sporadically mainly at dumpsites and this assessment revealed that there is no existing structure of engagement between the two levels of governments as far as multi-lateral environment agreements are concerned. In this particular case, it is very urgent since County Governments are the principal actors on solid waste management issues. Taking advantage of the Council of Governors forum as an entry point to create awareness amongst County Governments in respect of the requirement on open burning of waste would be a step in the right direction.

3. County Governments are hardly doing enough for solid waste management in general and promotion of 3R in particular. The first step towards stopping of open burning is for the County Governments to develop and finance waste management strategies that prioritize promotion of 3R. Such strategies would compel County Governments to map and organize the waste pickers at their designated dumpsites. This would enable monitoring of what they are doing as they conduct their material recovery. Material recovery at the dumpsites is rampant thus the justification as an entry point. This should then be followed with awareness creation on the implications of open burning of waste to the health of informal actors recovering wastes at the dump sites. Alongside this, there is need to secure the dump sites with a fence and start to monitor both emissions and leachates arising as these are crucial indicators to monitor health and environmental pollution exposures respectively.

4. There is need for urgent collaboration between research institutions including Kenya Medical Research Institute, Kenya Industrial Research and Development, the Universities and non-state actors especially the informal ones to bridge the gap between their innovations and technology. None of the actors in whichever County they operated had any collaboration with either the university or any other research institutions yet they are key in incubation of any of the products being made out of waste materials and even to bring to the fore some of the health implications of open burning in particular and handling of waste in general.

5. It is imperative that if open burning is to stop then the County Governments must urgently prioritize space allocation and working stations for non-state actors even if they are to start with a few of them in every County. This way, the counties would then compel the 3R promoters to be documenting waste streams dealt in and their quantities. As of now, there is no systematic data collection by non-state actors a situation that denies any waste management system to ascertain the exact amount of waste recovered leading to stoppage of open burning. In tandem with this, the Ministry of Environment and Natural Resources should sieve out best available technologies and environmental practices in promotion of 3R and its related activities and implement a program that would expose this group of non-state actors on a periodic basis to such.

6. At the moment, very few non-state actors are keeping any useful data in regard to how much waste and streams dealt in. This situation applies also to the incomes that accrue from 3R promotion activities. It is therefore urgent that a template for self-monitoring and assessment is developed as a starting point that can standardize information arising from these actors. Such information is key to reporting the progress of open burning of waste in Kenya and would be useful to assist County Government in future planning of solid waste management infrastructure to be developed.

9.4 County Specific recommendations

Nakuru County: NASWAMA may have been the entry point for promotion of 3R activities in Nakuru since it brings together all the CBOs who are licensed to collect, transport and dispose of waste in Nakuru County. However, NASWAMA is an umbrella organization only for CBOs collecting and transporting waste. If NASWAMA is to serve as the entry point, then there will be need to re-orient the activities of its members towards 3R promotion and further train the actors on matters related to waste material recovery, sorting and other related value addition activities. In addition, the County Government will have to formalize NASWAMA activities and view the SACCO as the voice through which the numerous CBOs can voice their concern to the County. Furthermore, the SACCO can then be the link between the actors promoting 3R activities and the recycling industries like the Nakuru plastics. Alternatively, other groups including Oasis Women Group and individuals already engaged in 3R activities can serve as the entry point for 3R promotion. Also, the Nakuru Go Green which is a Self-Help Group of 29 people and is producing compost out of barley husks, maize residues and other organic waste can be the entry point for any 3R related activities promotion in respect of organic waste. Nakuru County is the Country's bread basket and agricultural waste in the form of organics must be well managed.

Kisumu County: Bamato Environment and Sanitation Initiative is a well-established CBO SACCO with massive technological capacity for promotion of 3R. However, the SACCO appeared to be embroiled in competition with recycling industries. This tug of war can only be resolved by the County Government by limiting the operating licenses of the SACCO to semi processing of waste materials as opposed to final products making. It was also reiterated by the County NEMA Director that the SACCO has been supported for a long time by different organizations yet they seem not to be on any development path. It would therefore be necessary to train the SACCO members on entrepreneurial skills and also unlock the bottleneck around power supply to the SACCO facility. This is supported by the fact that the area where the SACCO is located is not an industrial area, small and is only rented.

