ASSESSMENT OF COMMUNITY PARTICIPATION IN SOLID WASTE MANAGEMENT IN BAGAMOYO TOWN, TANZANIA

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A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF ENVIRONMENTAL STUDIES (HEALTH) OF THE OPEN UNIVERSITY OF TANZANIA

2016

CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by the Open University of Tanzania a dissertation titled; ***Assessment of Community Participation in Solid Waste Management in Bagamoyo Town, Tanzania,*** in partial fulfilment of the requirements for the degree of Master of Environmental Studies of the Open University of Tanzania.

…….

Dr. Matobola Joel Mihale

(Supervisor)

……..……

Date

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DECLARATION

I, **Chonge Mazengo**, do here by declare that this dissertation is my own original work and that it has not been presented and will not be presented for a similar or any other award at any other university.

…….

Signature

……

Date

DEDICATION

I dedicate this to my parents, Mr and Mrs Mazengo for making my education possible.

ACKNOWLEDGEMENTS

I thank the Almighty God for blessing me this opportunity and assisting me in each phase of my studies at Open University of Tanzania.

I am extremely grateful to my supervisor Dr. Matobola Joel Mihale for his meticulous academic advice. Indeed his valuable comments, challenges and encouragements were fundamental in shaping and producing this dissertation. I commend and thank him for his tireless expert opinions and a unique guidance during this research from the proposal stage to report completion. I am deeply indebted to him.

I gratefully appreciate the contribution of knowledge by the rest of my course lecturers, for their guidance and support. My sincere appreciation also goes to my fellow students for their cooperation throughout my studies at Open University of Tanzania.

I am extremely grateful to my family especially my parents and sisters for always being a support system and their unceasing love and encouragement.

ABSTRACT

Solid waste management is a primary cause for concern in most municipals in Tanzania as most municipals cannot collect and dispose-off all of the solid waste generated, the remaining are left causing health hazards, smell nuisance, increased pests and environmental problems. This study assessed local community participation in solid waste management in Bagamoyo town, Tanzania. A cross sectional study was used in the study and data were collected using both structured and non-structured interviews. Field observations and secondary data supplemented the data collected using questionnaires. Collected data were analysed using SPSS version 20 software. Results indicated respondents were mainly involved in cleaning of their surroundings, collection, storage, transportation and final disposal of solid waste but are not involved in treatment and recycling. Results indicated that only 28% of the households involved in this study use burning, 25% use refuse pits, 28% use communal centres/ collection points and 19% use open dumping as mechanisms for managing solid wastes produced in the households. Results also indicated that, lack of collection and storage facilities at household and community levels is a major problem and solid waste management (SWM) is largely perceived to be a responsibility of local government authorities thus their attitude towards participating in SWM is quite unfavourable. There is a need to put more efforts towards educating and sensitizing community members about their role in SWM activities and use of modern alternatives of SWM like composting. There is a need also to have strong environmental committees for purposes of enhancing community participation at community members.

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LIST OF ABBREVIATIONS

CBOs	Community Based Organizations
EEA	European Environmental Agency
EMA	Environmental Management Act
HH	Household
IETC	International Environment Technology Centre
LGA	Local Government Authority
MCC	Mbeya Municipal Council
NGO	Non-Governmental Organization
OUT	Open University of Tanzania
SW	Solid Waste
SWM	Solid Waste Management
UN	United Nations
UNEP	United Nations Environmental Program
UN-HABITAT	United Nations habitat
WB	World Bank
WRI	World Research Institute
TTB	Tanzania Tourist Board

CHAPTER ONE

GENERAL BACKGROUND

1.1 Introduction

Inadequate waste management systems ranging from non-existing collection facilities to ineffectual disposal methods cause contamination of the land, water and air. Debris dispersal pollutes the ecosystems and hazardous substances due to industrial garbage and electronic waste put a strain on the environment and the health urban of inhabitants (UNEP, 2011). Environmental problems that most cities in developing countries face are mainly caused by inadequate provision of basic services such as water supply, sanitation facilities, transport infrastructure and waste collection (Baud 1994).

Solid waste management is a primary cause for concern in most municipals in Tanzania similar to many other African nations. Estimations indicate that most local authorities can collect and dispose-off approximately 20% to 30% of the solid waste generated (Chinamo, 2003), the remaining solid wastes are causing health hazards, smell nuisance, pests and environmental problems.

In Tanzania local authorities are responsible for overall management of solid waste in their areas of respective jurisdiction (EMA, 2003). Environmental Management Act and other legal frameworks guide the local authorities develop their own legal framework to facilitate effective waste management systems. To this effect each municipal authority has to develop by-laws for collection and disposal of solid waste management (SWM) within their area of operations (Urban Authorities Act, 1982). Moreover waste management practices depend upon the socio-economic condition of the particular urban society, its cultural background, history, climate influence, infrastructures, types and consumption habits.

Most of the time, the public is considered to be capable of acting together towards shared environmental interests (Leach, *et al.,* 1997).Participation of the community members in the management of solid waste may involve financial or physical contributions, for instance organising community based groups to work together in proper waste handling activities in the area, as well as paying waste collection fees (Bernardo, 2008).Solid waste management activities seem not to be a priority with many communities, hence community participation towards the waste management practices is very minimal. Therefore it is recommended to give emphasis in this area so as to stimulate and motivate communities to achieve active participation and involvement in environmental management services.

Solid waste management problem in most cities and towns in Tanzania relates to handling at generation, collection, transportation, treatment, disposal, financing as well as capacity of the city and other key players. There is lack of proper waste sorting mechanisms at the household level, hence it is difficult to reduce waste through recycling and safe disposal of waste including hazardous materials (UN-HABITAT, 2006).In slums where no waste disposal facilities exist, individual households often bury waste in small pits in the surrounding areas, while others burn their waste regularly on the plot or indiscriminately dump on streets and in the drains. Waste management systems which include community participation and do not require high technology and inappropriate machinery might prove to be sustainable at the community level, since income generating waste management systems can be maintained by low income communities (Halla *et al* 1999).

1.2 Statement of the Research Problem

Solid waste management is rapidly becoming a serious concern in Tanzania due to rapid increase in population and urbanization. Waste management involves control of waste materials generation, sorting, collection, storage, transportation, processing and disposal in

a manner that is in accordance with the best principles of public health, economic, engineering and other environmental concerns.

Local authorities have been given mandate to manage solid waste, this is mandatory activity which is provided under the Local Government Act, No. 8 of 1982 (Urban Authorities Act). Unfortunately what has been observed is that municipal authorities have very low capacity in managing solid wastes. According to Chinamo (2003), in Tanzania most municipal authorities can collect and dispose only a third of the generated solid waste in their areas of jurisdictions hence the necessity of local community involvement. Inadequate solid waste management have been associated with numerous diseases such as typhoid, cholera, diarrhoea, malaria, hepatitis, dysentery and yellow fever and other detrimental health hazards including exposure to heavy metal poisoning, respiratory problems, vector borne, skin and eye infections (UNEP, 2012).

Local community and specifically households often behave contrary to schedules and rules of effective solid waste management (Bernardo, 2008). Previous studies has shown that rate of payment by households depend directly on their level of satisfaction and their interest (Skelcher, 1993). If residents understand the sanitary objectives of contribution and its public usefulness, and if they are satisfied with the services, they were willing to pay their contributions.

It is all over agreed that community involvement and participation to solid waste management practices not only help solving the problem but rather ensures sustainability and improve the condition of the environment. However, community participation in management of solid wastes continues to be a major challenge in Tanzania, particularly in the rapidly growing cities and towns like Bagamoyo. This study therefore intends to

unveil which factors that influence public participation in solid waste management in Bagamoyo town, Tanzania.

