

Journal of **Environment** (JE)

**Influence Of Stakeholders Participation And Management Of Solid
Waste Disposal. A Critical Literature Review.**



CARI
Journals

Influence of Stakeholders Participation and Management of Solid Waste Disposal. A Critical Literature Review.

¹*Elizabeth Muturi

Graduate: School of Environment and Soil Sciences, Moi University

Corresponding Author's Email: muturi@iprjb.com

ABSTRACT

Purpose: Solid waste is the remnant of the refuse that is collected and discarded by the public either in a managed system or in a mismanaged way. It also includes garbage or trash which consists of everyday items discarded by the public, for example plastic papers and containers, kitchen refuse, and market waste. The general objective of the study was to examine influence of stakeholder's participation and management of solid waste disposal. A critical literature review.

Methodology: The paper used a desk study review methodology where relevant empirical literature was reviewed to identify main themes and to extract knowledge gaps.

Findings: The study concludes that the stakeholders are local and national government municipalities; city corporations; non-governmental organizations (NGO's); households, private contractor; Ministries of Health and Environment. The authorities, local and national municipalities, are largely responsible for the Waste Collection in the waste management chain. The Ministry of Health was is the most important stakeholder, followed by municipalities and solid waste management councils. The constitution of Kenya (2010) guarantees the right to a clean and healthy environment for all Kenyan where one of the functions of counties is solid waste management.

Recommendations: The study recommends that there should be good drainage and proper town planning especially building standards like spacing and reserved areas; urban planning, infrastructural maintenance, and waste management like garbage clearing, and waste channeling; early warning system, reliable forecast, awareness, and inspections; community involvement through farming, afforestation, environmental sanitation, and stoppage of illegal mining; flood protection like dams, gabion, digging trenches, and water harvesting.

Keywords: *influence , stakeholder's ,participation and management solid waste disposal*

INTRODUCTION

Background of the Study

Solid waste is the remnant of the refuse that is collected and discarded by the public either in a managed system or in a mismanaged way. It also includes garbage or trash which consists of everyday items discarded by the public, for example plastic papers and containers, kitchen refuse, and market waste. According to Munala & Moirongo (2011), solid waste is managed for a number of reasons including protection of human health and promotion of the quality of the environment and ensuring sustainability of a clean and healthy living environment. Waste management serves as a good performance indicator for municipalities. Although it is an essential service, solid waste management is not efficiently performed by many cities and towns authorities in developing countries. The most common problems associated with solid waste management in developing countries include: irregular collection services, low collection coverage, open dumps and uncontrolled informal waste scavenging activities (Wang, Jie, Yoonhee, & Takuya, 2011).

According to the United Nations Human Settlements Programme (UNHABITAT) (2010), the environmental movement emerged in the 1960s. Since 1970 developed countries have been investing heavily in recycling and waste management. Some of the challenges developing countries face is managing their towns and cities. One such challenge that has become a threat to the health of the population is poor management of waste disposal including solid waste, poor management of sewage system. In the last 20 years, high income countries have been investing resources in recycling. However, developing countries have been facing numerous challenges in the area of solid waste management. These include: financial constraint, giving low priority to solid waste management sector, and negative public attitudes towards solid waste management (Wang, Jie, Yoonhee, & Takuya, 2011).

In Thailand, the waste produced in 2016 in the city of Bangkok was projected to be around 4.21 Mt translating to 16% of the total waste generated in the country. However, according to Vassanadumrongdee & Kittipongvises, (2018) waste management strategies in Bangkok including use of 3Rs, enhanced waste assembly system and community focused solid waste management are not bearing fruits due to minimal community participation in source separation of waste. Further,

a comparative study focusing on community solid waste management in eight major cities throughout China carried out in the year 2000 concluded that kitchen waste and recyclables should be separated at the source thus stakeholder involvement was found to play an important role in MSWM (Tai et al., 2011). The study also cited enhancement in law, organization mechanisms and civic education as problematic issues that needed to be addressed.

In Kenya, some of the challenges identified in domestic waste management include lack of enforcement plans to oblige waste producers to pay for waste management services especially households, apathy from households given that it has always been responsibility of county council/government to manage waste and lack of proper equipment for waste management, (Monyoncho, 2013). Further, a qualitative study conducted in Makina informal settlements of Kibera slums in Nairobi to assess the household management of domestic solid waste found that Makina residents have inadequate capacity to handle solid wastes generated from their households and the practice of the 3Rs: Reduction, Reuse and Recycling of the domestic solid waste was barely there. The study identified various opportunities that exist in Makina area for improvement of the current situation including community training how to reduce, reuse and recycle DSW which only 7% of the respondents had knowledge on as well as enforcement of waste management by-laws by the Nairobi County Council. The study also recommended consolidation of the efforts of all stakeholders handling DSW in Makina such as the Makina residents, civil societies, international organizations, Private Firms and the Local Government into an integrated approach of waste management (Mwangi, 2011). Further, according to Muthoni, (2014), the major cause for the sustained rise in unmanageable SWM in Nairobi is basic social factors such as trust, accountability, communication and commitment breakdown amongst the stakeholders.