Also, there is the Kisumu Solid Waste Management Plan that is being spearheaded by the French Government. It would be useful to explore possibilities of creating urban nexus by anchoring the agenda for stoppage of open burning of waste and diffusion of best environmental practices through such programmes.

Nairobi County: non-state actors involved in 3R and its related activities in Nairobi appear to have invested a lot of financial resources in their activities and handle/divert huge amounts of waste from open burning. They have also developed a good rapport with County Government Department of Environment. Such relationship would go a long way in ensuring that much waste is diverted from open burning if the County Government can fast-track site allocation for them even if every sub-county could have one site to assemble all 3R promotion and its related activities actors. This would also serve as a step towards the realization of the key milestones contained in the County's Integrated Solid Waste Management Plan. Taka Taka Solution, WEEE Centre, December Waste Paper and Kleanbira Youth Group are some of the non-state actors whom this project could start with for the next phase of capacity building so that they can serve trainers of trainers for actors within Nairobi and in other counties. These groups are located in different sub-counties which bring in diversity of experiences from different local contexts.

Nairobi also has a number of initiatives with other bilateral partners through which urban nexus could be created to infuse the agenda for stoppage of open burning of waste. It would be a step in the right direction to explore such possibilities in the next stage of this project.

Mombasa County: There is need to very targeting training and capacity building for non-state actors involved in 3R and its related activities as their activities are still very low, handle very limited quantities of waste and those who do it, only do it a secondary undertaking not a primary concern. The same training should also be done on the County officials who apparently do not even know the location of the non-state actors on 3R promotion and its related activities yet these actors when well equipped with knowledge have demonstrated to divert huge quantities of waste from open burning. The level of open burning at collection centres in Mombasa County deserve specially awareness attention on the implications of open burning and the possible penalties levelled against those who conduct such activities.

In conclusion, it is noted that Green Belt Movement and Kenya Disaster Concern would be the key organizations in rolling out awareness programme on 3R and its related activities for this project. Such awareness programme can take any form as the strategy would depend on what resources are available. Nonetheless in a County like Mombasa where awareness on promotion of 3R and its related activities is very low, there would be need to combine print and electronic mediums of awareness creation with lots on electronic media.

Annexes

6.1: Study recommendations for fast-tracking

1. There is need for review and conduct assessment of the relevant legislations and regulations at national and county levels to identify legal gaps towards strengthening the legal frameworks to address open burning and implementation of Stockholm Convention in line with BAT/BEP guidelines of the Convention. The assessments will also develop priority recommendations for legal reform and gap filling on open burning in the existing legislations and regulations,
2. There is need for County Governments to conduct stakeholders' identification and maintain a register of the non-state actors involved in 3R activities to help document such activities. This would enable monitoring of their activities and impacts of their material recovery at the dumpsites and elsewhere. Such action should then be followed with awareness creation on the implications of open burning of waste to the health of those involved.
3. The Ministry of Environment and Natural Resources should conduct sensitization for the County Governments on the Stockholm Convention BAT/BEP guidelines on open burning, conduct training needs assessments and follow with trainings on implementation of the SC BAT/BEP guidelines.
4. Urgent collaboration between research institutions and non-state actors especially the informal ones to bridge the gap between their innovations and technology is required. None of the non-state actors in whichever county they operated had any collaboration with either the university or any other research institutions yet they are key in incubation of any of the products being made out of waste materials.

County Specific recommendations:

Kisumu County: Bamato Environment and Sanitation Initiative is a well-established CBO SACCO with massive technological capacity for promotion of 3R. However, the SACCO appeared to be embroiled in competition with recycling industries. The project should follow up to this group with a training on entrepreneurial skills and further engage the County Government of Kisumu to limit the group's operating license to semi processing of waste materials as opposed to final products making. This would place the SACCO on the path to recovery and grounding at this particular segment of the waste recycling chain.

Nakuru County: A follow up should be made with the Nakuru Go Green group who are currently using some organic waste segments to make compost so that they can expand the network for organic waste material to also receive those from the municipal markets and others in order to set an enterprise for compost production in Nakuru.

