**EFFECTIVENESS OF NEIGHBORHOOD BASED ORGANIZATIONS IN SOLID WASTE MANAGEMENT: THE CASE OF ILALA MUNICIPALITY IN DAR ES SALAAM REGION, TANZANIA.**

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

**2014**

# CERTIFICATION

The undersigned certify that he has read and hereby recommends for acceptance by the Open University of Tanzania (OUT) a dissertation titled **“Effectiveness of Neighbourhood Based Organizations in Solid Waste Management: The Case Study of Ilala Municipality, Dar es Salaam Region, Tanzania**”, in partial fulfilment of the requirements for the degree of Master of Science in Environmental Studies (Health) of the Open University of Tanzania

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Date

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Signature

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Date

# DEDICATION

I dedicate this dissertation to my beloved wife Bahati Mwasalujonja for the encouragement, moral and financial support. I also dedicate this work to my children Erick Noah, Michael Noah, Baines Noah and Elizabeth Noah for bearing with the tough situations during the difficult moments of two-year study period at the Open University of Tanzania.

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# ABSTRACT

The aim of this study was to assess the effectiveness of neighborhood based organizations (NBOs) in solid waste management. The study was conducted in Ilala Municipality - Dar-es- Salaam, Tanzania. Data were collected using open and closed questionnaires, documentary review then after that data were analyzed using descriptive and inferential statistics; all analyses were performed in statistical package for social sciences (SPSS), version 17. Primary data were collected using questionnaires following stratified random sampling; secondary data were obtained from statistical records.

The findings of the study in regard to the characterization of solid waste showed that most waste came from food remains and vegetable peels (p= 0.282), broken glass (p= <0.001), textiles (p=<0.001), kitchen waste (p=0.001), and paper wrappers (p=0.512). Frequent collection of wastes is required because they were generated in the large quantity and most of them are biodegradable. Furthermore, the study revealed that majority of the residents (p=0.019), used the hessian sacks and plastic bags (p=0.020), as storage facilities of solid waste. In collection of solid waste from generation point to the final disposal point, polythene bags (p=<0.001), were the most used waste collection containers. In case of waste disposal methods majority of the respondents ( p=0.016), reported the lack of dumping places near their houses. Furthermore it was observed that Neighborhood based organizations were non- conventional methods which experienced many problems including lack of modern equipments for waste collection and transportation, low wage for Neighborhood based organization workers, poor community participation and lack of reliable market for the recycled waste. Regardless of the challenges that neighborhood based organizations faced, majority of respondents (89.9%), reported that the approach was effective in solid waste management. It is recommended that the Ilala Municipality has to increase the awareness on use of Neighborhood based organizations in dealing with solid waste management.

# TABLE OF CONTENTS

[**CERTIFICATION** ii](#_Toc403399466)

[**COPYRIGHT** iii](#_Toc403399467)

[**DECLARATION** iv](#_Toc403399468)

[**DEDICATION** v](#_Toc403399469)

[**ACKNOWLEDGEMENT** vi](#_Toc403399470)

[**ABSTRACT** vii](#_Toc403399471)

[**TABLE OF CONTENTS** viii](#_Toc403399472)

[**LIST OF TABLE** xii](#_Toc403399473)

[**LIST OF FIGURES** xiii](#_Toc403399474)

[**LIST OF PICTURES** xiv](#_Toc403399475)

[**LIST OF ABBREVIATIONS** xv](#_Toc403399476)

[**CHAPTER ONE** 1](#_Toc403399477)

[**1.0 INTRODUCTION** 1](#_Toc403399478)

[1.1 Statement of Problem 5](#_Toc403399479)

[1.2 General Objective 6](#_Toc403399480)

[1.2.1 Specific Objectives 6](#_Toc403399481)

[1.3 Research Question 6](#_Toc403399482)

[1.4 Significant of the Study 7](#_Toc403399483)

[**CHAPTER TWO** 8](#_Toc403399484)

[**2.0 LITERATURE REVIEW** 8](#_Toc403399485)

[2.1 Introduction 8](#_Toc403399486)

[2.2 Breeding site of insects and vermin 8](#_Toc403399487)

[2.3 Dumping places 8](#_Toc403399488)

[2.4 Amount of Solid waste generated in Sub-Sahara 9](#_Toc403399489)

[2.5 Collection and Transportation of Solid Waste 9](#_Toc403399490)

[2.6 Location of Dumpsite 10](#_Toc403399491)

[2.7 Solid Waste Management Stream 11](#_Toc403399492)

[2.8 Neigborhood based organization 11](#_Toc403399493)

[2.9 Inadequate land for landfill 12](#_Toc403399494)

[2.10 Community participation in Solid Waste Management 13](#_Toc403399495)

[2.11 Dakar experience in solid waste management 14](#_Toc403399496)

[2.12 Low Willingness to pay in Solid Waste Collection Services 14](#_Toc403399497)

[2.13 Collection of Solid Waste 15](#_Toc403399498)

[**CHAPTER THREE** 16](#_Toc403399499)

[**3.0 RESEARCH METHODOLOGY** 16](#_Toc403399500)

[3.1 Research Design 16](#_Toc403399501)

[3.2 Study Area and Population 16](#_Toc403399502)

[3.2.1 Study Area 16](#_Toc403399503)

[3.2.2 Study Population 17](#_Toc403399504)

[3.3 Data Collection Technique 18](#_Toc403399505)

[3.4 Data Processing 19](#_Toc403399506)

[3.5 Data Analysis 19](#_Toc403399507)

[3.6 Sampling frame and sample size 19](#_Toc403399508)

[3.7 Sampling procedure 20](#_Toc403399509)

[3.8 Data on characterization of solid waste generated in the study area 20](#_Toc403399510)

[3.9 Assessment of neighbourhood-based waste collection 20](#_Toc403399511)

[3.10 Analysis of neighbourhood based solid waste storage 21](#_Toc403399512)

[3.11 Determination of effectiveness of neighbourhood based waste disposal methods 21](#_Toc403399513)

[**CHAPTER FOUR** 22](#_Toc403399514)

[**4.0 RESULTS AND DISCUSSIONS** 22](#_Toc403399515)

[4.1 Introduction 22](#_Toc403399516)

[4. 2 Basic Socio-Demographic and Economic Profile of Respondents 22](#_Toc403399517)

[4.2.1 Socio-Demographic Characteristics 22](#_Toc403399518)

[4.2.2 Socio-economic Characteristics 23](#_Toc403399519)

[4.2 Characterization of solid waste generated in the study areas 25](#_Toc403399520)

[4.3 Assessment of Neighborhood-Based Waste Collection Techniques 27](#_Toc403399521)

[4.3.1. Method of solid waste collection existing in the study areas 27](#_Toc403399522)

[4.3.2 Types of carriage used to move solid waste 29](#_Toc403399523)

[4.3.3 Personal Protective Equipment (PPE) used when collecting wastes 31](#_Toc403399524)

[4.3.4 Frequency of solid waste collection 31](#_Toc403399525)

[4.3.5 Local authority control of waste control schedules 32](#_Toc403399526)

[4.3.6 Problems associated with disposal/dumping of waste near household areas 33](#_Toc403399527)

[4.4 Assessment of Neighbourhood-Based Waste Storage Techniques 34](#_Toc403399528)

[4.4.1 Ways in which wastes are stored in households 34](#_Toc403399529)

[4.4.2 Education status of waste collection workers 36](#_Toc403399530)

[4.5 To determine the Neighbourhood-Based waste Disposal Methods 37](#_Toc403399531)

[4.5.1 Perception of respondents in quantity of solid generated daily 37](#_Toc403399532)

[4.5.2 Presence of dumping place in the area 37](#_Toc403399533)

[4.5.4. Situation of solid waste in Ilala Municipal 40](#_Toc403399534)

[4.5.5 Awareness on waste management issues 41](#_Toc403399535)

[4.5.6 Barriers to sustainable waste management 44](#_Toc403399536)

[4.5.6 Advantages and disadvantages of neighborhood-based approach in SWM 45](#_Toc403399537)

[**CHAPTER FIVE** 48](#_Toc403399538)

[**5.0 CONCLUSIONS AND RECOMMENDATIONS** 48](#_Toc403399539)

[5.1 Conclusions 48](#_Toc403399540)

[5.2 Recommendation 48](#_Toc403399541)

[**REFERENCES** 50](#_Toc403399542)

[**APPENDICES** 53](#_Toc403399543)

# LIST OF TABLE

[Table 4. 1: Socio-demographic characteristics of respondents 23](#_Toc403399600)

[Table 4. 2: Socio-economic characteristics of respondents 24](#_Toc403399601)

[Table 4. 3: Types of solid waste generated in the study areas 26](#_Toc403399602)

[Table 4. 4: Methods of solid waste collection existing in the study areas 28](#_Toc403399603)

[Table 4. 5: Types of carriage used to move solid waste 30](#_Toc403399604)

[Table 4. 6: Frequency of solid waste collection 32](#_Toc403399605)

[Table 4. 7: Local Authority Control (LAC) of waste control schedules 33](#_Toc403399606)

[Table 4. 8: Ways in which wastes are stored in households 35](#_Toc403399607)

[Table 4. 9: Education status of waste collection workers 36](#_Toc403399608)

[Table 4. 10: Solid waste dumping sites 38](#_Toc403399609)

[Table 4. 11: Solid waste disposal practices 39](#_Toc403399610)

[Table 4.12: Situation of solid waste in Ilala Municipal 41](#_Toc403399611)

[Table 4. 13: Presence of markets for solid waste recycling and composition plant 43](#_Toc403399612)

[Table 4. 14: Barriers to sustainable waste management 44](#_Toc403399613)

[Table 4. 15: Advantage of neighborhood-based approach in SWM 45](#_Toc403399614)

[Table 4.16: Disadvantage of neighborhood-based approach in SWM 46](#_Toc403399615)