According to the UN-Habitat, (2010) municipalities have in the recent past come to the realization that they cannot successfully collect and remove waste without active participation and cooperation from community members who are the service users. As such there is a broad agreement that integrated solid waste management is the future as it provides the important intersection between the stakeholders, the elements and the sustainability aspects of a successful waste management system. ISWM is designed to improve the performance of solid waste system

and to support sound decision-making by helping municipalities and other stakeholders to understand how the different parts of the system relate to each other. In the ISWM, a stakeholder is a person or an organization that has a stake, or an interest in waste management (UN-Habitat, 2010). The municipalities, whose general responsibility is urban cleanliness and the citizens or households who use the system, are (almost) always stakeholders in waste management. Other stakeholders differ from city to city, so they need to be identified in the local context and often also grouped according to their interests. The private sector organizations involved in providing any waste management service and any other organizations that provide any funding for the ISWM (local and national government, NGOs, aid agencies) are also stakeholders. 12 In ISWM, Influencing Factors are a set of tools to be used by municipal managers to perceive, study and balance priorities and create measures to give the desired results.

The EPA, (2012) outlines institutional factors, fiscal factors, technical factors, environmental factors as well as social factors as the factors that influence the selection, operation and effectiveness of any waste management scheme. Here, Institutional factors are the legislations, processes and policies that allow the government to properly implement ISWM. It should be ensured that a country has passed laws and established a national policy on solid waste management standards and practices. Further the roles and responsibilities of each stakeholder should be spelt out and local authorities equipped with resources to implement the ISWM plan. Fiscal factors refer to the cost of implementing the various waste management activities. The sources of funding both the short-term and long-term aspects of ISWM should be identified. Technical factors are those that relate to location and equipment to be used in waste management and they include projected waste generation, geological factors, transport distances and equipment as well as training necessary to perform waste management activities.

Environmental factors focus on the effects of waste management on land, water and air. They also relate to pollution control and public health concerns. Compliance with national standards should be monitored to ensure health risks are minimized and the environment is conserved. Finally, social factors relate to local customs, religious practices and public education as regards waste management. Citizen participation in all phases of waste management planning should be

encouraged to help gain community awareness, input and acceptance. This model was adopted because of its integrated approach to waste management; its recognition of the role of various stakeholders/ the public in the sustainable management of waste. This is 13 important in analyzing the waste management system which is the intention of this study with particular regard to stakeholder participation in solid waste management. Stakeholder participation in solid waste management takes various forms. According to Asnani and Zurbrugg, (2007) community involvement may be carried out through consultation where those in power hear from community members, business owners and industries on the type and frequency of services they desire, their willingness to pay for the desired services and at what frequency and their commitment and willingness to take part in decision making regarding waste management aspects like collection, transport, treatment and disposal. In the United States of America, laws have been put in place in various states to involve stakeholders in waste collection, recycling and re-use especially of electronic items through engagement with them. According to Kahhat et al., (2008), in Washington producers of computers, laptops and televisions are required to offer recycling services to their customers by the Electronic Product Recycling Law put in place in 2006.

According to Adongo et al., (2015), in Tamale Ghana, all-inclusive collaboration between stakeholders in the management of waste in the area improved waste management by bringing innovations like adding value to waste by turning it into fertilizers and partnerships among stakeholders were found to promote information flow. In terms of communication, Mbeng, Phillips & Fairweather, (2009) cite flow of information as important for the implementation of the 3Rs, waste deterrence and composting among people. Another element of stakeholder participation in waste management is through partnerships between authorities and private entities. In Nairobi, Kenya, Public-Private cooperation in waste management was initiated in 1997 by the then City Council of Nairobi focusing on garbage collection, sweeping of streets and transportation of waste to Dandora 14 dumpsite by hired waste handlers, this was found to improve waste collection by 40% to 90% (Njoroge, Kimani & Ndunge, 2014).

According to Tauhid-Ur-Rahman, (2006) majority of community members are prepared to play a role in order to improve DWM and agree that their involvement is important for enhanced DWM

and general setting of a locality. Public hearings, public meetings and workshops are some of the most widely used forums for public involvement. Public meetings gather varying stakeholders to interact with an audience in information sharing and conversation at any point of public involvement with the aim of cultivating a feeling of community and building consensus (EPA, 2017). By their nature public meetings tend to be informal with no explicit agenda except for providing stakeholders a platform to hear from one another. Out of public meetings which usually bring together large groupings of people, smaller dialogue meetings or focus group discussions may be carried out by a few like-minded stakeholders. According to the Urban Environment Thematic Group, (2004), advisory groups and task forces may also be used as forums for public involvement. Advisory groups are beneficial in giving the stakeholder's views throughout a process and provide a chance for consultations between key stakeholders to ensure that reliable information comes out of advisory group sittings.