1.3 Objectives of the Study

The general objective of this study was to assess the extent of local community participation in solid waste management in Bagamoyo town, Tanzania

1.3.1 Specific objectives

Specifically this study will have the following specific objectives,

i. To assess the extent of participation of local community in solid waste management in Bagamoyo town.

ii. To examine the current solid waste management practices and barriers for community participation in Bagamoyo town.

iii. To evaluate community knowledge, attitude and perception on management of solid waste in their environments.

1.4 Research Questions

1.4.1 General Research Question

This study is expected to answer the general research question, to what extent does the local community in Bagamoyo participate in solid waste management.

1.4.2 Specific Research Questions

i. To what extent does local community participate in solid waste management in Bagamoyo town?

ii. How is solid waste management being practiced and what are barriers for community participation in Bagamoyo town?

iii. What is the level of knowledge, attitude and perception of Bagamoyo residents on management of solid waste in their environments?

1.5 Significance of the study

The aspiration to conduct this study is due to the fact that most of urban towns including Bagamoyo experience inappropriate waste handling, storage, collection and disposal practices pose environmental and public health risks in urban and peril-urban areas. Public health and environmental aspects which are associated with solid waste, give rise to the importance of solid waste management in any society (Aickenhead, 1999). Community participation in developmental activities has been widespread in the country, yet very little is known on its operational success and challenges of community participation in solid waste management (Skelcher, 1993).

Since, Bagamoyo is a tourist town, the good and a clean environment has impact to tourism business for which benefits not only the government but also the local community. The key to the success of solid waste management system in any urban area is the cooperation of citizens. Therefore it is important to find out factors that influence community participation in waste management to enhance better living environment, health and economic wellbeing.

The findings of the study will provide an insight of involvement of community on waste management practices. The successful conclusion of the study will assist future researchers on the similar or related subjects and serve as a stepping stone by proposing and recommending areas that may need further studies to be conducted.

CHAPTER TWO

LITERATURE REVIEW

This chapter presents literature review connected to the study. The review of the literature is organized on theoretical grounds and empirical evidences based on the specific objectives of the proposed study, knowledge gaps which exist from the preceding literatures on the research subject are identified.

2.1 Conceptual Definitions

2.1.1 Community Participation

World Bank (1994) defines participation as a process, through which stakeholder's influence and share control over development initiatives, decisions and resources which affect them. Participation involves a significant number of persons in situations or actions, which enhance their well-being. It is the process by which individuals and families assume responsibility for their own health, welfare and development.

2.1.2 Solid Waste Management (SWM)

Solid waste management involves the set of activities associated with control of generation, storage, collection, transportation, treatment and disposal of solid waste in a manner that is in accordance with the best principles of public health, economics, engineering, conservation, aesthetic and other environmental considerations (United Nations centre for Human Developments, 1998). According to World Bank Urban development and local government unit report (2012) solid waste management incorporates administrative, financial, planning, engineering and environmental considerations in search of solution and aims on the prevention of waste production through in-process modification, reuse and recycling. Solid waste management practices

can differ from urban to rural areas, residential to commercial and industrial producers, and from developed to developing nations.

Solid waste refers to a variety of refuse arising from human activities and that are recognised as unwanted and useless thus are discarded. Solid waste is generated as a result of industrial, residential and commercial activities in any given area (Edwards, 2004). As such, landfills are typically classified as sanitary, municipal, industrial construction and or demolition waste sites. In addition to that, the term solid waste in this study will refer to all discarded non-liquid materials from households, industrial and commercial establishments, institutions, and streets that do not have value any more in the eyes of the first generator or user.

2.1.3 Functional Components of the Waste Management System

The waste management system is a complex system comprised of different functional components/elements that must be employed in order to make the whole system effective, the elements of waste management system as described as follows:

Waste generation which refers to all activities involved in recognizing things which are no longer usable or wanted and are either thrown away or gathered for systematic disposal.

Onsite handling, processing, and storage these are the activities at the waste generation point which enable easier collection. This involves waste sorting which is important for effective waste management. For example, waste bins are positioned at the areas which generate ample amounts of waste (Edwards, 2004).

Waste collection, a vital stage of waste management, it involves activities such as solid waste collection bins placing, collecting waste from those bins and storing trash in the

locations where the collection trucks are emptied. This is characteristically not the main phase of waste transportation even though the collection stage may involve transportation. (LeBlanc, 2016).

Waste transfer and transport are all the practices incorporated in moving waste from the waste collection and storage areas in big waste transport trucks to the designated waste disposal sites.

Waste recovery, processing and disposal refer to the practices, tools, and facilities used in the treatment of waste to reduce the strength, to recover recyclable and reusable constituents from the waste stream and to increase the efficiency of other functional waste management components (Edwards, 2004).

Disposal is the last stage in waste management, in particular including the activities undertaken to manage waste materials that are not reused or recycled and through the use of combustion and sanitary landfills. Land filling is the most common way of managing these wastes, landfills must be accurately designed and constructed and systematically managed. It includes the activities aimed at the proper waste disposal of waste materials in locations such as dump sites, landfills or waste-to-energy facilities (LeBlanc, 2016).

2.2 Theoretical Literature Review

This study is guided by two theories, the Arnstein's ladder of participation and Citizen Participation theory for the reason that there is strong relationship between these theories and issues related to community participation and developments initiatives as follows;

2.2.1 Arnstein's Ladder of Community Participation Theory

The theory of participation according to Arnstein's work stems from the explicit recognition that there are different levels of participation, from manipulation of citizens, consultation to sincere participation, i.e. the levels of citizen control and partnership. The

concept behind this theory is that, individuals are expected to be active in public service decision-making and should, therefore be responsible for them(Arnstein, 1969). Based on this theory one can argue that determining which issues the community are allowed to be involved in is central to an understanding of participation and empowerment. Relating this theory with community participation on waste management, this theory generally provides a useful means of understanding and appraising community participation.

The theory takes in to account some of the intricacies connected with categorisation on community participation in public activities, such as the heterogeneity and inclusivity of the community (Begum, 1999). In our context the community is heterogeneous, there is a mix up of culture, values, ethics and attitudes for which these have to be considered. But all in the entire theory advocate that higher levels of community participation are always beneficial and desirable. The success of solid waste management strongly depends on people's behaviour, when people understand the issue changes in waste disposal practices can best be obtained (Buenrostro, 2011). This theory in other way advocates the necessity of community participation and empowerment and their impacts on indiscriminate waste disposal practices (Abuyuanl, 1999).

2.2.2 Citizen Participation Theory

Citizen participation theory has long been a module of the democratic decision-making process and describes private individuals to influence public decisions. Participation can offer an assortment of rewards to citizens: instrumental (resulting from the opportunity to contribute to public policy) or intrinsic to the involvement (through the very act of participation) (WRI, 1997). The planner's prospects are also imperative in that an operative public participation program can lead to a better preparation process and product as well as personal gratification. For example masses of underprivileged people in the crowded cities of the developing countries support themselves and their families by

indirectly or directly participating in waste collection and recycling (World Resources Institute, 1997)

2.3 Empirical Literature Review

This part will review various literatures on community participation on solid waste management practices globally, Africa and in Tanzania context. Various studies were reviewed and discussed in this part to point out the research gap on issues solid waste management.