[Table 4.17: Income per month (Tshs.) 47](#_Toc403399616)

# 

# LIST OF FIGURES

[Figure 1. 1 : Map of Dar es Salaam showing location of Ilala Municipality 18](#_Toc402961802)

[Figure 4. 1: Percentage of solid waste generated in the study areas 25](#_Toc402961795)

[Figure 4. 2: Perception of extent of problem caused by solid waste generated 27](#_Toc402961796)

[Figure 4. 3: Personal protective equipment used when collecting waste 31](#_Toc402961797)

[Figure 4. 4: Problems associated with disposal of waste near household areas 33](#_Toc402961798)

[Figure 4. 5: Perception of respondents on quantity of solid generated daily 37](#_Toc402961799)

[Figure 4. 6: Awareness of laws regulating waste management 42](#_Toc402961800)

[Figure 4. 7: Number of individuals received waste management education 43](#_Toc402961801)

# LIST OF PICTURES

[Picture 1: Shows motor tricycles used for collection and transportation of solid waste in Mwembe Madafu ward, Gongo la Mboto 29](#_Toc402961753)

[Picture 2: Shows the Hessian and Polythene bags used for storage of wastes at household level 35](#_Toc402961754)

[Picture 3: Shows the recycled waste ready for marketing as one of the solid waste 40](#_Toc402961755)

# LIST OF ABBREVIATIONS

CBOs Community Based Organizations

CCN City Council of Nairobi

DCC Dar es Salaam City council

DESWAM Decentralized Solid Waste Management System

DLAs Dar es Salaam Local Authorities

EIA Environmental Impact Assessment

EGSSAA Environmental Guidelines for Small Scale Activities in Africa

KMC Kinondoni Municipal Council

IMC Ilala Municipal Council

MoHSM Ministry of Health and Social Welfare

MRF Material Recovery Facility

NBOs Neighbourhood-Based Organizations

NGOs Non-Governmental Organizations

PPE Personal Protective Equipment

SWM Solid Waste Management

SWNSM Solid Waste Neighbourhood Self Management

TMC Temeke Municipal Council

UN United Nations

WB World Bank

WEO Ward Executive Officer

WHO World Health Organization

NEAP National Environmental Action Plan

# CHAPTER ONE

# INTRODUCTION

Solid waste is an unavoidable by-product of human activities, economic development in manufacturing industries, urbanization and improvement of living standards of people in cities and rural areas. Once produced, solid wastes create an adverse effects to public health and utilize valuable space needed for other purpose, and generally becomes unpleasant and not tolerable to public,(Tchibanoglus, 2001)

According to the World Health Organization (WHO), municipal solid waste (MSW) represent the highest proportion of solid waste generated in many countries across the the world (WHO, 2006). Statistics from the same study show that global estimated percentage distribution by weight of all MSW generated in a typical community in 2008, excluding industrial and agricultural waste, for residential and commercial, excluding special and hazardous waste ranges from 50 to 70%.

Over the last few years, the problem of waste management has received considerable attention in all countries (UN, 2005). In developed countries, towards planning, technical resources, sound financial resources and fairly static population growth have met that the provision of adequate facilities in waste management is possible. However, in developing countries, metropolitan authorities have to function under pressure as a result of rural–urban migration, decreasing availability of disposal resources and lack of environmental awareness (UN, 2002).

Currently, global MSW generation levels are approximately 1.3 billion tonnes per year and are expected to amount to 2.2 billion tons per year by 2025. This represents a significant increase of per capital waste generations rates from 1.2 to 1.42 kg per person per day in the next fifteen years. However, global averages are broad estimates only as rates vary considerably by regions, country, and city and even within cities (USAIDS, 2009). For example, in the Middle East and North Africa regions, solid waste generation is 63 million tons per year per capita, waste generation is 0.16 to 5.7 kg per person per day and has an average of 1.1kg/capita/day (WB 2009).

The management of solid waste in Tanzania’s urban and rural areas has become an ever-increasing problem (MoHSW, 2011). In urban centres, the problem is much greater because of many sources of waste generation, which includes households, industries, commercial, institutions, agriculture, hospitals, construction, and demolitions. A large part of the waste especially solid waste is buried or burnt on-sites, disposed haphazardly by roadsides, on open spaces or in valley and in storm water drains. ( Ilala Municipal report, 2012). In addition, the municipal solid waste management also involves crude dumping, normally in natural depressions, on open land and in abandoned quarry sites. Waste containing hazardous components and hospital wastes are also disposed of in the same dumpsites. (MoHSW, 2012)

Plastic waste materials have been and still are eye sore in our surroundings as they are in practices, thrown indiscriminately everywhere. They are non-biodegradable and emit hazardous gases in the environment when burned haphazardly. Sometimes the plastic waste materials are misused as “flying Toilets” in unplanned settlements and in places without latrine facilities, thus contaminating the environment as well as producing bad

smells and unsightly conditions. (www.plasticmanagement.com)

In order to improve SWM in Dar es Salaam city, new concepts were introduced to privatize and improve revenue collection. Before that, Dar es Salaam city council was the only authority responsible for provision of public services, including primary waste collection, temporally storage, and transportation to the disposal sites and sometimes recycles waste. Among the new approaches used are the community based organizations (CBOs), neighbourhood based organization (NBOs) and other non-governmental organisations (NGOs) (Ilala Municipality Report, 2011).

Neighborhood based organization refers to the principle of moving solid waste management away from inadequate centralization and into far more manageable divisions of neighborhood areas (DESWM Report, 2011). The main objective of introducing this approach was to establish a comprehensive decentralized SWM system including households solid waste separation, solid waste collection, recycling, re-using, and composting at a material recovery facility (MRF) on the existing Mwembe madafu transfer stations (Ukonga), Buguruni and continued transportation of residual waste to final dumpsite. In this case solid waste collected from neighbourhood areas is brought to the commercial waste collection points, where recycling, composting take place and residual waste is transported to the dumpsite for final disposal(Ilala Municipality Report, 2012).

Actually neighbourhood approach takes place in unplanned areas, where there is no sanitary lane and refuses collection vehicles cannot reach. Both neighbourhood and community based organizations are formed and registered by an appropriate ward authority ([www.borda-sadc.org](http://www.borda-sadc.org)). This was the first comprehensive DESWM project established in Dar es Salaam. This project has two phases and focuses on displaying a complete solid waste management services delivery and waste reduction by upwards of 45 – 60% through waste separation, composting, and recycling at a full materials recovery facility (MRF).

The Ilala Municipality was said to generate an estimate of solid waste 1,100 tonnes of solid waste a day, of which 456 tones (42%) of the total waste was collected per day and transported to the Pugu dumpsite for final disposal (Ilala Municipal council report, 2013) In the municipality, solid waste was collected and transported using vehicles, skip buckets (storage), hand carts etc. The amount of waste collected came from planned and unplanned areas and collected with different approaches to improve solid waste management in Ilala, these approaches are neighbourhood, and community based organizations including the conventional method. In the NBOs and CBOs involve public participation and partnership approach, in which the community play a major role in solid waste management while the conventional methods is confined in urban centre and less in unplanned areas (Ilala Municipality report, 2012).

Ilala municipality in order to improve solid waste management and support the conventional approach, the municipality came to realize that there is a need to formalize the collection sites using practical cost effective approaches. A practical design was suggested by two NGOs, Borda and sustainable cities working with wards and CBOs in Ilala. The design consists of concrete pad, partial concrete blocks wall and corrugated steel roofs. Space was allocated to dumping by hand carts, manual materials sorting and recyclable materials storage. A key to this design was regular collection of waste for

transport to Pugu to minimize build-up waste.

Based on Dar es Salaam Metropolitan development projects 2011, waste management projects proposal came up with the waste quantity and composition of waste in Ilala, about 40% of the waste are organics from kitchens, followed by 16% plastics, 10% yard waste and 8% paper. Metal constitute 5% and ceramics/stones about 6% of the total, this waste composition help in planning and design of solid waste management activities. This study intends to assess the effectiveness of neighbourhood-based organizations (NBOs) in solid waste management, a case study of Ilala Municipality, Dar es Salaam Region.

# 1.1 Statement of Problem

The solid waste management in Ilala Municipality is a major public health problem and environmental pollution, which needs immediately solution to arrest the situation, among the approaches used were to involve private actors to collect and transport solid waste from generation points to the communal waste collection sites or dumpsite. Among the private collectors are the neighbourhood-based organizations (NBOs).

Neighbourhood based organization (NBO) which is a non conventional method or system that is applied in unplanned or low income areas as a key method in improving solid waste management in Ilala municipality, which involves community participation.

The NBOs were lacking financial support, equipment or tools for solid waste separation, composting plant, personal protective equipments reliable market for selling recycled materials and manure after composting, low community participation, lack of political will, poor relations between politicians and general population, politics of privatization low community priority for solid waste management, low willingness to pay for services and political apathy. Therefore the success of current approach of managing solid waste in urban areas cannot be separated from the role of NBOs which perform waste collection on a daily basis. However there is little information on the effectiveness of NBOs in SWM in the study area. This research will therefore collect information with regard to operation and effectiveness of NBOs as an alternative means in dealing with waste.

# 1.2 General Objective

To assess the effectiveness of neighbourhood based organizations (NBOs) in solid waste management, in Ilala Municipality, Dar es Salaam Region, Tanzania.

# 1.2.1 Specific Objectives

1. To characterize the solid waste generated in Ilala Municipality.
2. To determine neighbourhood-based waste storage techniques.
3. To assess neighbourhood-based waste collection techniques.
4. To determine the neighbourhood-based waste disposal methods.

# 1.3 Research Question

Are the neighbourhood-based organizations effective in solid waste management in Ilala municipality?