In America, Los Angeles County Solid Waste Management Committee/Integrated Waste Management Task Force, (2019) reports of monthly taskforces meetings comprising of local government representatives, SWM and recycling industry partners, community members and business owners that look into solid waste management issues like facilities expansion and to hear views from each stakeholder. According to IGES (2018), a focus group discussion (FGD) on Development of National Strategy to Reduce Short-Lived Climate Pollutants (SLCP) from Municipal Solid Waste Management (MSWM) in the Philippines, (2018) came up with recommendations for the draft National Strategy on the same. In Nkulumane Suburb of Zimbabwe, Sinthumule & Mkumbuzi, (2019) in their study on participation on communitybased solid waste management found community meetings as some of the forums through which stakeholders take part in SWM. Though the community meetings were found to be low-priority for the community members, the county council admitted to using such meetings for awareness campaigns. In Nairobi, Community Based Organizations and Youth Groups involvement commenced in 1994 and workshop consultations have been held periodically in the county government of Nairobi with various stakeholders to discuss waste separation at source, waste collection, treatment and recovery and waste collection (Karanja, 2005). In terms of communication practices, Asnani and Zurbrugg, (2007) say that community involvement may be

carried out through consultations where those in power hear from community members, business owners and industries.

Authorities learn, the type and frequency of services desired by stakeholders, their willingness to pay for the desired services and at what frequency and their commitment and willingness to take part in decision making regarding waste management aspects like collection, transport, treatment and disposal. According to the EPA, (2010) community involvement is an essential element of the decision-making process for the setting up of waste management and recycling facilities. In Japan's Ulsan Northern District, the problems around the construction of a food waste recycling facility were fixed consensually using a participatory decision-making tool known as the citizens' jury (Eun, 2016). Consensus building was one of the communication methods used to establish trust between stakeholders. Petts, (1995) advocates for consensus building and citizen panels to address the challenges arising from the not-in -my-backyard phenomenon common in waste management. Consensus- 16 building is meant to enhance the value of community involvement by empowering the communities to take a proactive role in decision making. In A Case Study of Community Involvement and Consensus-Building in Hampshire, Communal disapproval to the placement of waste facilities was partly explained by a failure to directly involve people in essential policy decisions about waste management (Petts, 1995; Hasan, 2004). According to Hasan, (2004) in his paper Public Awareness is Key to Successful Waste Management the public must be made aware of waste management issues to understand the significances of inappropriate management of waste and how it may eventually pose a serious risk to their lives and well-being. Further, Eun, (2016) posits that a constant flow of information to and learning by the stakeholders through deliberating on specific issues (through a focus group interview, regulatory negotiation, a citizen jury, or planning cells) or general ones (through public polling, a citizen advisory committee, or a consensus conference) is an essential requirement for participatory decisionmaking.

Domestic Waste means waste generated from residences (EMCA, 2006). It consists mainly of biodegradable waste which is food and kitchen waste, green waste paper and non-biodegradable such as plastics, glass bottles, cans, metals and wrapping materials. There are varying types of

waste that are categorized as domestic waste. Jouhara et al., (2017) identify domestic waste as follows in different countries: In the USA, majority of the domestic waste comprises of paper, followed by food residue and plastics. Other materials comprising of domestic waste are food waste, yard trimmings, rubber, leather, textiles, metals, wood waste and glass. In the UK, majority of domestic waste comprises of food waste, garden waste, wood and furniture, paper and card, glass, metals, plastics and textiles. In China as well, the largest portion of domestic waste is made up of food residue. Other forms of domestic waste are noncombustibles, rubber, plastics, textiles, paper and wood waste. In India, the typical composition of domestic is largely food and garden waste, followed by paper, textiles, glass and ceramics, plastic / rubber and metal (Mishra et al., 2014). According to Jerie & Tevera, (2014), the major components of the waste generated in the informal sector of Gweru, Zimbabwe includes food and vegetable wastes. Other nonbiodegradable waste in the area includes paper, metal, textiles, rubber and leather products. In Arusha Tanzania, solid wastes include domestic garbage which consists of degradable food wastes, leaves, dead animals, and non-degradable waste such as plastics, bottles, nylon, industries and commercial waste (Yhdego & Kingu, 2016).

In Kenya, domestic waste comprises largely of organic material, paper, plastics, glass and metal and textiles. In Thika, Mugo et al., (2015), found that majority of the waste consisted primarily of four components: paper, plastic, organics and food. Food accounted for 15.51%, paper 18.31%, plastics 17.89% and organics other than food 16.51% respectively obtained at 95% confidence level. Domestic waste management can be described as a mechanism associated with the control of generation, storage, collection, transport, processing and disposal of solid wastes in a way that favors the best interests of public health and takes into considerations environmental concerns. The management of solid waste is a process that has six key elements namely; Waste generation, Waste storage, Waste collection, Waste transfer and transport, Waste processing and recovery and Waste disposal. Waste generation encompasses those activities in which materials are identified as no longer being of value and are either thrown away or gathered together for disposal. The World Bank, (2012), estimates that by 2016 the rate of waste generation globally was 2.1 billion tonnes per 18 year. The rates of waste generation however vary from region to region with Sub-Saharan Africa generating 62 million tonnes per year which translates to an average of 0.65kg per

person per day of waste and East Asia and the Pacific Region is approximately 270 million tonnes per year. NEMA estimates that in Kenya, the waste generation rate in major towns is 2400 tonnes/day in Nairobi, 250 tonnes/day in Nakuru, 400 tonnes/day in Kisumu, 140 tonnes/day in Thika, 600 tonnes/day in Eldoret and 2200 tonnes/day in Mombasa (NEMA, 2014).