2.3.1 Solid Waste Management Worldwide

Solid waste is largely considered an 'urban' concern. In rural areas where on average, residents are usually poorer waste generation rates tend to be much lower since they purchase fewer store-bought items (which results in less packaging), and have higher tendencies of reuse and recycling(Daniel, 2012).Consequent rise in commodity prices and increased scarcity of natural resources have increased the need for recycled products. Currently the resource worth of waste is becoming a significant driver in various developing nations and provides a livelihood for the urban poor (Halla, 1999). Compared to third world countries, recycling performance of solid wastes has improved in most developed countries. Based on a report assessing the role of recycling and its economic implications, recycling turnover has increased by almost 100 per cent to a minimum of EUR 60 billion in 2008 from that of EUR 32 billion in 2004 in the European Union countries (EEA, 2011).

The escalating volume and complexity of waste associated with the current economy is posing severe threat to ecosystems and human health. Annually, 11.2 billion tonnes of solid waste is estimated to be collected worldwide and decomposition of the organic

fraction of solid waste is contributing around 5 per cent of global greenhouse gas emissions. By 2025 this volume is anticipated to increase to 22.2 billion tonnes (UNEP, 2011). In lower income countries waste generation rates will likely be more than twice what they are today over the next twenty years. Globally, in 2025 solid waste management expenses will rise from today's yearly 205.4 billion dollars to about 380 billion dollars (World Bank, 2012). Solid waste management is commonly a municipal's single largest budgetary item in lower income countries municipals. International Environmental Technology Centre, (2012) report shows generation of solid waste is increasing and the management costs increases. By 2025 in China alone Waste management expenses will approximately double from 25 billion US dollars to about 50 billion US dollars.

The effort to meeting the Millennium Development Goals (MGD) and associated targets for water and sanitation are wasted in most cities and towns where solid wastes are generated. Furthermore reports from World Bank (2012) shows that production of most waste per capita is high in developed countries, while developing nations which have low income generate the least solid waste per capita. Regardless this fact the total waste production of upper middle income nations is lower than that of lower middle income nations

2.3.2 Solid Waste Management in Africa

In sub Saharan developing Africa nations, burning and open dumpsites are the methods that are widely used in disposing of waste. Burning of mixed waste occurs hand in hand with open dumping, overgrazing of stray and domestic animals and contamination of groundwater and surface water by hazardous substances due to leachate(World Bank 2012). Dumpsites have been associated with numerous diseases such as diarrhoea, malaria, typhoid, cholera, hepatitis, dysentery and yellow fever and

other detrimental health hazards including exposure to heavy metal poisoning, respiratory problems, vector borne, skin and eye infections (UNEP, 2012).

From the earliest primitive human society there have been efforts to dispose solid waste safely. In the early days, disposal did not pose much strain on the environment as land was abundant and settlements were sparse (Kolzow, 1994). Solid waste management became challenging with the rise of population and urbanisation where large numbers of people begun to congregate in fairly small areas in pursuit of livelihood. In tandem with the rising urban population, the generation of solid waste is also increasing.

Waste generation in sub-Saharan Africa is roughly 62 million tonnes per annum (World Bank 2012). Per capita waste generation is generally low in this region, but spans a wide range, from 0.09 to 3.0 kg per person per day, with an average of 0.65 kg/capita/day (World Bank, 2012). Due to waste generated by the tourism industry and a more comprehensive accounting of all wastes produced, the countries with the highest waste generation per capita rates are islands.

2.3.3 Solid Waste Management in Tanzania

The population explosion in Tanzania cities has not been necessarily complemented by the development in basic facilities, including those of waste management. This implies that large amounts of the generated waste end up in the environment in a deplorable ways which results in environmental and public health risks (Malisa, 2007). Consequently, there are inadequate waste collection and disposal facilities in many coastal urban areas. Despite initiatives by the Tanzanian government to minimize the problems caused by solid waste, it continues to be a threat to the coastal population, marine and coastal environment. Both economic and methodological interventions are vital for institutional capacity building, provision of suitable technologies and reinforcement of human resources improvement.

In Tanzania thus far there is no policy for SWM at the national level; rather there are scattered portions of legislation on SWM in different policies and local government by laws which are for that matter not supported by a principal policy on SWM. Due to the state of affairs, the solid waste management problems are handled local government authorities in the country based on the bylaws they established for themselves (Malisa, 2007)

Community participation was introduced in Tanzania in early 1960s however community participation in development activities became widespread in the country in late 1990s when it was given emphasis. To date very little is known on the success and challenges of community participation and involvement in solid waste management activities (Coffey, 1994). A large number of community members is ignorant of the need for SWM and their willingness to participate in SWM is quite unfavourable, they perceive solid waste management to be sorely the responsibility of local government authorities.

2.3.4 Conceptual Framework

Management of solid waste is the utmost significant provision a town authority should provide. Solid waste management is influenced by the existing policy on solid waste management in a town and level of community awareness and attitudes, in addition the role of solid waste management stakeholders like Households, community, Local Authority, Community based authorities, Non-governmental organization and Private sector are crucial in management of solid waste management. Environmental concerns are best handled with the participation of all concerned stakeholders, on a pertinent level. This model is based on the fact that effective community participation is

important because everyone generates waste and can be affected directly and in directly if waste is not well managed. Also factors such as type of waste generated, contribution of various stakeholders, and community awareness can also influence the extent by which the community participate in solid waste management practices