1. What are the characteristics of solid waste generated in Ilala Municipality?
2. What are the neighbourhoods-based waste storage techniques?
3. What are the neighbourhoods-based waste collection techniques?
4. What are the methods of the solid waste disposal in Ilala?

# 1.4 Significant of the Study

Solid waste in the least developed and low-income developing countries of the Region are characterized by its high organic content. As much as 70-80 per cent of the waste generated is organic, (WHO, 2006). This research would therefore collect information in regard to functional and effectiveness of Neighbourhood based organizations in the area of solid waste management and come up with recommendations which would help to improve the solid waste management activities in the study area. Therefore these recommendations could include: expansion of recycling, re-using and composting, as recovery methods which could help to reduce the amount of waste that could reach the dumpsites and reduce the operational costs. Also could create employment to the community, using the recycled materials as source of income and keeping the environment clean. This research could advise the Ilala Municipality to train the NBOs workers and households on safe separation of solid waste, use of recycled waste as source of income. Finally it is a pre-requisite for the partial fulfilment for the award of Master of Science in environment science (Health).

# CHAPTER TWO

# 2.0 LITERATURE REVIEW

# 2.1 Introduction

Solid waste refers to any of a variety of solid materials, as well as some liquids in containers, which are discarded or rejected as being spent, useless, with less or in excess, usually solid waste is a result of human activities (Willeys, 2009).

# 2.2 Breeding site of insects and vermin

Solid waste can be considered according to its depreciation of land and recreational areas by garbage, litter, hazardous waste and plastics. General health hazards of solid waste are caused by insects, rodents and contamination. 90% of flies breed on urban refuse. Flies act as mechanical transmitters of diseases like cholera and dysentery. Mosquitoes breed inside discarded containers especially during rainy seasons. They spread diseases such malaria, dengue fever, yellow fever and filariasis (Amref, 2001).

# 2.3 Dumping places

Illegal dumping is the deposition of waste on the ground surface or in water except at a permitted disposal site (Wright, 2007). Any decomposing garbage and other solid waste may become the sources of food to disease vectors, rats and other vermin.

Municipal solid waste generation rates are influenced by economic development, the degree of industrialization, public habits, and local climates. Generally, the higher the economic development and rate of urbanization, the greater the amount of solid waste produced. Income level and urbanization are highly correlated and as disposable income and living standards increases consumption of goods and services correspondingly increases as does the amount of waste generated. Urban residents produce about twice as much waste as their rural counterparts (UNWUP, 2007).

# 2.4 Amount of Solid waste generated in Sub-Sahara

Waste generation in sub-Saharan Africa is approximately 62 million tonnes per year per capital, the generation is generally low in this region, but spans a wide range from 0.09 to 3.0Kg per person per day with an average of 0.65Kg/capita rates are islands, likely due to waste generated by tourism industry and a more complete according of all wastes generated, (Kironde, 1995). The annual waste generation in East Asia and the pacific is approximately 270 tones millions per year. This quantity is mainly influenced by waste generation in china, which makes up 70%of regional total. Per capita waste generation ranges from 0.44 to 4.3 kg per person per day for the region with an average of 0.95kg/capital/day (Hoornweg at el 2005).

Solid waste generation, at any type of solid waste is generated at a certain point usually known as a source. The source could be individual households, commercial centre, farm, industries, institutions and others. The first step in the management of solid wastes should start right at the generation point and composition of solid wastes should be estimated for local authorities in making decision about suitability of specific collection, treatment or disposal methods. Obviously for rural areas waste generation rate is much lower though in settlements and growing sub-towns there is considerable increase of solid waste materials (Berthier, 2003).

# 2.5 Collection and Transportation of Solid Waste

Solid waste collection is always the most controversial part of a refuse management programme. In order to satisfy the demand of public health and environmental quality, there are pertinent issues to take on board (MoH, 2004). The following activities should be in place in order to enable waste collection in urban areas, primary collection refers carrying waste from source to collection points and secondary collection, is transporting of waste from collection points (secondary storage sites) to treatment facilities. To ensure proper collection standards and appropriate; refuse containers should be placed strategically at all points where people pass or congregates. For example of these strategic places are residential halls, pathways, compounds, offices, business places, play grounds, classes and conference rooms (MoHSW, 2004).

# 2.6 Location of Dumpsite

Solid waste disposal is a final stage in solid waste management system. The choice of any method of solid waste disposal depends mainly on climatic conditions and the economy of the local authority and the community.

Consideration should be given to environment, economic, hygiene, social benefits and the availability of tipping sites. Relevant authorities should ensure that service providers protect workers from occupational health and safety hazards as stipulated in the occupational safety and health legislation (MoHSW, 2006). SWM is a major public health issue and a growing environmental problem in developing countries. It continues to be a major challenge in urban areas throughout the world particularly in the rapidly growing urban and rural towns of the developing world. Currently the systems of waste management in the cities of most developing countries are very rudimental at the best and are grossly insufficient and ineffective. Uncontrolled landfill disposal of solid waste is a persistent problem which causes a range of external costs including human health hazards (Bartone, 1991).

# 2.7 Solid Waste Management Stream

In order to reduce the impact of rubbish and other wastes, several management approaches need to be applied. Waste management covers the collection, transportation, processing, recycling or disposal and monitoring of waste materials. The term usually relates to materials produced by human activities and generally undertaken to reduce their effects on people’s health and environment, (Arlosoroff, 1985). Waste management is also carried out to recover resources from it. Waste management can involve solid, liquid, gaseous or radioactive substances, with different methods and fields of approach for each. Solid waste lack hardness they are not firm and they are easily be cut or be compressed. These could be decomposed over time. In general, they are destroyable. On other hand, hard or solid waste includes garbage, physical rubbish, abandoned vehicles and scraps, parts of demolished buildings, construction wastes and recyclable materials which are firm, solid, hard and not compressible than the former (Amref,2001).

# 2.8 Neigborhood based organization

In Bogor, Indonesia, solid waste neighbourhood self management (SWNSM) is a based on the principle of moving solid waste management away from inadequate centralization to more manageable divisions of neighbourhood areas. A key component of this approach is the implementation of recycling, reusing and composting. The SWNSM project objective is to highlight possibilities for applying the system in a wider area, including other cities in Indonesia.

SWNSM is a relatively new concept in solid waste management. In early 1990, it was applied in several locations in Jakarta by various non government organizations. While only one location (involving a recycling program) remains in operations; considerable experience has nevertheless been gained with the SWNSM system in Bogor, (Ministry of Public Works, Indonesia, 1990). Bogor consisting of small scale management, the system involves consultant supervision of several workers and is headed by a consultant staff.

Rapid rate of population growth in Indonesia cities has far outstripped the available resources and technology intended to deal with such increases. In many Indonesian urban development areas, adequate infrastructures is coefficient lacking and is failing to keep pace with development. The municipality of Bogor is typically of the surrounding cities of the Jakarta Metropolitan. Specifically, population growth, and area expansion have greatly overextended city infrastructures resources especially in the area of solid waste management. (Bogor City council report, 2012).

# 2.9 Inadequate land for landfill

Because solid waste management is a dynamic field, there is a no “best method” for all problems that arise. However, in the situation being considered, there are four important issues that must be taken into account in order to determine the impacts of alternative courses of action. First, Bogor’s development area has more than quadrupled in the last five years, increasing from 2,257 than before 1992 to 71,913 in 1996. Thus, both the population and service areas have changed a great deal. Even with its old municipal area, the local sanitation covered no more than 80% of the total area, with the total residential garbage collection of 426m3. Currently, the services area is less than 50% with a total collection of 619m3. Also in Bogor municipality the scarcity of the available land, Bogor city has already experienced great difficulty in finding adequate landfills to meet the needs of the waste generation rate, which has almost doubled during the past decade. The 4.5 ha landfills in Rancamaya, 8km south of Bogor has already reached its capacity. Another problem of solid waste management in Bogor is technical, financial and institutional resources and capabilities are greatly restricted, thereby limiting Bogor waste services coverage to less than 50% of the total area. Solid waste in Bogor generally comes from different sources, namely residential areas (e.g. well planned, flats alley, hilly alley and real estate’s), commercial districts, markets and streets (Bogor Municipality Report, 1990). Private actors and CBOs involved in solid waste management activity in Nairobi City. The entry of private collectors in solid waste management in Nairobi started in 1986 owing to declining waste collection performance by City Council of Nairobi (CCN), with the emergence of 2 of the oldest companies in the city (Karanja, 2005).

# 2.10 Community participation in Solid Waste Management

Community Based Organizations and groups involved in solid waste management activities including collection, composting and recovery and sales of recyclables started to emerge later in 1994, (Karanja, 2005) with the heightened lack of service delivery especially in low income areas and informal settlements. From minuscule beginnings, both sets of actors in Nairobi’s SWM system have blubbered to count 115 registered Private Waste Collectors/companies and over 135 CBOs and youth groups as of 2009 (Ngau and Kahilu, 2009), explaining the rapid increase in private collection since 1998.

**Timeline of increase of private actors in Nairobi’s Solid Waste Management**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Type of Actor** | **Year** | | | | |
| 1986 | 1994 | 1998 | 2007 | 2009 |
| No. of Private Waste Collectors | 2 |  | 60 | 87 | 115 |
| No. of CBOs and Youth groups in SWM |  | Entry year |  |  | 135 |

Source: Study Findings, 2014

Due to increase of private actors in Nairobi, the following trends were observed from the evaluation of Nairobi’s Solid waste Management:-

* CCN control of waste collection and management faces several physical and financial capacity limitations owing to resources constraints amongst a multitude of other factors.
* Private waste collection by private companies and CBOs is growing in importance as an alternative route for the provision of waste collection services and seems rational to encourage the growth of this arm instead for collection service provision, with CCN taking on a more supervisory role.
* Waste collection levels remain low, but are growing with the contribution of private collectors and CBOs.
* There is a vibrant waste recovery and trading sector in the city.
* Low community participation
* Lack of political will and relations between politicians and general population.