Statement of the Problem

Management of household waste in the urban centers continues to be a major due to the fastgrowing population. In residential areas in Ruiru, open dumping sites continue to emerge due to rapid urbanization and population growth despite the county government's efforts in waste management. Njogu et al., (2014) established that poor solid waste management is significant in Ruiru where some wards do not receive services from the municipal council frequently leading to buildup of wastes in the open dumpsites. The study proposes that the municipality should underscore the importance of building public-private partnerships for enhanced DWM. The study also recommends that the municipal council should also work on intensifying the existing partnerships with the private companies and provide more garbage collection and recycling services. Further, Njuguna, (2016) echoes this in his study in Gitambaya Village, Ruiru that established that community participation in domestic waste management as practiced by households and business operators is limited; hence further compounding solid waste menace. The common theme among these identified studies was the acknowledgement that effective domestic waste management is linked to stakeholder participation in the process. However, these studies do not elaborate how stakeholder participation influences the domestic waste management process. This study therefore sought to fill that gap by establishing the relationship between stakeholder participation and effective domestic waste management

Objectives of the Study

The general objective of the study was to examine influence of stakeholder's participation and management of solid waste disposal. A critical literature review

Justification and Significance of the Study

The foundation of stakeholder participation in domestic waste management is based on the fact that every person produces waste and can be affected directly and indirectly if the waste is not well managed. It is largely viewed that waste management is the singular duty and obligation of local authorities, and that the public is not expected to play a part (Vidanaarachchi et al., 2006). 6 Nevertheless, researchers have found that functioning effectiveness of solid waste management depends upon active involvement of both municipal agencies and citizens. Sharholy et al., (2008) cite individuals partaking in decision making as critical in efficient solid waste management and point out lack of community awareness and societal indifference as factors contributing to lack of solutions in solid waste management. The findings of this study can be of significant benefit to residents, traders and landlords, the county environmental officers, as well as the private organizations involved in domestic waste management to give them a better understanding of the role, they can play in domestic waste management and the influence it would have on the domestic waste management process. The findings of this study on stakeholder participation strategies may be applied within the county government environmental offices to enable them update their information the forms of stakeholder participation strategies that may be more effective for domestic waste management. The findings on the influence of stakeholder communication practices may assist county government to discover the gaps in the communication about domestic solid waste management and fill them appropriately. Findings about the influence of stakeholder forums on domestic waste management may be utilized by the county government, the private waste collectors, the residents, landlords and the traders in helping to improve the functioning of stakeholder forums so as to better their outcomes. Additionally, the findings on the extent to which the frequency of stakeholder engagement influences domestic waste management in Biashara residential area will be useful to the county government, the private waste collectors, the residents, landlords and the traders in coming up with a realistic schedule for waste management..

LITERATURE REVIEW.

Theoretical Review

Two theories were found relevant in expounding on influence of stakeholder's participation and management of solid waste disposal. The theories that were found to fit the research construct are the stakeholder theory proposed by Freeman (1977) and theory of waste management Pongrácz, 2002.

Stakeholder theory

This study was guided by the stakeholder theory which was first published in 1984 by R. Edward Freeman (Mitchell et al., 1997; Frooman, 1999; Heidrich et al., 2009). The theory is mostly employed in organizational management and business ethics to refer to morals and values when managing an organization. Stakeholder theory seeks to define the specific stakeholders of a company and examine the conditions under which manager treat these stakeholders. The theory identifies the typologies of stakeholders in terms their power that is the extent to which they are able to impose their will in a relationship, their expected structures or behaviors and the criticality of their claims. According to the theory, from the examination of these attributes it is possible to find out the implications of controversial interactions between stakeholders and organizations by introducing similar interests and connections between them. Further, the instrumental approach of the theory uses empirical data to determine the links that exist between the management of stakeholder groups and the achievement of communal goals (most commonly profitability and efficiency goals) The rationale of using this theory in this study was that it justifies introduction of the element of stakeholder participation in domestic waste management which is largely seen as a preserve of the county governments and municipal councils. Community members and the county government are both stakeholders in domestic waste management and this study sought to understand how a relationship between them affects the efficiency of the domestic waste management process. The stakeholder theory also uses empirical data to determine the links that exist between the management of stakeholder groups and the achievement of communal goals (most commonly profitability and efficiency goals). This aligns with the study in that it seeks to establish how stakeholder involvement in waste management would impact on the effectiveness of the waste management process.