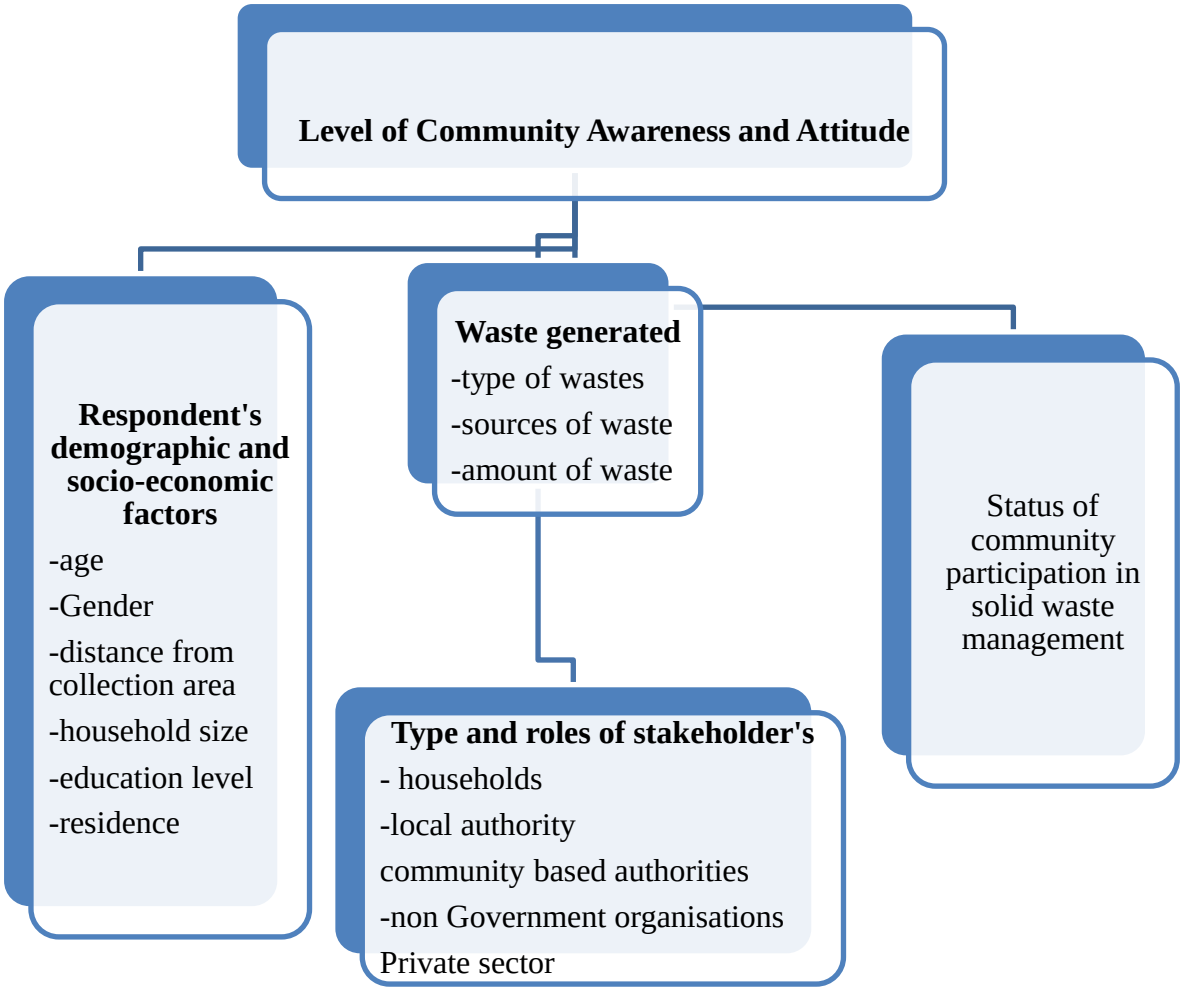


Figure 2.1: **Conceptual Framework**

(Source: Researcher, 2016)

CHAPTER THREE

RESEARCH METHODOLOGY

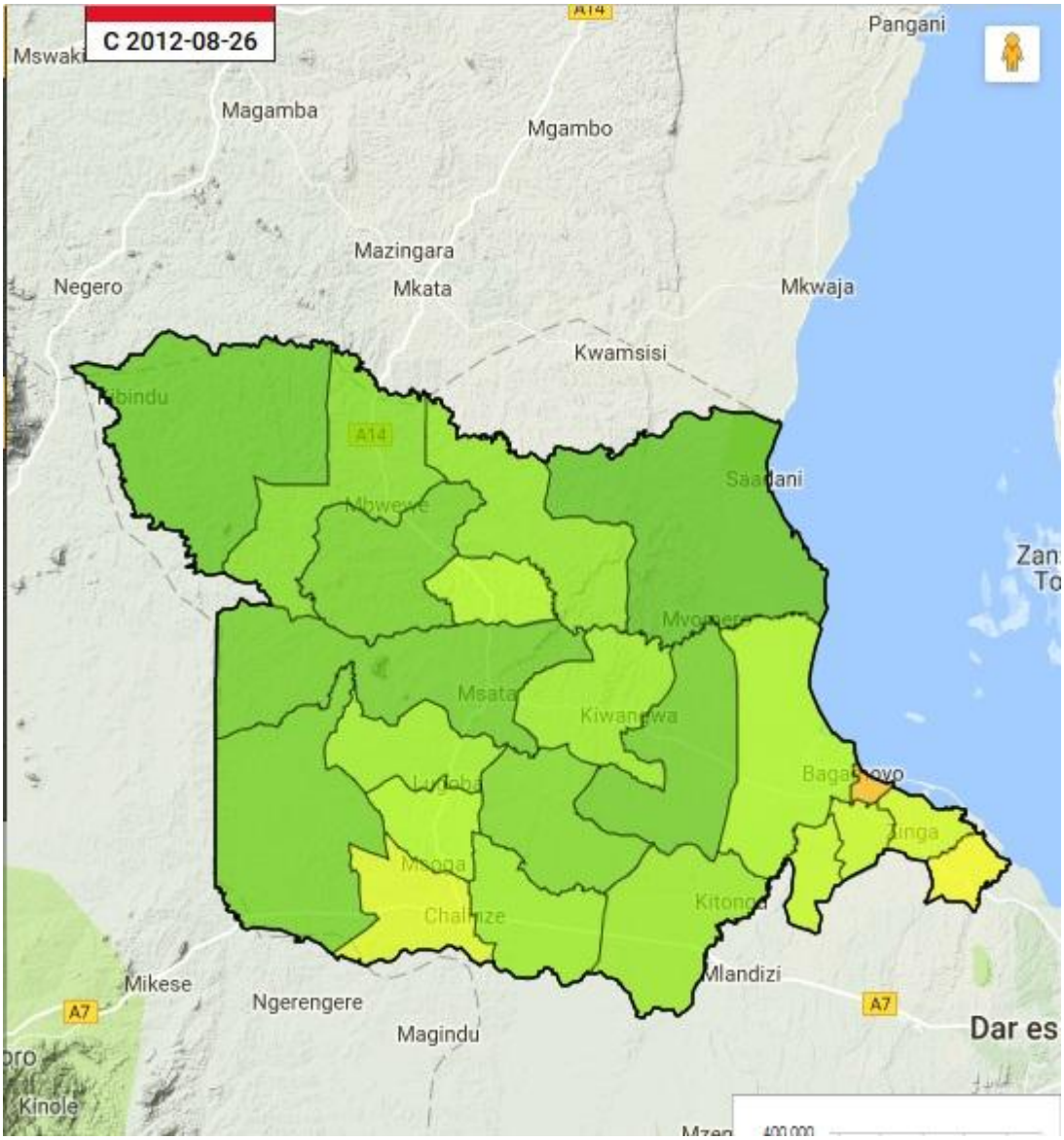
This chapter will basically describe the study designs, study area, data collection techniques and how the findings were analysed and presented.

3.1 Research Design

A Cross sectional study was used to assess community participation on solid waste management; both quantitative and qualitative approaches were used interactively in the study. This means that the study involved mixed design in which both methods were incorporated from sampling procedures, data collection, data analysis to data interpretation. The mixed scheme will compensate the weakness of one approach by using the strength of another approach (Taylor *et al*, 2011).

3.2 Study Area

The study was carried out in Bagamoyo town. Bagamoyo is one of the 6 districts of the Pwani Region of Tanzania. It is bordered to the East by the Indian Ocean, to the North by the Tanga Region, to the South by the Kibaha District, and to the West by the Morogoro Region. The area is located at 6°26′S 38°54′E. It lies 75 kilometres (47 miles) north of Dar-es-Salaam on the coast of the Indian Ocean (BDT, 2012).



Map 3.1: Bagamoyo District Map

Source (BDT, 2012)

According to the 2012 Tanzania national census, the population of the Bagamoyo District was 311,740 (NBS 2012). Because of its wide-ranging history, tourist's attractions and vicinity to Dar es Salaam, Bagamoyo is more diverse than some other areas of the country. Bagamoyo town has about 61,000 inhabitants and is the capital of the Bagamoyo District, recently being considered as a world heritage site (TTB, 2011).

3.3 Population of the Study

Members of households and local government authorities who are involved in Solid waste management in Bagamoyo town made up the target population of the study.

3.4 Sampling Design and Sample Size

Dunda ward and Magomeni wards were purposefully selected because they are located at the centre of Bagamoyo town. These wards were ideal because have high waste production due to large number people and intensity of human activities (due to tourism). Representative sample of population that was included in the sampling unit was determined by using random sampling technique.

3.4.1 Sample Size Determination

This study employed a simple random sampling method to determine the appropriate sample size. Single population proportion formula was used to calculate the sample size. The sampling precision/error of the study was 95% confidence interval when calculating sample size to achieve adequate accuracy. The following formula was used to compute the sample size based on the known 15% population that involved in solid waste management in Bagamoyo municipal.

$$n = \frac{N\left(Z\ \frac{\propto}{2}\right)^2 pq}{d^2(N-1) + \left(Z\ \frac{\propto}{2}\right)^2 pq}$$

Whereas;

n = sample size,

N= number of study area population, 43,793 (BDT, 2012)

CI=95% corresponds to maximum likely error and is 5% to be used in this study.