Nairobi County: non-state actors involved in 3R and its related activities in Nairobi appear to have invested a lot of financial resources in their activities and handle/divert huge amounts of waste from open burning. They have also developed a good rapport with County Government Department of Environment. Such relationship would go a long way in ensuring that much waste is diverted from open burning if the County Government can fast-track site allocation for them even if every sub-county could have one site to assemble all 3R promotion and its related activities actors. This would also serve as a step towards the realization of the key milestones contained in the County's Integrated Solid Waste Management Plan. Taka Taka Solution, WEEE Centre and December Waste Paper are some of the non-

state actors whom this project could start with for the next phase of capacity building so that they can serve trainers of trainers for actors within Nairobi and in other counties.

Mombasa County: There is need a targeting training and capacity building for non-state actors involved in 3R and its related activities as their activities are still very low scale. The same training should also be done on the County Government officials who apparently do not even know the location of the non-state actors on 3R promotion and its related activities yet these actors when well equipped with knowledge have demonstrated to divert huge quantities of waste from open burning. Urgent follow up still with the County Government with awareness creation to stop open burning at collection centres in Mombasa County deserve special attention on the implications of open burning and the possible penalties levelled against those who conduct such activities.

Finally, the need to conduct an inventory of 3R related activities and their actors as well as detailed quantities handled cannot be overemphasized for all the counties. This would place the project on the path to proper documentation of impacts of stopping open burning of waste.

6.2 Non-State Actors in 3R Promotion and its related activities (Individual, CBOS, CBO-SACCOS or Youth Groups) & Circumstances of their operations

COUNTY OF OPERATION (NAIROBI, NAKURU, KISUMU, MOMBASA) - tick as appropriate

Name of sub-county -----

Name officer collecting this information.....

Date

collected.....

General Profile Information:

1. Name of Respondent and contact.....
2. Gender: Male Female.....
3. Age of respondent.....
4. Name of Organization/Individual.....
b) When was the organization started/when did you start these activities.....
5. Physical location of your activities/operations.....
6. If organization, how many members/employees are there: Male..... Female.....
7. Are the members/employees trained?
If yes what skills do they have.....
.....
.....
.....
8. Do you provide any protective clothing to your members/workers? Yes () No ()
9. Is this area you operate from rented (), squatted on () or bought ()
10. For how long have you operated from here, 1-3 yrs. (), 3-6 yrs.(), 6-10 yrs.(), over 10 yrs.()
11. What operational licenses do you have and from which organization?
12. How much does such licenses cost in Ksh per year?

Waste dealt in

1. How much of waste do you handle per day/week/month in kilograms?
2. What type of waste do you handle?
 - (i) Plastics: (a) Hard (b) Soft
 - (ii) Paper (a) Cardboard (b) Newspapers

- (ii) Metal
- (iii) Glass
- (iv) Organic
- (v) Others (specify)

3. What motivated you into management of waste?

.....

.....

.....

4. What is the source of your waste?

- (i) Household
- (ii) Industries
- (iii) Commercial (specify)
- (iv) Pickers
- (v) Institutions
- (vi) Other (specify)

What is done with waste once received

1. What do you do with the waste once you receive it?

- (a) Value addition
- (b) Product making

2. If value addition in (a) above, please explain

.....

.....

.....

3. (a) Who do you supply to?.....

(b) Where are your customers based?

(c) How much do your customers buy per kilogram for each product?

(d) In your view, which of your products is in high demand?

.....

.....

.....

4. If product making in 1(b) above, please explain

.....

.....

.....

.....

5. How much of waste material does each of your final product take in kilograms?

- 6. Whom do you sell to?
- 7. Where are your buyers located?
- 8. How much does each of your final product cost in Kenya shillings?
- 9. How much are your returns per month in Kenya shillings?.....
- 10. How do you handle the remaining waste material?.....

Challenges faced

What challenges do you face?

.....

.....

.....

6.3 Interview with County officials in charge for solid waste management affairs on 3R

(NAIROBI, NAKURU, KISUMU, MOMBASA) - tick as appropriate

Name of the officer being interviewed

Position of the Officer and Department.....