The Theory of Waste Management

The study was also guided by the theory of waste management which represents a more detailed description of the concepts and elements of waste management including giving a holistic view of the goals of waste management (Pongrácz, 2002). Waste management theory is based on the belief that waste management is to avoid damage to human health and their surroundings. 24 According to this theory, the accurate description of the term waste and definition of the role of ownership in waste management is important in coming up with an effective waste management process. The theory recognizes that accurate definition of waste and the clarification of the role of ownership in waste management have a role in effective waste management. It may create a conflict with already existing information and instead increase the problem of waste instead of reducing it or it may improve the effectiveness of waste management. The rationale of using this theory in this study was that the theory as well as the study is interested in finding new information on the society's definition of domestic waste and domestic waste management as well as the influence that society members' participation in waste management has on the effectiveness of the process. On the other hand, the theory of waste management aligns with the study in that it recognizes that accurate definition of waste and the clarification of the role of ownership in waste management have a role in effective waste management. This study sought to determine the influence of such accurate definition and clarification of roles in the waste management process.

Empirical Review

Njagi, (2015) conducted a study to investigate the effects of solid waste management in Embu Town. The specific objectives of the study were: to identify policy development by Embu Town on solid waste disposal, to examine management of solid waste disposal used by Embu Town and to investigate the challenges of managing solid waste in Embu Town. The research done has focused on big cities and towns like Nairobi, Mombasa Nakuru and Eldoret. However, there is scant literature on medium and small towns like Embu. Lack of literature on medium and small like Nyeri, Naivasha and Embu prompted the researcher to embark on this research. This research sought to fill in such gaps in the solid waste management issues in Kenya. Results from the study of solid waste management in Embu Town may inform research and policy making in similar

towns in other counties. The theory of new public administration (NPM) was used. This study used a descriptive survey research design. Purposive sampling was used to select 10 policy makers for interviews conducted by the researcher 323 residents and business people were selected randomly and given questionnaires to fill on their own. The data collected was coded and categorized into patterns or themes. Research findings were presented using graphs and tables. Descriptive statistics such as frequencies and percentages were used to summarize the data in the questionnaires. Tables, graphs and pie charts were used to present the results. The research findings showed that Embu Town has yet to develop policies to deal with solid waste management. The disposal methods used in Embu Town include waste collection and dumping of waste in the open dumpsite. The research also found out that Embu Town faces many challenges in regard to solid waste management.

Aden,(2010) conducted a study to that sought to find out whether the size of the manpower influences solid waste management and disposal, establishing extend to which the size of manpower influences solid waste management and disposal in Garissa Municipality, finding out the frequency of solid waste collection, establishing the main solid waste disposal facilities available to residents of Garissa Municipality, determining extent of funding for solid waste management and assessing the impact of the residents' attitude on solid waste disposal in Garissa Municipality in relation to gender and age. The study covered five residential and business areas of the Municipality. It adopted a descriptive research design. The data was collected through questionnaires and observations. The outcome of the study indicated there was a shortfall of the technology applied in the management of solid waste in Garissa Municipality. The researcher recommends that solid waste from organic sources should be composted to generate manure and that the solid waste from metallic, glass and plastics be converted into items for secondary use. These would generate income for the Municipality. The researcher also recommends improvement of regulations controlling the handling of solid waste. There should be guidelines on how the communities would dispose solid waste from their premises. Further the study revealed that there was adequate manpower and relatively adequate facilities to collect and transport solid waste to well defined and gazetted dumpsites. The residents were found to have positive attitude towards waste disposal. The funding of solid waste management programmes was found to be insufficient and therefore sustainable sources of funding should be sought.

Ngiri, (2012) conducted a study to establish the influence of site availability on management of waste disposal in Kerugoya town, to assess the extent to which governance influences the management of solid waste disposal in Kerugoya town, To establish the influence of finance on management of solid waste disposal in Kerugoya town, To establish the influence the modern technology had in management of solid waste disposal in Kerugoya town. The research gap that the municipality needed to be addressed was to investigate ways by which health problems such as malaria and diseases related to respiratory organs could be reduced within the town dwellers in relation to the proper waste management. The study highlighted the relationship between governance and management of solid waste disposal. The study showed that modern technology need to be embraced in order to bring change within the municipality as far as management of solid waste disposal was concerned.

Mohammed, (2020) conducted a study on to establish the determinants of effective solid Waste Management in Mombasa County. The study was guided by four objectives which were: to Examine the extent to which recycling materials contribute towards enhanced solid waste management in Mombasa County; to assess the extent to which government policies contribute towards enhanced solid waste management in Mombasa County; to establish the extent to which education and awareness contribute towards enhanced solid waste management in Mombasa County and to assess the extent to which public participation contributes towards enhanced solid waste management in Mombasa County. The study was guided by three hypotheses; stakeholder hypothesis; behavioral finance hypothesis and institutional hypothesis. The researcher used descriptive survey research design. The researcher used a questionnaire to collect data. The sample size was 240 respondents from a population of 450 solid waste management department employees of Mombasa County. Validity and reliability of the research was conducted and questionnaire was found to be reliable. Illustrative inferential insights which are mean, standard and rate were utilized; tables and figures were used to exhibit information. The coefficient of determination was 0.843 which implied that there was 84.3% variation in solid waste management in view of advancement in recycling. The study found out that the correlation coefficient was 0.918 which indicated that there was a significant relationship between solid waste management and recycling. The study found out that there was 87.5% variation in enhanced solid waste management because