$\left(Z\ \frac{\propto}{2}\right)^2$ =1.96

Researcher is considering proportion of variable under study based on the known ideal staff turnover of 15%.

Hence;

p =15%=0.15,

p + q=100%

q=85% ⇒ q=0.85

Given the formula

$$n = \frac{N\left(Z\ \frac{\propto}{2}\right)^2 pq}{d^2(N-1) + \left(Z\ \frac{\propto}{2}\right)^2 pq}$$

Therefore,

$$n = \frac{43{,}793 * (1.96),^2\ 0.15 * 0.85}{0.05^2(43{,}793-1) + (1.96)^2 0.15 * 0.85}$$

n=195

The simple random sampling technique was applied to determine sample size for each ward .The proportion of each thematic group was obtained through the following formula:

$$n_{h=(N_{h/N)n}}$$

Whereby:

n_h= Proportional sample size of each ward

N_h= Number of population in ward, which are 14,559 for Dunda ward and 29,234 for Magomeni ward.

N= Total population of study area by 2012 which is 43793

n= Total sample size of the study area=195

Therefore, Proportional sample size of each ward

Dunda ward:

n_h= (14559/43793)*195

n_h = 65

Magomeni ward:

n_h= (29234/43793)*195

n_h= 130

Therefore, the sample size for Dunda ward and Magomeni wards are 65 and 130 respectively.

This procedure was used to obtain 195 head of households and residents of Dunda and Magomeni wards in Bagamoyo town who were then interviewed to collect the desired information, the results are as shown in the table 3.1 below.

Table 3. 1: Sampling Design, Study Population and Data Collection Tool

Ward/ source of data	Target population	Sample size	Sampling design	Data collection tool
(i) Population				
Dunda ward	14,559	65	Simple Random Sampling	Questionnaire
Magomeni ward	29,234	130	Simple Random Sampling	Questionnaire
Total	43,793	195		
(ii) In-depth interviews with SWM stakeholders				
Bagamoyo town council	1	2		In-depth interview

3.5 Methods of Data Collection

Data were collected from both primary and secondary data methods as detailed below;

Primary data was collected using household Questionnaire survey (Appendix 2), direct observation, and in-depth interview (Appendix 3) using a set of questions with the local authorities involved in solid waste management in Bagamoyo district. Likert scale of 5-point scale was used to analyse the level of awareness of community and the extent to which communities participate in the management of solid waste practices in Bagamoyo town.

The secondary data was collected through reviewing journals and articles, books and Bagamoyo council environmental conservation reports.

3.6 Data Reliability and Validity

Data quality was determined by checking reliability and validity of the information collected during data collection. This study adopted the construct validity to validate data and Cronbach Alpha (α) scale to measure internal reliability. According to (Ritter, 2010) the Cronbach's alpha (α) value must be at 0.70 or higher to preserve variables in suitable scale. SPSS was used to test reliability for the study that gave Cronbach alpha of 0.705 which is reliable.

Pre-testing of research instruments prior to data collection was done to determine Validity of the data. The result of pre testing was used to modify the research tools so as to be able to capture the required information**.**

3.7 Data Analysis

The data collected was edited, summarized and coded. Analysis was done using the Statistical Package for Social Science version 20 (SPSS ver. 20). Descriptive statistics

(frequencies, percentages and means) were used to analyse and summarize the findings. Findings were presented in tables, charts, figures and photos based on the computation outputs.

3.8 Ethical Issues Considerations

Ethical approval for the study was requested from university clearance committee. Clearance letter of introduction from Open University of Tanzania was obtained and submitted to District executive director (DED). Prior to data collection the respondents' consents was sought. This involved providing the respondents with information on the nature and the aim of the study as well as the facts that the respondents needed to be provided with relevant to the study.

CHAPTER FOUR

RESULTS AND DISCUSSION

The chapter presents descriptive and analytical results of the study aiming at answering the following research questions; (i) To what extent does local community participate in solid waste management in Bagamoyo town, (ii) How is solid waste management being practiced and barriers for community participation in SWM and, (iii) What is the level of knowledge, attitude and perception of Bagamoyo residents on management of solid waste in their environments?

4.1 Socio-Demographic Characteristic of the Study Population

Results shown in Table 4.2 revealed that 54% of the respondents n =195 participated in this study were female. About 51% of participants were between the ages of 18 and 40 years, only 17% were aged above 60 years. Among them 46% were married and 34% were not. A total of 45% participants have attained college education. Over half of the respondents are living in household with 3-8 members of extended family. About 40% of the participants were employed while 30% of the participants were self-employed and 18% were involved in agriculture activities.

Table 4.2: Socio-Demographic Characteristic of the Study Population

	Frequency (n=195)	Percentage
Sex		
Male	89	45.7
Female	106	54.3
Age		
18-40 years	99	50.6
41-60 years	64	32.9
<60 years	32	16.5
Marital status		
2Single	66	34.1
Married	90	46.3
Divorced	13	6.7
Widowed	23	11.6
Separated	3	1.2
Education level		
No formal education	4	1.8
Primary education	51	26.2
Secondary education	53	27.4
College/university education	87	44.5
Duration living in the area		
Less than 1 year	10	4.9
1 to 5 years	46	23.8
6 to 10 years	64	32.9
<10 years	75	38.4
Household size		
> 2 persons	18	9.2
3 to 5 persons	101	51.8
6 to 8 persons	64	32.8
< 8 persons	12	6.2
Occupation		
Employed	77	39.6
Self employed	58	29.9
Agriculture	36	18.3
Others	24	12.2

Source: Field work, 2016

4.2 Local Community Participation in SWM in Bagamoyo Town

Respondents were asked whether they participate in solid waste management. The findings showed that majority (82%) of the participants participate in solid waste management in their area. Few (6%) respondents do not participate at all when it comes to solid waste management in their area. About 12% of the respondents did not respond whether their households participate in SWM in their neighbourhood or not (Figure 4.2).

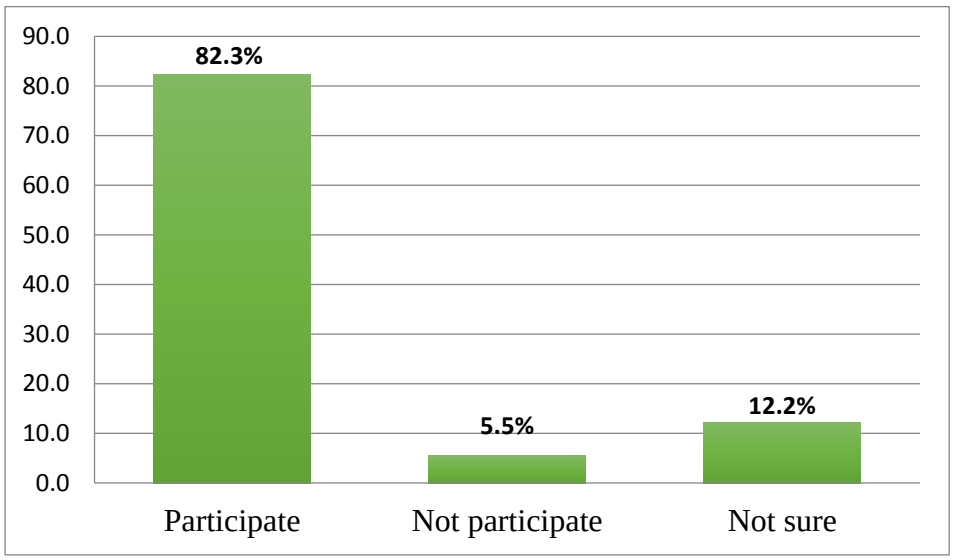


Figure 4.2: Level on Community Participation on SWM in Bagamoyo

Source: Field work, 2016

Table 4.3 shows that majority 65%of the participants said their households were mainly involved in cleaning for their surroundings. About 21% said that they participate in preservation and conservation of their area and about 15% were involved in education, seminars, training and doing community awareness in matters concerning solid waste management in Bagamoyo town.