# 2.11 Dakar experience in solid waste management

In recent years, the urban management of Households waste has been of increasing interest to both researchers and policy makers. Public waste collection has several components. Sorting, incinerating, recycling, burying, composting etc. effective waste collection is important in public services in African Capital Cities, failure of which can result in many lands of unfavourable outcomes. Olfactory nuisance linked to bad smelling, emanation of flying objects, underground water and air pollution (Dakar Municipality Report, 2012).

# 2.12 Low Willingness to pay in Solid Waste Collection Services

In understanding the factors that could make households waste collection more effective in capital city of Senegal, Dakar in particular; a critical question we seek to answer is how much households would be willing to pay for efficient waste collection. The experience was conducted in Dakar in 2006 and allowed us to estimate household’s willingness to pay according to various scenarios (Kwak, Yoo and Kim 2004). Resident’s willingness to pay for community solid waste collection and disposal services was poor. The Dakar Municipality experienced low response on community pay for the solid waste management activities, also experience huge difficulties in entering adequate collection in all neighborhoods of the capital, while down town Dakar was often sufficiently served, other suburban areas were not ( Kah, 2005).

# 2.13 Collection of Solid Waste

In Senegal decentralization has resulted in the transfer of waste collection from the central government to municipality and local governments. The accelerated growth in the population of Dakar, however, has created a very rapid increase in household waste production (Gurmu, 2007). Policy makers have experimented with several different formulas to deal with waste collection in its proper management (Dakar Municipal Report, 2011).

Waste collection in Dakar is deposited in Mbeubeuss, a subarb of Dakar 20KM from downtown, it is estimated that every year up to 475,000 metric tones of wastes are deposited in this area without any type of processing. Most NGOs quality Mbeubeuss as an ecological bomb that may explode at any time. Environmental risks associated with waste depositing and storage is quite high. Pollution of underground water reserve, air pollution and proliferation of flies and mosquitoes (Melian, 2005).

# CHAPTER THREE

# 3.0 RESEARCH METHODOLOGY

This section describes how the study was done. It describes the research design, study area, study population, as well as sampling techniques. Type of data collected and data collection methods are also described.

# 3.1 Research Design

This study adopted a cross-sectional research design in that the data were collected at once from the selected sample of respondents in the three wards in the study area.

# 3.2 Study Area and Population

# 3.2.1 Study Area

The study was conducted in Ilala Municipal Council which is among the three municipalities of Dar es Salaam Region, (Figure 1.1). The Municipality covers an area of 210 km2 with an estimated population of 1 million people (2012 Population and Housing Census). It is bordered by the Indian Ocean to the East, Coast Region to the West, Kinondoni Municipality to the North and Temeke Municipality to the South.

Dar es Salaam is the country’s largest industrial and commercial centre with an estimated population of more than 4 million and a population growth rate of 4.3 percent (2012 Population and Housing Census). Dar es Salaam Municipal Government is composed of Dar es Salaam City Council (DCC) and three contiguous municipal Councils namely: Kinondoni Municipal Council (KMC) to the north, Ilala Municipal Council (IMC) in the centre and Temeke Municipal Council (TMC) to the south. Together the four local government authorities are commonly referred to as Dar es Salaam Local Authorities (DLAs). More than seventy percent of the population live in unplanned and under serviced areas of the city (DLA, 2012).

The inhabitants of the Ilala Municipality are Zaramo ethnic group and other tribes from upcountry (MOHSW, 2004). It comprises of three locations namely Ukonga, Ilala and Kariakoo. Solid waste generation rate in Dar es Salaam is estimated to be 1100 tones per day of which only about 50% of the total waste generated per day are collected and transported to Pugu Kinyamwezi dumpsite (Ilala Municipality report, 2012).

The dumpsite is also located in the IMC territory which is about 35 km from the city centre. This shows that about 500 tons of waste remains uncollected across various generation points, of which it creates high accumulation of wastes hence pose attraction of rats and other vermin, where they breed and provide high risks of environmental pollution, epidemic diseases like cholera, plague and other public health problems including unpleasant smell.

# 3.2.2 Study Population

A total of 178 respondents were interviewed from households, Neighbourhood based organization workers, ward executive officers and ward health experts.

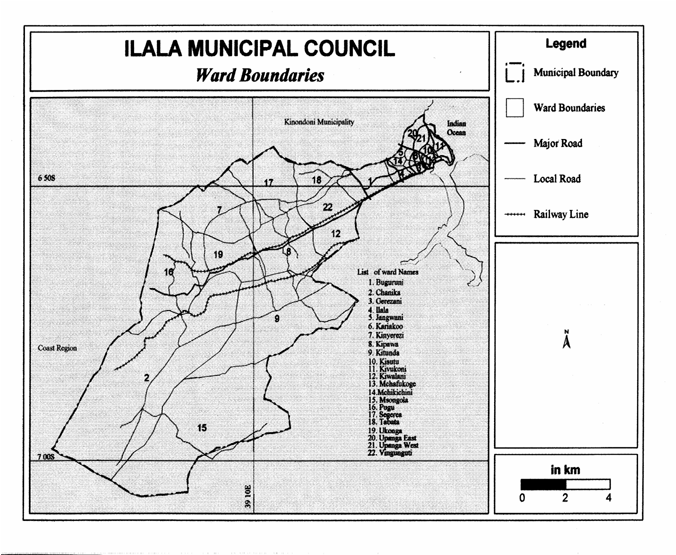
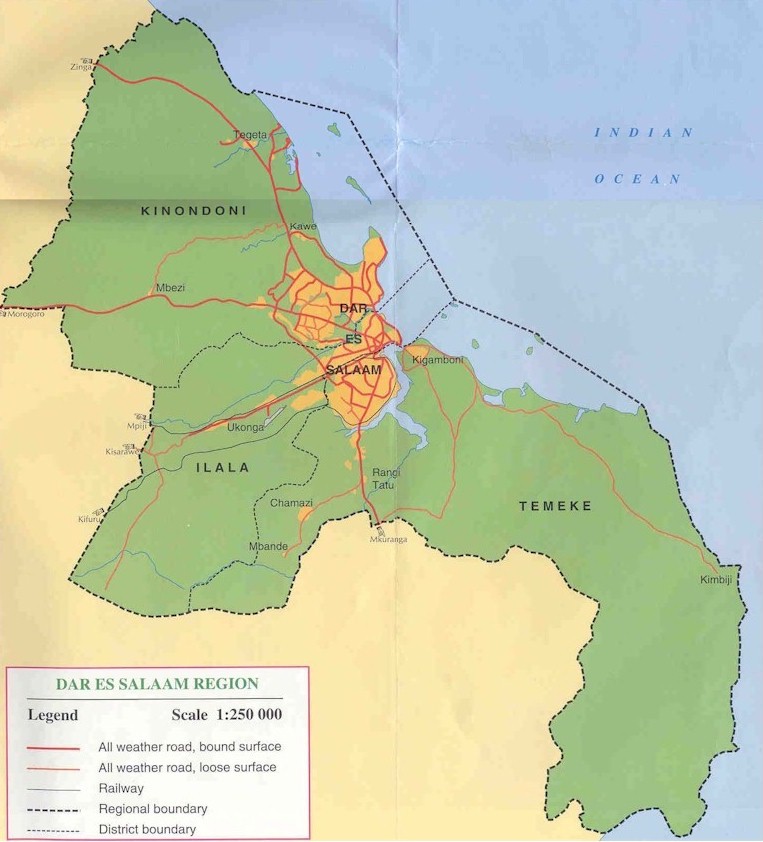


Figure 1. 1 : Map of Dar es Salaam showing location of Ilala Municipality

Source: Ilala Municipal Authority,Dar Es Salaam

# 3.3 Data Collection Technique

The study employed a wide range of methods for data collection including, key informative, questionnaires, documentary review of secondary data which were obtained from the Ilala Municipality- Health Department, Ward offices and NBOs offices. Both qualitative and quantitative primary data were obtained from interviewing the respondents at household using open and closed ended questionnaires. Short explanation on the use of the questionnaires was provided to the respondents. The interview was conducted in Swahili.

# 3.4 Data Processing

The collected data were analyzed in the Statistical Package for the Social Sciences (SPSS), version 17 was used.

# 3.5 Data Analysis

The data were analyzed using both descriptive and inferential statistics, descriptive statistics was to describe, organize, and summarize data, which included, central tendency, and tables. In inferential statistics, Chi-square test was applied to find out the association or significance of the study variables.

Formula χ2 = (observed- expected) 2

Expected

The following were the conditions for applying chi square test:

1. Randomly drawn from the population
2. The population will be at least 10 times as large as the sample.
3. Observed frequencies cannot be too much small.
4. Measured variables must be independent.
5. Values of independence must be mutually exclusive.

# 3.6 Sampling frame and sample size

The sample unit was selected from 3 wards, namely Buguruni Kisiwani, Mnyamani and Mwembe Madafu Ukonga , which were implementing NBOs and was the major subject of the study. Also these areas were selected because had high population, business or commercial centres.

# 3.7 Sampling procedure

The random sampling procedure was used to get the respondents who were interviewed from the 3 wards in Ilala Municipality, to provide the required information. Therefore listing of households in the street was performed randomly to give equal chance to the selected households who were interviewed using questionnaires. Other respondents, who were interviewed, including NBOs workers, ward executive officers and Health Experts.