of progress in government policy. The study found out that the correlation coefficient was 0.935 which show that there was significant relationship between solid waste management and government policy. The study found out that there was a correlation coefficient of 0.877 which elucidates that there was a positive relationship between improved solid waste management and education and awareness. The study found that education and awareness was 0.729 which meant that there was 72.9% variation in upgraded solid waste organization due to change in public participation. The study found that the association coefficient was 0.854 which illuminates thusly there was a positive relationship between improved solid waste and public participation. From the findings of this study, it can be concluded that public participation contributes influences on improved solid waste management, recycling contributes influences on improved solid waste management, education and awareness contributes influences on improved solid waste management, government policy contributes influences on improved solid waste management. The study recommended that for improved solid waste management public participation has to be practiced at all times, recycling should be embraced, education and awareness is paramount especially in processes, training, and equipment used etc. and government policies need to be passed and implemented in good faith.

Mugambi, (2017) conducted a study to find out factors influencing household functional solid waste management systems in Meru town. The study was guided by the following objectives; to determine how types of household solid waste generated, availability of household functional solid waste equipment and facilities, household functional solid waste management awareness and laws and polices influence functional solid waste management in Meru town. The study adopted a descriptive research design, targeting the management team of functional solid waste management companies in Meru town. This study also adopted a stratified and simple random sampling technique to select a sample population of 302 respondents arrived at by calculating the target population of 4,899 with a 95% confidence level and an error of 0.05. Primary data was obtained using self-administered questionnaires. Data was analyzed using descriptive statistics such as frequencies, percentages, mean score and standard deviation. Statistical Package for Social Sciences (SPSS Version 22.0) was used for this purpose. Data was presented inform of tables and graphs. Finally, inferential data analysis was done using Pearson correlation coefficient and

regression analysis (multiple regression analysis). The study revealed that recyclable waste has improved cleanliness in Meru town and that inorganic waste has discouraged prompt collection of waste. The study also found that public participation initiatives improve cleanliness of Meru town and that littering prevention program facilitates functional solid waste management. The findings also showed that availability of trash bins enhances cleanliness of Meru town and that availability of adequate landfill prompt collection of waste. In regard to this, the study revealed that recyclable waste has improved cleanliness in Meru town and that inorganic waste has discouraged prompt collection of waste. The study also concluded that availability of household solid waste equipment and facilities positively and significantly influenced household functional solid waste management, that type of household solid waste generated positively and significantly influenced household functional solid waste management, that household solid waste management awareness positively and significantly influenced household functional solid waste management and that waste management laws and policies positively and significantly influenced household functional solid waste management. Therefore the study recommended that existing by laws should be strictly enforced in all areas of the town and new ones formulated to cope with changing times for example formulation of town policy, that awareness be created in all areas/institutions in the town, schools, hospitals, colleges, workplaces among other areas on importance of clean environment in the town, that existing by laws should be strictly enforced in all areas of the town and new ones formulated to cope with changing times for example formulation of town policy and that Meru town authorities should collect household solid waste in for free.

2.5 Research gaps

Geographical gap is a knowledge gap that considers, the untapped potential or missing/limited research literature, in the geographical area that has not yet been explored or is under-explored. For instance Njagi, (2015) who conducted a study to investigate the effects of solid waste management in Embu Town. The specific objectives of the study were: to identify policy development by Embu Town on solid waste disposal, to examine management of solid waste disposal used by Embu Town and to investigate the challenges of managing solid waste in Embu Town. Purposive sampling was used to select 10 policy makers for interviews conducted by

the researcher 323 residents and business people were selected randomly and given questionnaires to fill on their own. The research findings showed that Embu Town has yet to develop policies to deal with solid waste management. The studies presented a geographical gap as the study was conducted in Embu while while our current study focused influence of stakeholder's participation and management of solid waste disposal.

Methodological gap is the gap that is presented as a result in limitations in the methods and techniques used in the research (explains the situation as it is, avoids bias, positivism, etc.) Mohammed, (2020) conducted a study on to establish the determinants of effective solid Waste Management in Mombasa County. The study was guided by three hypotheses; stakeholder hypothesis; behavioral finance hypothesis and institutional hypothesis. The researcher used descriptive survey research design. The researcher used a questionnaire to collect data. The study found out that there was 87.5% variation in enhanced solid waste management because of progress in government policy. The study found out that the correlation coefficient was 0.935 which show that there was significant relationship between solid waste management and government policy. The study found out that there was a correlation coefficient of 0.877 which elucidates that there was a positive relationship between improved solid waste management and education and awareness. The studies presented a methodological gap as it used descriptive research design while our current study adopted a desktop literature review method

Conceptual gap arises because of some difference between the user's mental model of the application and how the application actually works. Mugambi,(2017) conducted a study to find out factors influencing household functional solid waste management systems in Meru town. The study adopted a descriptive research design, targeting the management team of functional solid waste management companies in Meru town. The study also found that public participation initiatives improve cleanliness of Meru town and that littering prevention program facilitates functional solid waste management. The findings also showed that availability of trash bins enhances cleanness of Meru town and that availability of adequate landfill prompt collection of waste. The study focused on factors influencing household functional solid waste management

systems in Meru town, while the current study examined focused on influence of stakeholder's participation and management of solid waste disposal presenting a conceptual gap