Table 4. 3: Level of Participation on Solid Waste Management in the Community

Household participation level	Frequency (n=195)	Percentage
Education, seminar, training, awareness	28	14.6
Preservation and conservation	41	20.7
Cleaning activities	126	64.6

Source: Field work, 2016

According to Mbeya City Council (2008/09), it is indicated that only 44% of the generated solid waste is collected and disposed-off, whereas the rest (56%) is left unattended resulting to health and environmental problems and this is mainly influenced by absence of waste collection infrastructures.

To know whether there were any community solid waste collections infrastructures within the respondent's locality, it was revealed that 45% of the participants know that there are community collection centres in their neighbourhood while 42% of the participants said there is no any community solid waste collection facility available in their neighbourhood (Figure 4.3). On the other hand, 13% were not sure whether the solid waste collection facilities are available or not.

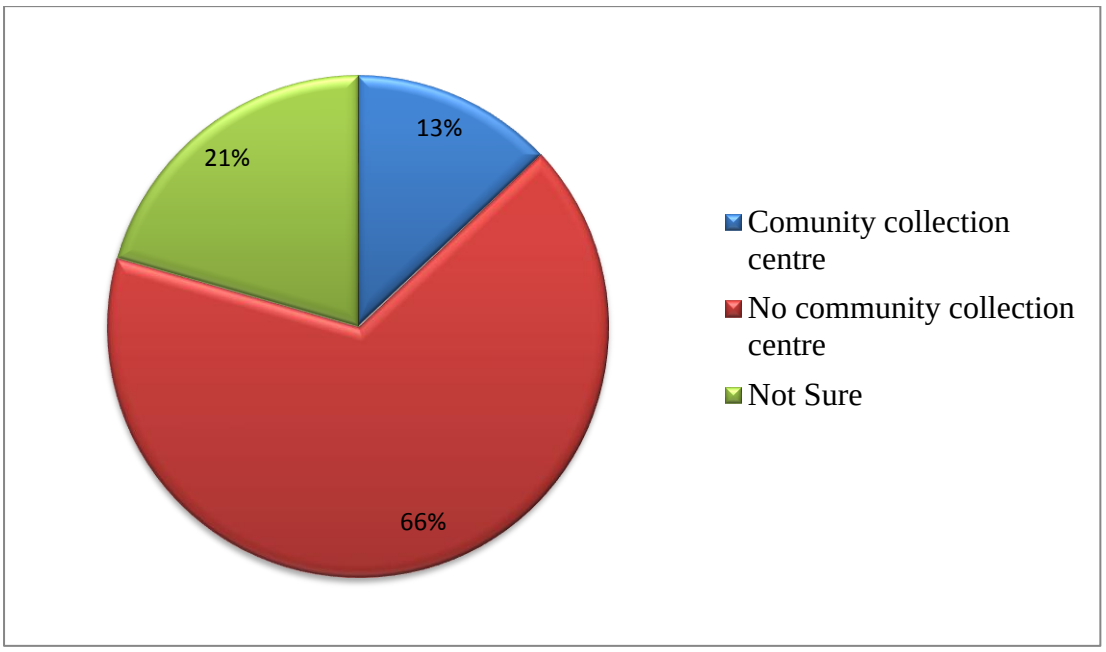


Figure 4.3: Availability of Community Collection Facility/Centre for Solid Waste in the Neighbourhood

Source: Field work, 2016

Respondents were asked whether storage facilities for storing household solid waste are available and currently working. Finding shows that more than half of the respondent's households have solid storage facilities, 38% said that they do not have any solid waste storage facility within the household and very few (1%) were unaware of having this facilities or not inside their homes.

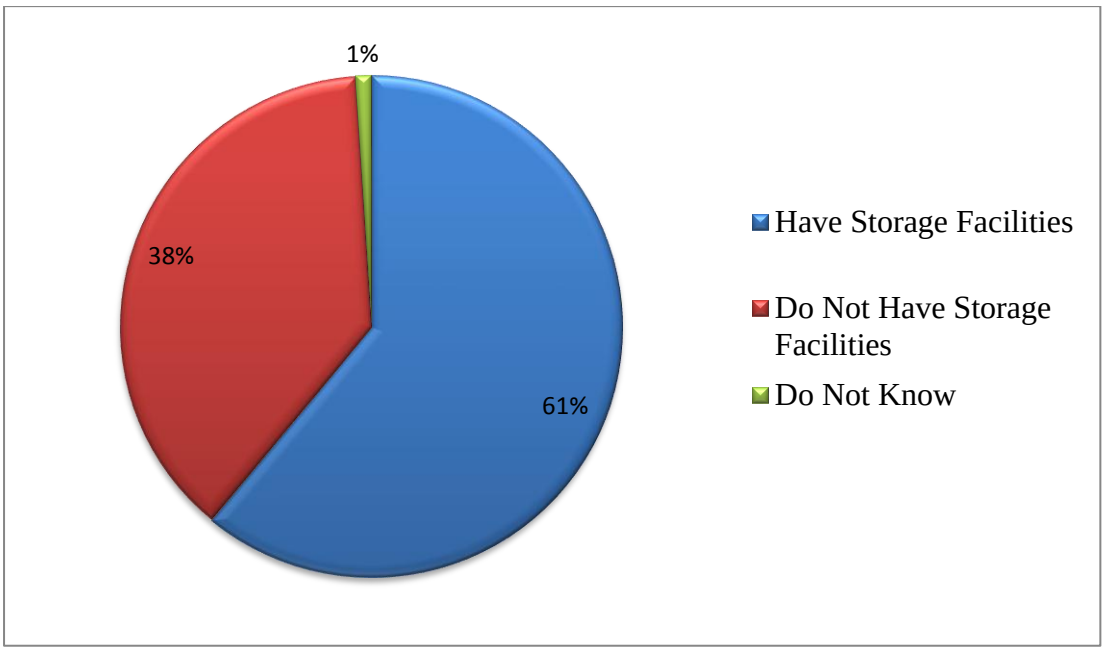


Figure 4.4 Availability of Household Storage Facilities for Solid Waste

Source: Field work, 2016

4.3 SWM and Barriers for Community Participation in Bagamoyo Town

Respondents were asked to tell on how they normally dispose wastes from their households after collection/storage. About 28% of the households (n=195) use local burning (incineration) as a mechanism for solid waste management produced in the household. In addition, 28% of the respondents used communal collection centers and 25% use refuse pits purposely made, while 19% of the households use open dump sites available in their households (Figure 4.4). This was also observed during the study field observations that burning or dumping solid wastes openly in backyard gardens or in open spaces was a common practice.