# 3.8 Data on characterization of solid waste generated in the study area

Residential wastes were observed from the sources at household level before transported to the communal waste collection point, by NBOs workers. After waste had reached at the waste collection point, were separated manually to determine different types of waste, where some waste were used for recovery purposes, including composting, recycling, re- using. Most waste observed were food left over, vegetable peels, plastics, metal scraps, and litters from kitchen. Recycling and re-using and composting, were the common methods for characterization of waste in the study area. The recycled materials were used as raw materials to produce new goods and re-useable materials were used again for the same purpose or similar use, without changing its nature or structure. (Refer to question no.9)

## 

# 3.9 Assessment of neighbourhood-based waste collection

It was revealed that, each day waste were collected by the NBOs at household level, in the collection of waste, handcarts and motor tricycles were used for collection and transportation of solid waste. The amount of waste collected was not estimated because were lacking weighing machine. Also trucks were used to collect waste from communal waste collection point to the final disposal point (Dumpsite).It was also observed that Municipality had made effort to explore new conversion technologies for waste collection and disposal, including provision of motor tricycles, modern trucks, planning for construction of sanitary landfill by the Ilala Municipality, (Refer to question no.10 iv-vii).

# 3.10 Analysis of neighbourhood based solid waste storage

At residential level, the hessian bags and polythene bags were the common types of storage facilities used to store solid waste at generation point (source). Also skip buckets were used to keep waste at primary collection point and placed where people were able to use them easily. (Refer to question no.11)

# 3.11 Determination of effectiveness of neighbourhood based waste disposal methods

It was revealed that in Ilala municipality the following waste disposal methods were used including, uncontrolled tipping, composting, recycling and incineration, except incineration was applied in the healthcare facilities only. The effectiveness of neighbourhood based waste disposal methods were determined by not observing dumping places near homes, keeping the environment clean and community participation was increased. Also the research team managed to visit the Mnyamani health centre reported that the prevalence of diarrheal diseases, including cholera were decreased, one of the reasons reported was the improvement of environmental sanitation in the area where NBOs were implemented.

# CHAPTER FOUR

# 4.0 RESULTS AND DISCUSSIONS

# 4.1 Introduction

This section provides analysis results and discussion of the findings. Provided first, is a summary of socio-demographic and economic characteristics of the respondents in the study. Specifically, the first section gives information on sex, age and marital status of the respondents (socio-demographics), and education, occupation and sources of income of respondents (socio-economic indicators). The second section presents results on characterization of waste generated, the third on assessment of neighborhood-based waste storage techniques, the fourth on neighborhood waste collection methods and lastly on neighborhood–based waste disposal methods.

# 4. 2 Basic Socio-Demographic and Economic Profile of Respondents

# 4.2.1 Socio-Demographic Characteristics

Table 4.1 gives information on socio-demographic of the respondents in the three study wards within Ilala Municipality. A total of 178 respondents were interviewed: 56 from Kisiwani ward, 62 from Mnyamani ward and 60 from Madafu ward. As seen in the table, of the 178 respondents, 61 (34.5%) were males and 116 (65.5%) were females. Likewise, the difference between wards in terms of distribution of respondents by sex was statistically insignificant (chi-squire test p-value=0.718). The majority (37.6%) of the respondents were in the age group between 31-40 years, followed by the age range 15-30 years and 46-60, which represented 34.8% and 18.0 of the total respondents in the study respectively. A small proportion (9.6%) of the total respondents was above 60 years of age. A comparison between wards in terms of age distribution of the respondents revealed a significant difference (p=0.031). Regarding marital status of the respondents, most 120 (67.4%) were married, followed by single 43 (24.2%) and widow/widower 15 (8.4%). However, the differences between wards in this aspect were not statistically significant (p=0.094).

Table 4. 1: Socio-demographic characteristics of respondents

| **Variable** | **Ward** | | | **Total** | **P-value** |
| --- | --- | --- | --- | --- | --- |
| **Kisiwani** | **Mnyamani** | **Madafu** | **178 (100)** |
| **Socio-demographic characteristics** |  |  |  |  |  |
| **Sex, *n* (%)** |  |  |  |  |  |
| Male | 21(37.5) | 19(30.6) | 21(35.6) | 61(34.5) | 0.718 |
| Female | 35(62.5) | 43(69.4) | 38(64.4) | 116(65.5) |
| **Age, *n* (%)** |  |  |  |  |  |
| 15-30 | 14(25.0) | 30(48.5) | 18(30.0) | 62(34.8) | 0.031 |
| 31-45 | 29(51.0) | 19(30.6) | 19(31.7) | 67(37.6) |
| 46-60 | 9(16.1) | 9(14.5) | 14(23.3) | 32(18.0) |
| >60 | 4(7.1) | 4(6.5) | 9(15.0) | 17(9.6) |
| **Marital status, *n* (%)** |  |  |  |  |  |
| Single | 9(16.1) | 19(30.6) | 15(25.0) | 43(24.2) | 0.094 |
| Married | 45(80.4) | 38(61.3) | 37(61.7) | 120(67.4) |
| Widow | 2(3.6) | 5(8.1) | 8(13.3) | 15(8.4) |

# 

Source: Study Findings, 2014

# 4.2.2 Socio-economic Characteristics

The majority (66.1%) of the respondents had primary school education, 24.7% had O-level secondary education, 5.6% had no formal education, and 2.8% and 0.6% had post-secondary and A-level education respectively. Most (63.8%) of the respondents in the study were business people, 24.3% were employed in the private sector, 11.3% were farmers and a small percentage (0.6%) were dealing with other activities. Accordingly, the majority of the respondents in the study had primarily one major source of income and that was business which was reported by 73.0% of the respondents. Formal employment was the main source of income to 16.9% of the respondents. Agricultural activities and other sources provided income to 9.6% and 0.6% of the respondents respectively. As for socio-demographic characteristics, the respondents in the study were also comparable between wards in terms of socio-economic characteristics. This is evidenced by the p-values for testing for associations between the wards and all socio-economic variables, i.e., education (p=0.394), occupation (p=0.528), and main source of income (p=0.638) as Table 4.2 revealed.

Table 4. 2: Socio-economic characteristics of respondents

| **Variable** | **Ward** | | | **Total** | **P-value** |
| --- | --- | --- | --- | --- | --- |
| **Kisiwani** | **Mnyamani** | **Madafu** | **178 (100)** |
| **Socio-economic characteristics** |  |  |  |  |  |
| **Education, *n* (%)** |  |  |  |  |  |
| Primary school | 40(71.4) | 41(66.1) | 37(61.7) | 118(66.8) | 0.394 |
| Secondary school | 9(16.1) | 17(27.4) | 18(30.0) | 44(24.7) |
| High school | 1(1.8) | 0(0) | 0(0) | 1(6) |
| Tertiary education | 1(1.8) | 1(1.6) | 3(5.0) | 5(2.8) |
| No formal education | 3(8.9) | 3(4.8) | 2(3.3) | 10(5.8) |
| **Occupation, *n* (%)** |  |  |  |  |  |
| Farmers | 5(8.9) | 8(12.9) | 7(11.9) | 20(11.3) | 0.528 |
| Private sector employee | 11(19.6) | 19(30.6) | 13(22.0) | 43(24.3) |
| Business | 40(71.4) | 35(56.5) | 38(64.8) | 11.3(63.8) |
| Other | 0(0) | 0(0) | 1(1.7) | 1(0.6) |
| **Main sources of income, *n* (%)** |  |  |  |  |  |
| Employment | 9(16.1) | 12(19.4) | 9(15.0) | 30(16.9) | 0.638 |
| Business | 43(76.8) | 43(69.4) | 44(73.3) | 130(73) |
| Agricultural activities | 3(5.4) | 7(11.3) | 7(11.7) | 17(9.6) |
| Other | 1(1.8) | 0(0) | 0(0) | 1(0.6) |
| **Other sources of income, *n* (%)** |  |  |  |  |  |
| Employment | 0(0) | 1(1.6) | 4(6.7) | 5(2.8) | <0.001 |
| Agriculture | 4(7.1) | 3(4.8) | 15(25.0) | 22(12.4) |
| Business | 6(10.7) | 2(3.2) | 9(15.0) | 17(9.6) |
| None | 46(82.1) | 56(90.3) | 32(13.3) | 134(75.3) |
| **Total** | 56(31.5) | 62(34.8) | 60(33.7) | 178(100) |

Source: Study Findings, 2014

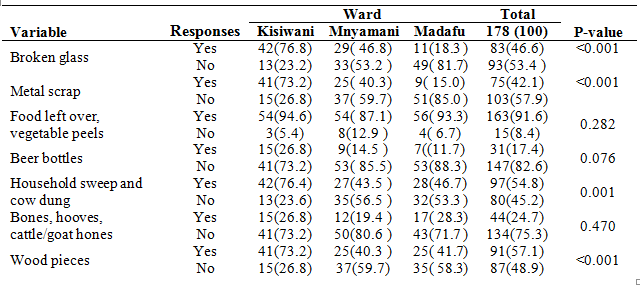
# 4.2 Characterization of solid waste generated in the study areas

Figure 4.1 provides different types of solid waste generated in the study areas. The majority (91.6%) of the respondents reported food leftover and vegetable peels to be the major types of solid waste generated in their areas. Among other types, some of the waste reported by more than 50% of the respondents includes paper wrappers (77.0%), litter from chicken (68.0%), waste textiles (69.7%), wood pieces (57.1%), household sweep and cow dung (54.8%). The characterization of solid waste in this study concurs with the three studies done by the three researchers as the following ( Karanja, 2005) in the City of Nairobi, cointreau (1982) and Arlosoroff, and ( JETRO,2002; JICA,1986), both from the City of Jakarta Indonesia who came up with the similar result that the major solid waste composition at household level is organic waste (41%). Other types which were reported by less than 50% of the respondents includes broken glass (46.6%), metal scrap (42.1%), beer bottles (17.4%), bones (24.7), hair from barber shops (18.5%) and lawn cuttings (24.7). Statistical differences existed between wards in some of the waste types generated. These are for broken glass, metal scrap, household sweep and cow dung, wood pieces, waste textiles, litter from chicken and lawn cutting (p<0.05) as shown in Table 4.3. (Refer to question no.9)

Figure 4. 1: Percentage of solid waste generated in the study areas

Source: Study Findings

Table 4. 3: Types of solid waste generated in the study areas



Source: Study Findings, 2014

Among the identified types of waste generated in the study areas, food leftovers and vegetable peels were reported by most of the respondents (64.6%) to cause serious problem in the areas as compared to paper wrapping materials (38.8%) or litters from chicken (18.5%). This might be because these types are generated in large quantity in the study areas thus they require frequent collection and disposal (Figure 4.2). The other types of wastes were reported by few respondents (<10%) which implies that they do not contribute much to the hindrance of solid waste collection and disposal in Ilala Municipal. The extent of the effect of other types of waste is presented in Appendix II. However, most of the respondents did not respond to the question regarding problematic waste as indicated in Figure 4.2 under DM (did not mention or report) and Appendix II.