METHODOLOGY

The study adopted a desktop literature review method (desk study). This involved an in-depth review of studies related to influence of stakeholder's participation and management of solid waste disposal. Three sorting stages were implemented on the subject under study in order to determine the viability of the subject for research. This is the first stage that comprised the initial identification of all articles that were based on influence of stakeholder's participation and management of solid waste disposal from various data bases. The search was done generally by searching the articles in the article title, abstract, keywords. A second search involved fully available publications on influence of stakeholder's participation and management of solid waste disposal. The third step involved the selection of fully accessible publications. Reduction of the literature to only fully accessible publications yielded specificity and allowed the researcher to focus on the articles that related to influence of stakeholder's participation and management of solid waste disposal which was split into top key words. After an in-depth search into the top key words (influence, stakeholder's, participation, management, solid waste disposal), the researcher arrived at 5 articles that were suitable for analysis. The 5 articles were findings from Njagi, (2015) who conducted a study to investigate the effects of solid waste management in Embu Town. The specific objectives of the study were: to identify policy development by Embu Town on solid waste disposal, to examine management of solid waste disposal used by Embu Town and to investigate the challenges of managing solid waste in Embu Town. Purposive sampling was used to select 10 policy makers for interviews conducted by the researcher 323 residents and business people were selected randomly and given questionnaires to fill on their own. The research findings showed that Embu Town has yet to develop policies to deal with solid waste management

Aden,(2010) who conducted a study to that sought to find out whether the size of the manpower influences solid waste management and disposal, establishing extend to which the size of manpower influences solid waste management and disposal in Garissa Municipality, finding out the frequency of solid waste collection, establishing the main solid waste disposal facilities

available to residents of Garissa Municipality, determining extent of funding for solid waste management and assessing the impact of the residents' attitude on solid waste disposal in Garissa Municipality in relation to gender and age

Ngiri, (2012) who conducted a study to establish the influence of site availability on management of waste disposal in Kerugoya town, to assess the extent to which governance influences the management of solid waste disposal in Kerugoya town. The study highlighted the relationship between governance and management of solid waste disposal. The study showed that modern technology need to be embraced in order to bring change within the municipality as far as management of solid waste disposal was concerned.

Mohammed, (2020) who conducted a study on to establish the determinants of effective solid Waste Management in Mombasa County. The study was guided by three hypotheses; stakeholder hypothesis; behavioral finance hypothesis and institutional hypothesis. The researcher used descriptive survey research design. The researcher used a questionnaire to collect data. The study found out that there was 87.5% variation in enhanced solid waste management because of progress in government policy. The study found out that the correlation coefficient was 0.935 which show that there was significant relationship between solid waste management and government policy. The study found out that there was a correlation coefficient of 0.877 which elucidates that there was a positive relationship between improved solid waste management and education and awareness.

Mugambi, (2017) who conducted a study to find out factors influencing household functional solid waste management systems in Meru town. The study adopted a descriptive research design, targeting the management team of functional solid waste management companies in Meru town. The study also found that public participation initiatives improve cleanliness of Meru town and that littering prevention program facilitates functional solid waste management. The findings also showed that availability of trash bins enhances cleanness of Meru town and that availability of adequate landfill prompt collection of waste

SUMMARY, CONCLUSION AND POLICY IMPLICATION FOR FURTHER STUDY

Summary

In places like the Maldives, where sea level rise is predicted to cause mass migration local communities do consider sea level rise a major factor affecting their communities and livelihoods . In addition, projections that lowland country of such kind are obtained from high resolution spatial and temporal simulation models that provide difference in regional climate impacts. However, data show that regional and seasonal difference in model simulations do not account for the physical implications such as changes in climate will cause on living organisms such as humans, crop sowing, vectors, pathogens, pest's infections, and distributions.

Conclusion

The study concludes that the stakeholders are local and national government municipalities; city corporations; non-governmental organizations (NGO's); households, private contractor; Ministries of Health and Environment. The authorities, local and national municipalities, are largely responsible for the Waste Collection in the waste management chain. The Ministry of Health was is the most important stakeholder, followed by municipalities and solid waste management councils. The constitution of Kenya (2010) guarantees the right to a clean and healthy environment for all Kenyan where one of the functions of counties is solid waste management.