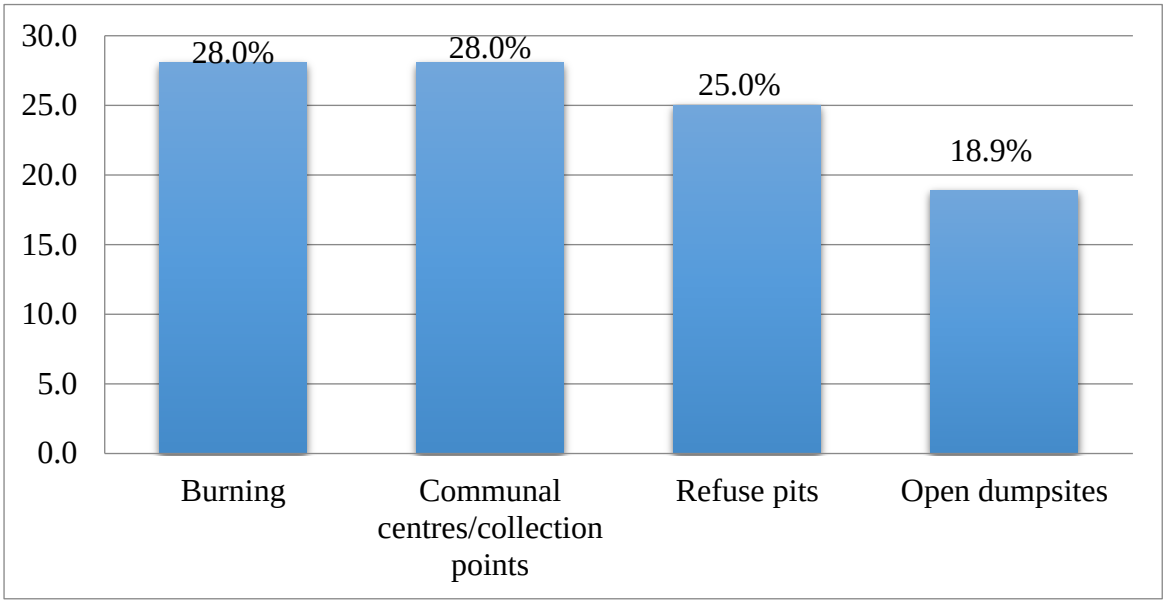


Figure 4.5: Solid Waste Management Practices in Bagamoyo Community

Source: Field work, 2016

Such indiscriminate disposal is an environmental hazard and can threaten human health and safety. Solid waste that is improperly handled and inadequately disposed of can be a breeding ground for pathogenic microorganisms and vectors of diseases, and can cause a public nuisance due to unsightliness and bad smell. In addition, it can cause contamination of surrounding soil, groundwater and surface water, and can create fire and physical hazards as well as have poisoning effects (from pesticides and insecticides). However, these problems can be avoided by using appropriate management techniques.According to Malisa (2007) most parts of urban areas cannot be easily accessed by refuse trucks, because they are unplanned. These areas carry about 60 - 70 % of the urban population. This means that, the solid wastes have to be managed by other means like incineration disposal in open spaces and disposal pits (Figure 4.5)

Figure 4. 6: Solid Waste Dumped in a Refuse Pit at Ukuni, The Outskirt of Bagamoyo Town.

Source (Researcher, 2016

As a contribution towards solid waste management in Bagamoyo,127 households (65%) contributed by providing cash to garbage collectors, 11%contributed by providing labour in solid waste management within their locality, 9% provided material/working facilities and 15% contributed cash, labour and material. Waste management systems which include community participation do not require high technology and machinery might prove to be sustainable at the community level, since income generating waste management systems can be maintained by low income communities as observed in the study.

Table 4.4: Household Contribution in Solid Waste Management within the Neighborhood

Contribution type	Frequency (n=195)	Percentage
Cash	127	65.2
Labour	21	11.0
Material	18	9.1
Both	29	14.7

Source: Field work, 2016

4.4 Level of Community Knowledge, Attitude and Perception on SWM

Respondents were asked about their knowledge, attitude and perception concerning solid waste management in their areas. Findings from Table 4.5 shows that among the respondents 82% still thinks it is a local government responsibility to work for solid waste management, they are of the opinion that SWM solely implies collection and disposal of the wastes by municipal authorities. The results are supported by the focus group discussions findings which indicated that most members of the community perceive SWM to be the responsibility of Local government.

Only few (12%) respondents agreed that it is the responsibility every member of the community to participate in solid waste management. Most (76%) of the participants were willing to participate in SWM in the neighbourhood (Table 4.5).

Table 4. 5: Community Knowledge, Attitude and Perception on Management of Solid Waste

Knowledge on SW management and willingness to participate	**Frequency (n=195)**	**Percentage**
Ever heard about SWM		
Yes	124	63.4
No	71	36.6
Opinion on responsibility for SWM in your neighbourhood		
Local government	160	82.3
Private company	11	5.5
Community in general	24	12.2
Willingness to participate in SWM in the neighbourhood		
Yes	149	76.2
No	28	14.6
Undecided	18	9.1

Source: Field work, 2016

By the use of Likert scale, (Table 4.6) participants were given some statements that indicated level of knowledge, attitude and perception on community management of solid waste in Bagamoyo town. Findings showed that relatively high percentage (43%) of respondents were of the view that Authorities should provide training & guidelines on

SWM while, 30% were undecided and few (4%) disagreed with the statement while majority of respondents 44% disagreed with the statement that *"Authority do not influence residents to participate in SWM activities".*

Over half (52%) of the participants involved in this study agreed that Community participation is necessary to enhance SWM. None strongly disagreed with the statement although 24% of the respondents in responding to this statement were not sure. About 60% of the participants disagreed that Communities have adequate knowledge about SW collection, Storage, separation and disposal. That means they are of the opinion that the community should have adequate knowledge on SW collection, storage, separation and disposals.

Table 4.6: Percentage Distribution of Respondents on Level of Knowledge, Attitude and Perception on SWM

Statement	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
"Authorities should provide training &guidelines on SWM"	7.9%	3.7 %	29.9%	15.9%	42.7%
"I am a key stakeholder in enhancing the success of SWM in my community"	0.0%	11.0%	18.3%	53.7%	17.1%
"Community participation is necessary to enhance SWM"	0.0%	8.5 %	24.4%	51.8%	15.2%
"SWM is not of immediate priority"	37.8%	29.3%	9.8%	22.6%	.6%
"Communities have adequate knowledge about SW collection, Storage, separation and disposal"	23.2%	59.8%	6.7%	7.9%	2.4%
"Authority do not influence residents to participate in SWM activities"	6.7%	43.9%	6.1%	42.7%	0.6%

Source: Field work, 2016

4.5 Advantages of Community Participation in SWM

Results from in-depth interview with local authorities show that there are advantages to community participation in solid waste management such as establishment of community based groups, conflicts between the government and community members are reduced, improved willingness of residents to participate in environmental activities. It also has enabled them to solicit funds and other resources such as to obtain dumping areas and Dunda ward managed to buy a waste transportation vehicle.

Results also indicated that participation of residents in SWM has greatly improved since December 2015 when the President of United Republic of Tanzania and the government said it is mandatory for people to participate in cleanliness of their households surroundings on the last Saturday of every monthly

Furthermore the in-depth interview revealed that by-laws were established to moderate solid waste management and other environmental activities within the district particularly Bagamoyo local government authority law of 2014. The Bagamoyo local authority government law, 2014 gives the mandate to supervise and moderate all environmental activities to ward executive and street office. One street chairman was quoted saying *Sheria ya mji mdogo wa Bagamoyo ya 2014 imeweka usimamizi wa mazingira katika ngazi ya kitongoji na mwenyekiti wa kitongoji ametajwa katika sheria hiyo kama msimamizi mkuu wa shughuli za mazingira.* Which translates to Bagamoyo local authority government law, 2014 has put all environmental activities at the ward level and the ward executive has been mentioned as the overseer of all environmental activities. This has made it easy for local authorities to organise people in their areas of jurisdiction to participate in environmental activities and improved the willingness of residents to participate in SWM.

Local authorities also had concerns on the shortage of resources especially funds and transport vehicles. They were of the opinion that allocation of funds from central government should be directed to lower levels of local authorities as they are primary overseers of environmental activities.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

This chapter will provide study conclusion, recommendations and potential areas for future research.