Date of the interview

Solid Waste situation:

- 1. How much waste is generated within your county?
- 2. Where is it disposed of?
- 3. Do you have a weighbridge on site and if yes, does it work consistently?
- 4. Approximate how much waste you collect and dispose in a day in tons?
 - b) Is there any separation of waste that takes place at the point of generation?
 - c) If yes, is it by county law or informally done?
 - d) If by any law, kindly mention the law and the section
 - e) How many recyclers do you have in your county?
 - f) Are they registered and if yes, are there any requirements and fees?
 - g) Which type of waste do they deal in?
- 5. Can you approximate how much waste is burned?
- 6. In your view, where does such burning take place?
- 7. Are you aware of where medical waste goes to?
- 8. Are there instances where such wastes find their way to the disposal site of the county?
and if yes, how do you deal with such situations?
- 9. In your view, does the county have both technical and infrastructural capacity to undertake 3R promotion?
- 10. If recyclers can promote 3R in your county, what support can your county lend them and which groups do you think are better suited to carry forward the 3R agenda?

Policy for waste management

- 5. Does your county have a documented policy or regulations for solid waste management?.....
- 6. What does such policy say about promotion of 3R?

7. What steps has your county taken to promote 3R as part of the overall solid waste management?
.....
.....
.....
8. Are you aware of the National strategy for SWM? and if yes, what has your county done to implement it?
.....
.....
9. Are you aware of the recently announced ban on manufacture, use, sale and importation of plastic carrier bags?
10. Who you do collaborate with in SWM in your county and what are those areas of collaboration?
.....
.....
.....
.....

6.4 List of actors who responded to the 3R Questionnaires and interviews in Nakuru County

S/No.	Name of respondent	Organization	Contact
1	Joash Nyakenya Omayo	Josmeala Hygiene Services	0721621285
2	Charles Mwangi	Manyani Environmental Youth Group	0710707738
3	James Nderitu	RocBo Multipurpose Society	0720983186
4	Ben Njoroge	SNK Enterprise	0728979325
5	Beatrice Chepng'eno	Tembo Cleaning Services	0729553755
6	Rotich K. Nicholas	Toje Environmental Services	0720601112
7	Irene Njoroge Kunyua	Oasis Women Group	0723942761
8	David Nzuki	Trashcan Umoja	0722586893
9	Simon Chege	Pangani Cleaner SHG	0721734530
10	Henry Masira	Mwamba Hygiene Services	Nil
11	Mary Wanja Mwathi	Griincom	Nil
12	James Gikaru Kang'ethe	Mwariki Pembe Mbili	0722912298
13	Hannah Njenga	Johapasi Moderate Cleaners	0722995781
14	Assumpta Nyambura	Green and Sparkle Organization	0716395595
15	Isack Kariuki Maina	Potential Education Research Network	0724450988
16	Hellen Wanjiu Maina	Individual	0726918446
17	Dr. Muriithi Kiogora	Chief Officer Environment-Nakuru County	0721117441

6.5 List of participants for the focus group meeting and interviews in Kisumu County - 2nd August 2017

S/No.	Name of respondent	Organization	Contact
1	Michael Odhiambo Otieno	Takawiri	0720668591
2	Joab Oluoch	Vuka Sasa Youth Group	
3	Claris Atieno	Touching Lives Integrated Group	0703694316
4	Raymond Ojwang'	Bamato Group	0727250859
5	Hellen Ajwang' Oywer	Nyalenda Active Disable Group	0716804507
6	Ben Makalaka	CBO Network	0725116945
7	Daniel Owino Opondo	Kicomi Project	0716098602
8	Owino Opondo	ZoomLion General Investment	0716098602
9	Willis Ouma Owaga	Individual	Nil
10	Phoebe Ogada	Taka Bora	0729644212
11	Jackline Akinyi Ochieng'	Individaul	Nil
12	Valentine Odhiambo Mingeyi	Bamato Environmental & Sanitation Project	0722471880
13	Erastus Nyamanga	Normal Difference	0727618880
14	Maurice Otieno	Individual	0727630129
15	Josephat Kibwobi	Individual	0723353387
16	Mary Rose Ogana	Individual	0721848296
17	Ruth Helida Otieno	Tem Atema Women Group	0728209399
18	Nashon Nyanga Okong'o	Taka En Pesa	0721595032
19	John Ochieng Orinda	Dump site Manager-Kisumu County	0728047809
20	Michael Sande	Director-Kisumu County	0720777056