Recommendations

The study suggested that that there should be good drainage and proper town planning especially building standards like spacing and reserved areas; urban planning, infrastructural maintenance, and waste management like garbage clearing, and waste channeling; early warning system, reliable forecast, awareness, and inspections; community involvement through farming, afforestation, environmental sanitation, and stoppage of illegal mining; flood protection like dams, gabion, digging trenches, and water harvesting

REFERENCES

- Awopetu, R. G., Awopetu, S. O., & Awopetu, M. S. (2016). The impact of flood on the socio-economic status of residents of Wadata and Gado-villa communities in the Makurdi metropolitan area of Benue State, Nigeria. *Management of Natural Disasters*, 92, 191.
- Blaikie, P., Cannon, T., Davis, I., & Wisner, B., (2014). *At Risk II-: Natural Hazards, People's Vulnerability and Disasters*. Routledge.
- Confalonieri, U, B Menne, R Akhtar, K L Ebi, M Hauengue, R S Kovats, B Revich and Woodward (2007). *Human Health Climate Change 2007: Impacts, Adaptation and Vulnerability, Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)*, Cambridge University Press, Cambridge, UK, 391-431
- Dewi, A., (2007). *Community-based analysis of coping with urban flooding: a case study in Semarang, Indonesia*. International Institute for GeoInformation Science and Earth Observation, Msc Thesis, Enschede, The Netherlands.
- Ford, J. D., Cameron, L., Rubis, J., Maillet, M., Nakashima, D., Willox, A. C., & Pearce, T. (2016). Including indigenous knowledge and experience in IPCC assessment reports. *Nature Publishing Group*, 6(4), 349–353. <https://doi.org/10.1038/nclimate2954>.
- Government of Kenya. (2015). *Statistical Analysis of Tourism Trends Globally and Locally*, Ministry of Tourism and Wildlife, Republic of Kenya. accessible [http://www.tourism.go.ke/ministry.nsf/doc/Tourism_Trends_OCT2006_Revised.pdf/\\$file/Tourism_Trends_OCT2006](http://www.tourism.go.ke/ministry.nsf/doc/Tourism_Trends_OCT2006_Revised.pdf/$file/Tourism_Trends_OCT2006)
- Heberger M, H., Cooley, P., Herrera, P.H., Gleick, and Moore, E. (2009). *The Impacts of Sea-Level Rise on the California Coast*, prepared by the Pacific Institute for the California Climate Change Center.
- Hellmuth, M. E., Moorhead, A., Thomson, M. C., & Williams, J. (Eds.). (2007). *Climate risk management in Africa: Learning from practice*. New York, NY, USA: International Research Institute for Climate and Society, Columbia University. v

- Hinkel, J., Lincke, D., Vafeidis, A. T., Perrette, M., James, R., & Tol, R. S. J. (2014). Coastal flood damage and adaptation costs under 21st century sea-level rise, 111(9), 3292–3297. <https://doi.org/10.1073/pnas.122246911>.
- IPCC (Intergovernmental Panel on Climate Change). (2013). Climate change 2013: the physical science basis. Contribution of working group 1 to the fifth assessment report of the intergovernmental panel on climate change (Stocker, T.F., D. Qin, G.K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex, and P.M. Midgley [Eds.]). Cambridge, United Kingdom and New York, NY, USA, 1535pp
- Kirwan, M.L., and Megonigal, J. P. (2013). Tidal Wetlands Stability in the face of Human impacts and Sea-Level-Rise. *Nature*, vol. 504, 53-60
- Leskens, J. G., Brugnach, M., Hoekstra, A. Y., & Schuurmans, W., (2014). Why are decisions in flood disaster management so poorly supported by information from flood models? *Environmental modelling & software*, 53, 53-61
- NKIROTE, D. (2020). Effectiveness of rainwater harvesting as a strategy for flood mitigation in Ruai area, Nairobi county, Kenya (doctoral dissertation, kenyatta university).
- Ogidi, O. B. (2013). Assessment of strategies used to control flood disasters in public primary schools in Nyatike division, Kenya (Doctoral dissertation, University of Nairobi).
- OMONDI, C. J. (2017). Prevalence of plasmodium species infection among primary school children and performance of malaria rapid diagnostic test kits in Baringo county, Kenya (Doctoral dissertation, KENYATTA UNIVERSITY).
- Ondieki, C. M. (2013). Hydrology and integrated water resource management for sustainable watershed management in Kenya. In *Cases on the Diffusion and Adoption of Sustainable Development Practices* (pp. 352-375). IGI Global.
- Patnaik, S. 2002. Sustainable non-timber forest products management: Challenges and opportunities. In P. S. Ramakrishnan, R. K. Rai, R. P. S. Katwal, and S. Mehndiratta (Eds.). *Managing traditional ecological knowledge for biosphere management in South and Central Asia*, pp. 97-127. New Delhi: UNESCO.

-
- Rojas, R., Feyen, L., & Watkiss, P., (2013). Climate change and river floods in the European Union: Socio-economic consequences and the costs and benefits of adaptation. *Global Environmental Change*, 23(6), 1737- 1751
- Shilabukha, Khamati (2015). Indigenous Knowledge And Management Systems For Marine Resources Among The Giriama Of North Coastal Kenya A Thesis Submitted To The Institute Of Anthropology , Gender And African Studies In Fulfillment Of The Requirements For The Award, (November), 509–515.
- Wigand, C., Ardito, T., Chaffee, C., Ferguson, W., Paton, S., Raposa, K., ... Watson, E. (2017). A Climate Change Adaptation Strategy for Management of Coastal Marsh Systems, 682–693. <https://doi.org/10.1007/s12237-015-0003->