Figure 4. 2: Perception of extent of problem caused by solid waste generated

Source: Study Findings, 2014

## 

**Photo: Shows different types of solid waste at Buguruni waste collection Point**

Source: Study Findings, 2014

# 4.3 Assessment of Neighborhood-Based Waste Collection Techniques

# 4.3.1. Method of solid waste collection existing in the study areas

The findings show that 84.8% of the respondents were collecting the wastes to the collection points which were then taken by the trucks to the disposal site. About 12.4% of the respondents had waste collection containers that assisted them to collect the waste to the disposal sites. The solid waste collection approach in this study agreed with the three studies done by three researchers (Gurmu, 2007) in the City of Dakar, cleaning Department of Jakarta (2003b) and Schuring (1992), of Ivory Coast, who came up with similar findings that, the policy makers in these countries experimented several different approach to deal with waste collection in its proper management from low income population to urban areas using neighborhood based approach. However, a large proportion of the respondents (86.0%) had no opinion regarding this aspect. A comparison between wards revealed existence of differences (p=0.041) in terms of roadside uncontrolled dumping. As seen in Table 4.4, few respondents in Madafu (5%) and Mnyamani (1.6%) wards were dumping their wastes along the roadside while no any individual from Kisiwani reported to do so, (Refer to question no. 10 iv-vii).

Table 4. 4: Methods of solid waste collection existing in the study areas

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Indicator** | **Responses** | **Ward** | | | | **Total** | **P-value** |
| **Kisiwani** | **Mnyamani** | | **Madafu** |
| **Household level** |  |  | |  |  |  |  |
| Collection points | Commonly Used | 49(87.5) | 56(90.3) | | 46(76.7) | 151(84.8) | 0.203 |
| Somewhat Used | 0(0) | 0(0) | | 1(1.7) | 1(0.6) |
| Don’t Mention | 7(12.5) | 6(9.7) | | 13(21.7) | 26(14.6) |
| Collection waste containers | Commonly Used | 7(12.5) | 6(9.7) | | 9(15.0) | 22(12.4) | 0.321 |
| Somewhat Used | 0(0) | 0(0) | | 2(3.3) | 2(1.1) |
| Not used | 0(0) | 0(0) | | 1(1.7) | 1(0.6) |
| Don’t Mention | 49(87.5) | 56(90.3) | | 48(80.0) | 153(86.0) |
| **Roadside** |  |  | |  |  |  |  |
| Roadside uncontrolled dumping | Somewhat Used | 0(0) | 1(1.6) | | 3(5.0) | 4(2.2) | 0.041 |
| Not Used | 3(5.4) | 0(0) | | 0(0) | 3(1.7) |
| Don’t Mention | 53(94.6) | 61(98.4) | | 57(95.0) | 171(96.1) |

Source: Study Findings, 2014

### 

Picture : Shows motor tricycles used for collection and transportation of solid waste in Mwembe Madafu ward, Gongo la Mboto

Source: Study Findings, 2014

# 4.3.2 Types of carriage used to move solid waste

Table 4.5 presents different carriages used by households to move their solid waste from their households to the collection site/disposal sites. The majority of the respondents reported to use polythene bags (59.0%). The others used Lorries (28.8%), tractor with trailers (27.5%), wheelbarrows (6.2%), ox-carts (2.2%), plastic basket (14.0%) and skip buckets (5.6%). With the exception of wheel barrows, ox-carts, plastic basket and skip buckets facilities, all the remaining categories show significance difference between wards with respect to the carriage used to move solid waste (p<0.001). These include polythene bags, trucks (Lorries) and tractor with trailers. The difference might be attributed to a larger number of respondents who used truck (58.9%) in Kisiwani, Polythene bags (86.7%) in Madafu and Tractor (55.4%) in Kisiwani compared to other facilities.

Table 4. 5: Types of carriage used to move solid waste

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Indicator** | **Responses** | **Ward** | | | **Total** | **P-value** |
| **Kisiwani** | **Mnyamani** | **Madafu** |
| Truck | Yes | 33(58.9) | 17(27.4) | 1(1.7) | 51(28.8) | <0.001 |
| No | 23(41.1) | 45(72.6) | 58(96.7) | 126(70.8) |
| DM | 0(0) | 0(0) | 1(1.7) | 1(0.6) |
| Wheel-barrows | Yes | 6(10.7) | 5(8.1) | 0(0) | 11(6.2) | 0.086 |
| No | 50(89.3) | 57(91.9) | 59(98.3) | 166(93.3) |
| DM | 0(0) | 0(0) | 1(1.7) | 1(0.6) |
| OX-carts | Yes | 0(0) | 2(3.2) | 2(3.3) | 4(2.2) | 0.422 |
| No | 56(100) | 60(96.8) | 57(95.0) | 173(97.2) |
| DM | 0(0) | 0(0) | 1(1.7) | 1(0.6) |
| Polythene bag | Yes | 18(32.1) | 35(56.5) | 52(86.7) | 105(59.0) | <0.001 |
| No | 38(67.9) | 27(43.5) | 7(11.7) | 72(40.4) |
| DM | 0(0) | 0(0) | 1(1.7) | 1(0.6) |
| Plastic basket | Yes | 12(21.4) | 5(8.1) | 8(13.3) | 25(14) | 0.174 |
| No | 48(78.6) | 57(91.9) | 51(85.0) | 152(85.4) |
| DM | 0(0) | 0(0) | 1(1.7) | 1(0.6) |
| Tractor with trailer | Yes | 31(55.4) | 17(27.4) | 1(1.7) | 49(27.5) | <0.001 |
| No | 25(44.6) | 45(72.6) | 58(96.7) | 128(71.9) |
| DM | 0(0) | 0(0) | 1(1.7) | 1(0.6) |
| Skip buckets | Yes | 3(5.4) | 4(6.5) | 3(5.0) | 10(5.6) | 0.718 |
| No | 53(94.6) | 59(93.5) | 56(93.3) | 167(93.8) |
| DM | 0(0) | 0(0) | 1(1.7) | 1(0.6) |

Source: Study Findings



**Photo: Indicates Handcarts used by NBOs to move waste from point of generation to the waste collection point**

Source: Study Findings, 2014

# 4.3.3 Personal Protective Equipment (PPE) used when collecting wastes

Of all the 178 respondents, only 22(12.4%) responded to this question whilst 156 (87.6%) had no opinion. About 10% of the respondents reported to use utility gloves when collecting the waste, 7.3% used gumboots, 3.9% used masks and aprons and a small proportion (1.7%) used caps (Figure 4.3). However, there was no statistical significant difference between wards in terms of PPE used (p>0.05) in all the stated PPEs (Appendix II). This indicates that most of the waste handlers are at risk that might be associated with the different types of waste generated and collected including exposure to diseases, injuries, accidents, and so forth.

Figure 4. 3: Personal protective equipment (PPE) used when collecting waste

Source: Study Findings, 2014

# 4.3.4 Frequency of solid waste collection

Table 4.6 presents the finding regarding the rate at which solid waste was collected; where by the majority of the respondents (50.6%) reported that waste was collected frequently while a few of them (0.6%) reported that the waste was not collected. A comparison between the wards revealed existence of significant differences in terms of frequency of solid waste collection (p<0.001). As seen in Table 4.6, a large proportion of the respondents in Madafu (78.3%) reported frequently collection of waste as compared to Mnyamani (41.9%) and Kisiwani (30.4%) wards.

Table 4. 6: Frequency of solid waste collection

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Indicator** | **Responses** | **Ward** | | | **Total** | **P-value** |
| **Kisiwani** | **Mnyamani** | **Madafu** |
| Frequency of solid waste collection | Not collected | 0(0) | 1(1.6) | 0(0) | 1(0.6) | <0.001 |
| Rarely collected | 10(17.9) | 25(40.3) | 7(11.7) | 42(23.6) |
| Somewhat collected | 29(51.8) | 10(16.1) | 6(10.0) | 45(25.3) |
| Frequently collected | 17(30.4) | 26(41.9) | 47(78.3) | 90(50.6) |

Source: Study Findings, 2014

# 4.3.5 Local authority control of waste control schedules

Seventy one (39.9%) of all the respondents in the study reported that the local authority was responsible for control of schedules of solid waste collection. This was reported by 55.0% of the respondents from Madafu, 50.0% from Kisiwani and 16.1% from Mnyamani. The control measures taken by the Authority to ensure achievement of their goals included monitoring, inspection, supervision, provisional of health education, encouraging cleanness, provision of vehicles and technical support in waste collection and handling.

Table 4. 7: Local Authority Control (LAC) of waste control schedules

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Indicator** | **Responses** | **Ward** | | | **Total** | **P-value** |
| **Kisiwani** | **Mnyamani** | **Madafu** |
| LAC | Yes | 28(50.0) | 10(16.1) | 33(55.0) | 71(39.9) | <0.001 |
| No | 27(48.2) | 52(83.9) | 27(45.0) | 106(59.6) |
| DN | 1(1.8) | 0(0) | 0(0) | 1(0.6) |

Source:

# 4.3.6 Problems associated with disposal/dumping of waste near household areas

Approximately 47.8% (*n*=85) of the respondents reported presence of nuisance smell due to dumping of solid waste near the households. Other problems related to dumping of waste were attraction of flies (30.3%), source of feed for animals (15.2%) including dogs, cats, poultry, and habitat for rats (Figure 4.4). No any variations existed (p>0.5) between wards in relation to the problems associated with disposing/dumping of waste near the households. Further details are given in Appendix IV.