6.6 List of participants for the focus group meeting and interviews in Nairobi County - 18th August 2017

S/No.	Name of respondent	Organization	Contact
1	Sospeter Githahu	Marurui United Youth Organization	0724965955
2	Daniel Pallehole	Taka Taka Solution	0710342203
3	Ibrahim Irungu	Individual	Nil
4	Nick Otieno	December Waste Company	0764853653; 0723853653
5	Seth Munyambu	Waste Electrical and Electronic Equipment (WEEE) Centre	0733986558
6	Boniface Mbithi	General Manager-WEEE Centre	0724429846
7	Lindah Morgan	Twaweza Initiative	Nil
8	Samwel Mwangi	Ecotaste Waste Management Ltd	0734404703; 0725640654
9	Amos Mutugi Wachira	Blue Garbage	072153701
10	Nicodemus Muriuki	Kasintr Youth Group	0701131238
11	Samuel Gitonga	Makinina Youth Group	0700534569
12	Nelson Ndungu	Individual	07108301724
13	John Njoka Mbugua	DMG	Nil
14	James Waweru Njuguna	Unified Self-Help Group	Nil
15	Urbunus Gichuhi Wamwea	Ghetto Pamoja Development Group	0720309079
16	Desmond Tutu	Riruta Environmental Group	0720107712
17	Peter Macharia Kanyi	City Garbage Recyclers	0728966826
18	Ahmed Kweya Esinapwakne	Gove Youth Group	0722491763
19	Karimi John	Kwa Karimi	0726648399
20	Thomas Isoka	Mr. Green Trading Africa Kenya Ltd	0729487181
21	Ibrahim Osman	Nexgen Recycling	0706501466
22	Eunice Kiiru	Eunice Wangeci Kiiru	0720449738
23	Richard Jobese	Community Transformative Agents	0722467264
24	Pharis Wanyama	Taka Taka Solution	0724378061
25	Duncan Miheso	Nairobi County Environment Officer	0724378061
26	Purity Wanjohi		nyawirawanjohi@gmail.com
27	Christine Kivuva	Nairobi County Environment Officer	christinemwendek@gmail.com
28	Samson Omondi	Technical University of Kenya	0724217641
29	Grace Ojiayo	Nairobi County Environment Officer	0725009801
30	Patricia Komudho	Nairobi County Environment Officer	0733790546
31	David Makori	Nairobi County Assistant Director of Environment	0720928721
32	Nancy Wangome	Anchors (UMI)	nmwangome@gmail.com
33	Salome Machua	NEMA	0722212644
34	Isaac Muraya	Director-Nairobi City County	0722840131
35	Andrew Adendo	Dump site Manager-Nairobi City County	0722931458

6.7 List of participants for the focus group meeting and interviews in Mombasa - 29th August 2017

S/No.	Name of respondent	Organization	Contact
1	Ibrahim Toi	Big Ship Group	0718206915
2	Mohamed Bagoshi	Bidii Kweli	0729097075
3	Abdallah Mbat	Miritini C	0734909226
4	Kennedy King'oku	Mombasa West Youth Group	0702349380
5	Mohammed Kashindo	Chaani United Self Help Group	0714597793
6	Mwinyi Joto	Mimihesa Group	0791617928
7	Emmanuel Jekozi	NHYCT	0708150404
8	Esther M. Mugo	ACT of LIFE Youth Group	0728667779
9	Elijah Odhuso	FIBI	0718363737
10	Eunice N. Mussomba	Mikindani Self Help Group	0704949877
11	Sammy Klachira	Airport Cleaners	0796340649
12	Sauda Kibibi	Wayani Youth Group	0702203284
13	Christine M. Matheka	Double Grace SHG	0717741495
14	Florence Awuori	Mbuyuni Youth Group	0700272589
15	Bosco Juma	Big Ship	0720040071
16	James Katana	Imarisha Vijana	0723734303
17	Josephat Siele	World Vision	0716445076
18	Boniface Wanyonyi	Operations Manager-Mombasa County	0720725127
19	Otieno Arowo	Environment & Safety Manager-Bamburi	0724231045