5.1 Conclusion

The aim of this study was to assess the local community participation in solid waste management in Bagamoyo town, Tanzania. Results indicated that majority (82%) of the respondents participate in solid waste management in their area, although among them 65% were mainly involved in cleaning for their surroundings and not proper management of the solid waste produced.

Results also showed that there is lack of collection, sorting and storage facilities at household level, whereas at community level transport, treatment and disposal areas are of major concerns. Most community members believe SWM is largely the responsibility of local government authorities and their outlook towards participating in SWM is quite inadequate.

Observations also show that on the outskirts of the town where settlements are sparse there are little or no proper waste management systems; these are the areas where open dumping, refuse pits and burning are mostly used as mechanisms of solid waste management. Unsanitary land filling of ponds, wetlands, puddles and pits are also commonly used to dispose waste and obtain areas for agriculture and building purpose.

Results further suggest that since the traditional SWM practices are not sustainable as about 28% of the households involved in this study use burning, 25% uses refuse pits and 18.9% use open dumping as a mechanism for solid waste management produced in the

household. It is therefore crucial to look for other modern SWM approaches such as recycling and reuse**.** There is need to educate the people on the importance of community participation and involvement in matters concerning the environment.

5.2 Recommendations

Based on the study results the following recommendations are pertinent:

(i) Investors and private sectors should be encouraged to establish waste recycling facilities to reduce the quantity of waste materials; this will in turn be a source of income and provide employment opportunities.

(ii) Training and education on separation/sorting of waste at generation level and promotion of sustainable approaches of SWM such as composting and recycling should be provided. This will in turn contribute in enhancing urban farming and income generation.

(iii) Community waste management financial support system ought to be created for the purpose of meeting some of the SWM expenses for basic collection and storage facilities should be covered.

(iv) Environmental committees and community based groups should be formed for purposes of boosting participation at lower levels among local residents of Bagamoyo Town.

(v) Local government authorities should direct efforts towards creating awareness and influencing Bagamoyo town community members about the importance of participating in SWM activities.

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APPENDICES

Appendix 1: Consent Agreement

THE OPEN UNIVERSITY OF TANZANIA

CONSENT FOR PARTICIPATION IN THE STUDY

Hello! I am Mazengo Chonge; I am a Master degree student pursuing a course on Environmental studies from the Open University of Tanzania. I am currently working on research titled "Assessment of Community Participation in Solid Waste Management in Bagamoyo Town, Tanzania"

Request for your participation: Kindly note that your involvement in this study is completely voluntary and you have a right to decline to be involved. If you consent to be included in the study, you also have the right to drop out from study if you wish to do so at any given time, without providing a reason. Your decision to pull out will not impact on your civic right to access any services anywhere. It is within your rights to decline but I humbly request you to participate.

Remunerations: On your participation in this study there may be no straight advantages to you. However the information you offer will assist to fill the gaps that still need to be filled on assessment of community participation in solid waste management in your local community.

Thanks for agreeing to participate in the study

Appendix 2: Household Questionnaire

A. Background Information

1. Gender of respondent

i. Male ii. Female ( )

2. What is your age in years? .....

i. 7-17years ii. 18- 40 years

iii.41-60 years iv. More than 60 years ( )

3. Marital status

i. Single ii. Married

iii. Divorced iv. Widowed v. Separated ( )

4. What is your level of education?

i No formal education ii. Primary education ( )

iii Ordinary secondary education iv. College/ University

5. How long have you been living in Bagamoyo town?

i. less than 1 year ii. 1 to 5 years

iii. 6- 10 years .iv More than 10 years ( )

6. What is the size of your household?

i. < 2 persons ii. 3-5 persons

iii. 6-8 persons iv. More than 8 persons ( )

7. What is the major source of income for your livelihood? (Tick one)

i. Salary/wage ii. Income generating project

iii. Agriculture iv. Others (Specify)…… ( )

B. Major Sources of Solid Waste and Waste Management Activities in Bagamoyo town.

8. What is the main type of generated solid waste in your household?

i. Food remains ii.Plastics (bottles, bags)/bottles/cans ( )

iii. Leaves/grass iv. Others (Specify)……v. All (i)-(iii)

9. Does your household have a storage facility for storing household solid waste?

i. Yes ii. No ( )

10. How do you dispose wastes from your households after collection/storage?

i. Incineration/burning ii. Communal centers/collection points

iii. Refuse pits iv. Open dumping ( )

v. Others (specify)……..

11. What type of storage equipment does your household (or establishment) have for waste storage at your household?

i. Metal or plastic container ii. Concrete (immovable) container

iii. Basket or Plastic bags iv. No container ( )

12. During the management of solid waste what type of contribution do you make?

i. Labour contribution ii. Cash contribution

iii. Material contribution iv. Contribution of cash and/or in-kind (labour and material

v. others (specify)……. ( )

C. Participation in Solid Waste Management and Challenges for Community Involvement in Bagamoyo Town.

13. Have you ever participated in environmental activities?

i. Yes ii. No iii. Don't know ( )

14. If yes, In what capacity did you participate?

i. Seminar/environmental education

ii. Environmental preservation/conservation

iii. Cleaning activities

15. Do you have a public collection centre/ point in your area?

i. Yes ii. No iii. Don't know ( )

16. If yes, who has provided the collection facility?

i. Community itself ii. City council

iii. Others ( )

17. What is your outlook about the public containers in your locality?

i. They are too far away from the house

ii. They are too small to contain all solid waste

iii. They produce unpleasant odours ( )

iv. Nothing is wrong with the public containers

v. There are no communal containers

18. In your opinion who has primary responsibility for collecting solid waste once it is brought to the transfer point?

i. Local government ii. Private company ( )

iii. Neighbourhood groupiv.Others (specify)….....

19. Have heard about solid waste management?

i. Yes ii. No iii. Don't know ( )

20. If yes, How did you happen to hear about solid waste management?

i. Through ward development committee awareness campaigns ( )

ii. Through fellow community members

iii. Through my own initiatives

iv. Workshops, seminars, training and guidelines

v. Others (Specify)……..

C: Level of knowledge, attitude and perception on management of solid waste among the respondents

21. Do you understand anything about activities involved in the management of solid waste management which are: generation, collection, sorting, storage, transfer, treatment and disposal of solid waste?

i. Yes ii. No iii. Don't know ( )

22. Is there any need for you to participate in solid waste management?

i. Yes ii. No iii. Don't know ( )

[Please tick in one box for each question indicating you answer for the following questions].

Question(s)	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	Total %
23. City Council provide training, guidelines or awareness on community participation in SWM						
24. I am one of the key stakeholders in enhancing the success of SWM in my community						
25. Participation through cash and/or in kind is necessary because Bagamoyo Council has no enough funds to cater for the whole cost of SWM						
26. Solid waste management is not of immediate priority						
27. Communities have adequate knowledge about SWM						
28. Leaders do not influence residents to participate in SWM activities						

Appendix 3.

List of questions for In-depth interview [Local authorities and SWM stakeholders]

1. What are the advantages of community participation in the management of solid waste?

……...……

……...……

……...……

2. As the authority, how do you organize stakeholders in dealing with solid waste management?

……..……...……

……...……

……..……

3. Are there any by-Laws, rules and regulations which govern community participation in solid waste management?

……

……

……...…….

4. Do you have any suggestions to improve the situation of community participation in solid waste management?

……

……...……

……...…….

5. What do you think are main problems/limitations in managing solid waste?

At household level;

……

……

……

At community level;

……

……

……..

Thank you for your time and cooperation.