Figure 4. 4: Problems associated with disposal of waste near household areas

Source: Study Findings, 2014

# 4.4 Assessment of Neighbourhood-Based Waste Storage Techniques

# 4.4.1 Ways in which wastes are stored in households

Table 4.8 presents results on the facilities used to store waste generated in their households. Overall, the majority of the respondents (86.0%) preferred to use hessian sacks compared to other facilities. This was reported by 92.9%, 74.2% and 91.7% of the respondents from Kisiwani, Mnyamani and Madafu respectively. A comparison between wards reveal that, standard dustbins and hessian sacks shows no significant different (p>0.05) while plastic bags indicated significant different (p=0.020).

The difference could be attributed to the large number of individuals in Mnyamani (19.4%) who were using plastic bags compared to the other wards. The storage techniques of solid waste found in this research agreed with the three studies done by the three researchers (Kungskulniti, 1990; Lohani, 1984);( cleansing Department of Jakarta,2005). In the City of Jakarta- Indonesia and (Munasinghe,1995) who came up with the similar use of polythene bags for storage of solid waste in the low income areas. (Refer to question no. 11).

Table 4. 8: Ways in which wastes are stored in households

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Indicator** | **Responses** | **Ward** | | | **Total** | **P-value** |
| **Kisiwani** | **Mnyamani** | **Madafu** |
| Plastic bags | Commonly Used | 2(3.6) | 12(19.4) | 3(5.0) | 17(9.6) | 0.020 |
| Somewhat Used | 1(1.8) | 2(3.2) | 0(0) | 3(1.7) |
| Not used | 0(0) | 1(1.6) | 0(0) | 1(0.6) |
| Don’t Mention | 53(94.6) | 47(75.8) | 57(95.0) | 157(88.2) |
| Standard dust bins | Commonly Used | 1(1.8) | 0(0) | 1(1.7) | 2(1.1) | 0.581 |
| Don’t Mention | 55(98.2) | 62(100) | 59(98.3) | 176(98.9) |
| Hessian sacks | Commonly Used | 52(92.9) | 46(74.2) | 55(91.7) | 153(86.0) | 0.019 |
| Somewhat Used | 0(0) | 1(1.6) | 1(1.7) | 2(1.1) |
| Don’t Mention | 4(7.1) | 15(24.2) | 4(6.7) | 23(12.9) |

Source:

### 

### G:\Mwasa pictures\DSC_0257.JPG

Picture : Shows the Hessian and Polythene bags used for storage of wastes at household level

Source: Study Findings, 2014

# 4.4.2 Education status of waste collection workers

Only 22.5% of the respondents indicated that waste collection workers were trained and majority of them were trained for a period of more than one week (10.1%), 5.6% for a week and 6.7% within a period of five days. Among the trained workers, only 20.2% remembered the course content of the training while the remaining 2.3% did not. A comparison between wards revealed some differences (p=<0.001) in all the mentioned variables namely training, duration of training and memorization of what they were taught. For those who mentioned the contents of the training reported that the training included among other aspects Environmental Impact Assessment (EIA), waste handling (collection, storage and disposal) techniques, use of PPE in waste handling, personal hygiene (health and environmental, including. sanitation) and environmental cleaning.

Table 4. 9: Education status of waste collection workers

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Indicator** | **Responses** | **Ward** | | | **Total** | **P-value** |
| **Kisiwani** | **Mnyamani** | **Madafu** |
| Trained | Yes | 7(12.5) | 4(6.5) | 29(48.3) | 40(22.5) | <0.001 |
| No | 46(82.1) | 58(93.5) | 31(51.7) | 135(75.8) |
| DM | 3(5.4) | 0(0) | 0(0) | 3(1.7) |
| Duration of course | 5days | 2(3.6) | 0(0) | 10(16.7) | 12(6.7) | <0.001 |
| 1week | 4(7.1) | 3(4.8) | 3(5.0) | 10(5.6) |
| other | 1(1.8) | 1(1.6) | 16(26.7) | 18(10.1) |
| DM | 49(87.5) | 58(93.5) | 31(51.7) | 138(77.5) |
| Remember course content | Yes | 6(10.7) | 3(4.8) | 27(45.0) | 36(20.2) | <0.001 |
| No | 1(1.8) | 0(0) | 2(3.3) | 3(1.7) |
| DM | 49(87.5) | 59(95.2) | 31(51.7) | 139(78.1) |

Source: Study Findings, 2014

# 4.5 To determine the Neighbourhood-Based waste Disposal Methods

# 4.5.1 Perception of respondents in quantity of solid generated daily

Overall, the majority of the respondents (50.0%) agreed to the fact that large quantities of solid wastes are generated per day in their respective areas. The large number of respondents from Kisiwani and Mnyamani evidences this fact: 62.7% and 58.1% respectively as Figure 4.4 demonstrates. This implies therefore that there is a need for daily collection of waste to prevent individuals from being exposed to high risks of getting diseases and accidents from the different types of waste generated in the wards. The difference between words in the perception of the amount of waste generated was statistically significant (p<0.001). Appendix V provides more details on this aspect.



Figure 4. 5: Perception of respondents on quantity of solid generated daily

Source: Study Findings, 2014

# 4.5.2 Presence of dumping place in the area

As can be seen in Table 4.10, most of the respondents (69.1%) reported lacking of dumping site close to their areas. Only 30.3% of the respondents reported that there was a dumping place near their areas. This was reported by 41.7% of the respondents from Madafu as opposed to 33.9% and 16.1% of the respondents from Kisiwani and Mnyamani wards respectively. With regard to distance to the dumpsite from the households, the results show that 25.3% of the respondents reported that the dumping site was within a distance of 0-100 m. The mentioned circumstance of dumping site requires an authority that is responsible for waste management to find an alternative way to solve the problem. Owing to the fact that lack of dumping site in relation to the large quantity of solid waste generated per day by household (Figure 4.5) would result into illegal dumping hence environmental pollution/degradation. Significant difference exist between wards in relation to both presence of dumping site in the area (p=0.016) and distance of the dumping site from the households (p=0.041). This implies that individuals in the study areas are at different risks of acquiring associated illnesses. (Refer to question no. 12)

Table 4. 10: Solid waste dumping sites

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Indicator** | **Responses** | **Ward** | | | **Total** | **P-value** |
| **Kisiwani** | **Mnyamani** | **Madafu** |
| Presence of dumping place in area | Yes | 19(33.9) | 10(16.1) | 25(41.7) | 54(30.3) | 0.016 |
| No | 37(66.1) | 52(83.9) | 34(56.7) | 123(69.1) |
| DM | 0(0) | 0(0) | 1(1.7) | 1(0.6) |
| Distance from Household | 0-100 m | 15(26.8) | 8(12.9) | 22(36.7) | 45(25.3) | 0.041 |
| 101-500 m | 2(3.6) | 2(3.2) | 3(5.0) | 7(3.9) |
| DM | 39(69.6) | 52(83.9) | 35(58.3) | 126(70.8) |

Source: Study Findings, 2014

**4.5.3 Perception of respondents in solid waste disposal practices**

With respect to solid waste disposal, 59.6% of the respondents detailed that some amounts of the solid waste generated are disposed to water bodies; some burnt (58.4%); and only 23.0% of the respondents agreed that most of it is disposed into landfills (Table 4.11). In addition, 10.7% of the respondents reported presence of incinerators in hospitals and dispensaries for handling solid wastes produces in hospitals. Disposal of solid waste in water bodies may result into water pollution and degradation of water quality for human consumption. The results of the present study in this aspect is supported by the three researcher who observed similar findings , (Trisyanti, 2004), JICA (1987) both of Jakarta Indonesia and NEAP (2013), who reported that most of the water bodies are polluted due to solid and untreated wastewater channeled to the rivers. In terms of level of satisfaction of the respondents in SWM by the LGA, the results show that most of them (76.4%) were fairly satisfied with the commitment of the LGA in handling waste while 15.2% of them were not satisfied and approximately 0.6% had no opinion (Table 4.11).

Table 4. 11: Solid waste disposal practices

| **Indicator** | **Responses** | **Ward** | | | **Total** | **P-value** |
| --- | --- | --- | --- | --- | --- | --- |
| **Kisiwani** | **Mnyamani** | **Madafu** |
| Fate of solid waste generated | Some burnt | 33(58.9) | 33(53.2) | 38(63.3) | 104(58.4) | <0.001 |
| Most deposited in landfill | 9(16.1) | 11(17.7) | 21(35.0) | 41(23.0) |
| DN | 14(25.0) | 18(21.0) | 1(1.7) | 33(18.5) |
| Deposit of solid waste into water bodies | Yes | 37(66.1) | 34(54.8) | 35(58.3) | 106(59.6) | 0.016 |
| No | 17(30.4) | 18(29.0) | 24(40.0) | 59(33.1) |
| DM | 2(3.6) | 10(16.1) | 1(1.7) | 13(7.3) |
| Use of Incinerators in solid waste disposal | Yes | 1(1.8) | 0(0) | 18(30.0) | 19(10.7) | <0.001 |
| No | 40(71.4) | 46(74.2) | 40(66.6) | 126(70) |
| DM | 15(26.8) | 16(25.8) | 2(3.3) | 33(18.5) |
| Levels of satisfaction in solid waste management by LGA | Satisfactory | 2(3.6) | 2(3.2) | 10(16.7) | 14(7.9) | 0.006 |
| Fair | 50(89.3) | 44(71.0) | 42(70.0) | 136(76.4) |
| Not satisfactory | 4(7.1) | 15(24.2) | 8(13.3) | 27(15.2) |
| DN | 0(0) | 1(1.6) | 0(0) | 1(0.6) |

Source: Study Findings, 2014

Generally, all the variables (indicators) indicated in Table 4.11 show significant difference between the three wards, i.e., with respect to the fate of solid waste generated, deposit of solid waste into water bodies, use of incinerators in solid waste disposal and

the levels of satisfaction in solid waste management by LGA



Picture 3: Shows the recycled waste ready for marketing as one of the solid waste

**Disposal methods practiced at Buguruni communal waste collection point.**

Source: Study Findings, 2014

# 4.5.4. Situation of solid waste in Ilala Municipal

Various reasons were given out in relation to the situation of solid waste in Ilala Municipal as Table 4.12 reveals. Accumulation of solid waste (49.4%) was the leading among others followed by waste not collected on time (20.2%), fairly regularly collected (20.3%), inadequate transport system (5.9%) and insufficient equipment for solid waste collection (5.6%). Other presented reasons include creation of illegal dumping, increasing population that results into high amount of solid waste generated, and improper solid waste collection and disposal systems (11.2%). Differences between wards exist in only two aspects, that is, waste not collected on time (p=0.045) and fairly regularly collected (p=0.001).

Table 4.12: Situation of solid waste in Ilala Municipal

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Indicator** | **Responses** | **Ward** | | | **Total** | **P-value** |
| **Kisiwani** | **Mnyamani** | **Madafu** |
| Waste not collected in time | Yes | 6(10.7) | 20(32.3) | 10(16.7) | 36(20.2) | 0.045 |
| No | 48(85.7) | 39(62.9) | 48(80.0) | 135(75.8) |
| DM | 2(3.6) | 3(4.8) | 2(3.6) | 7(3.9) |
| Fairly regularly collected | Yes | 22(39.1) | 9(14.1) | 5(8.3) | 36(20.3) | 0.001 |
| No | 32(57.1) | 50(80.60 | 53(88.3) | 135(75.8) |
| DM | 2(3.6) | 3(4.8) | 2(3.6) | 7(3.9) |
| Accumulation of waste | Yes | 21(37.5) | 29(46.8) | 38(63.3) | 88(49.4) | 0.079 |
| No | 33(58.9) | 30(48.4) | 20(33.3) | 83(46.6) |
| DM | 2(3.6) | 3(4.8) | 2(3.6) | 7(3.9) |
| Inadequate transport system | Yes | 6(10.7) | 2(3.2) | 1(1.7) | 9(5.9) | 0.214 |
| No | 48(85.7) | 57(91.9) | 57(95.0) | 162(91.0) |
| DM | 2(3.6) | 3(4.8) | 2(3.6) | 7(3.9) |
| Insufficient equipment for solid waste collection | Yes | 5(8.9) | 2(3.2) | 3(5.0) | 10(5.6) |  |
| No | 49(87.5) | 57(91.9) | 55(91.7) | 161(90.4) |
| DM | 2(3.6) | 3(4.8) | 2(3.6) | 7(3.9) |
| Other | Yes | 5(8.9) | 6(9.7) | 9(15.0) | 20(11.2) | 0.830 |
| No | 49(87.5) | 53(85.5) | 49(81.7) | 151(84.8) |
| DM | 2(3.6) | 3(4.8) | 2(3.6) | 7(3.9) |

Source: Study Findings, 2014

# 4.5.5 Awareness on waste management issues

Only 35.4% of the respondents were aware of the laws that regulate the whole procedures of waste management while the remaining proportion (64.5%) of the respondents was not aware. Respondents indicated the following matters to be included in the waste management laws. These are environmental management, keeping environmental clean, importance of PPE, impact caused by waste/refuse, personal hygiene and punishment against breach of the stated laws. As a significant part of the respondents is not aware of the laws regulating waste management, this situation is likely to hamper the Government’s efforts of protecting the environment from severe problems that might occur due improper waste management. Statistically, there is variations (p=0.004) between wards with respect to awareness on waste management issues as Figure 4.6 demonstrates. Appendix VI provides further detailed information on this aspect.



Figure 4. 6: Awareness of laws regulating waste management

Source: Study Findings, 2014

In relation to waste management education, the results show that few respondents (25.8%) have received waste management education/trainings which was given or supported by various stakeholders including Finland international, municipal health facilities, Media (TV and Radios), Municipal in collaboration with Plan international (Figure 4.6). The education/trainings focused more on environmental sanitation, proper disposal of waste and general environmental cleaning. Statistically, there appears to be significant variations (p<0.001) between wards with respect to the number of individuals who received waste management education as detailed in Appendix VII.



Figure 4. 7: Number of individuals received waste management education

Source: Study Findings, 2014

Table 4.13 presents information regarding the availability of market for recyclable waste materials and compositing plant. Small proportions (12.9%) and (4.5%) indicated the availability of markets for recyclable waste materials and compositing plant respectively. Mohammed Enterprises Limited, Bakhresa (Azam) Limited, Chinese Companies and individuals were mentioned by respondents to import the solid waste materials including plastic bottles and steel scrappers.

Table 4. 13: Presence of markets for solid waste recycling and composition plant

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Indicator** | **Responses** | **Ward** | | | **Total** | **P-value** |
| **Kisiwani** | **Mnyamani** | **Madafu** |
| Market for recyclable materials | Yes | 8(14.3) | 11(17.7) | 4(6.7) | 23(12.9) | <0.001 |
| No | 20(35.7) | 33(53.2) | 47(78.3) | 100(56.2) |
| DM | 28(50.0) | 18(29.0) | 9(15.0) | 55(30.9) |
| Compositing plant available | Yes | 6(10.7) | 2(3.2) | 0(0) | 8(4.5) | <0.001 |
| No | 12(21.4) | 18(29.0) | 41(68.3) | 71(39.9) |
| DM | 38(67.9) | 42(67.7) | 19(31.7) | 99(55.6) |

Source: Study Findings, 2014

# 4.5.6 Barriers to sustainable waste management

It was revealed that several factors constitute to the barriers for sustainable waste management as indicated in Table 4.14. The majority of the respondents (29.8%) reported lack of modern equipment for solid waste collection to be a major factor followed poor transport systems (19.1%), rejection of individuals in paying waste collection fee (10.7%), difficulties experienced during rainfall seasons (9.0%), and lack of education (3.9%). The factors included in the “other” category (19.1%) are inadequate proper supervision, huge amount of waste, lack of sanitary landfills around the street, poor administration systems and poor waste disposal systems/methods.

Table 4. 14: Barriers to sustainable waste management

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Indicator** | **Responses** | **Ward** | | | **Total** | **P-value** |
| **Kisiwani** | **Mnyamani** | **Madafu** |
| Factors | Poor transport systems | 13(23.2) | 13(21.0) | 8(13.3) | 34(19.1) | <0.001 |
| Lack of modern equipment for solid waste collection | 17(30.4) | 21(33.9) | 15(25.0) | 53(29.8) |
| Rejection of individual in paying waste collection fee | 5(8.9) | 9(14.5) | 5(8.3) | 19(10.7) |
| Lack of education Factors | 0(0) | 1(1.6) | 6(10.0) | 7(3.9) |
| Difficulties experienced during rainfall seasons | 10(17.9) | 6(9.7) | 0(0) | 16(9.0) |
| Lack of sanitary landfills around the street | 4(7.1) | 0(0) | 0(0) | 4(2.2) |
| Other | 3(5.4) | 23(38.0) | 23(38.3) | 34(19.1) |
| DM | 4(7.1) | 3(5.0) | 3(5.0) | 11(6.2) |

Source: Study Findings, 2014

# 4.5.6 Advantages and disadvantages of neighborhood-based approach in SWM

A number of advantages and disadvantages of the neighborhood-based approach in SWM were mentioned by the respondents in the study. With regard to advantages, Table 4.15 reveals that the approach has been more helpful as it has helped to make the environment clean (65.2%), prevented illegal dumping (89.9%) in created employment (43.3%). No significant differences exist between wards in all the three advantages mentioned (p>0.05).

Table 4. 15: Advantage of neighborhood-based approach in SWM

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Indicator** | **Responses** | **Ward** | | | **Total** | **P-value** |
| **Kisiwani** | **Mnyamani** | **Madafu** |
| Cleanness of the area | Yes | 36(64.3) | 41(66.1) | 39(65.0) | 116(65.2) | 0.236 |
| No | 16(28.6) | 16(25.8) | 21(35.0) | 53(29.8) |
| DM | 4(7.1) | 5(8.1) | 0(0) | 9(5.1) |
| No illegal dumping | Yes | 6(10.7) | 3(4.8) | 0(0) | 9(5.1) | 0.150 |
| No | 46(82.1) | 54(87.1) | 60(100) | 160(89.9) |
| DR | 4(7.1) | 5(8.1) | 21(35.0) | 53(29.8) |
| Source of Employment | Yes | 21(37.5) | 31(50.0) | 25(41.7) | 77(43.3) | 0.110 |
| No | 31(55.4) | 26(41.9) | 35(58.3) | 92(51.7) |
| DR | 4(7.1) | 5(8.1) | 0(0) | 9(5.1) |

Source: Study Findings, 2014

With respect to disadvantages, the results show that outbreak of diseases, high accumulations of waste, loop for thefts, and bad smell were among the mentioned disadvantages of the NBO approach (Table 4.16). With the exception of loop for theft, all the remaining disadvantages are statistically significant between wards (p<0.05). However, most of the respondents in the study did not agree that high accumulations of waste (71.9%), bad smell (42.7%) and loop for theft (76.4%) were really disadvantages of the NBO approach (Table 4.16).

Table 4.16: Disadvantage of neighborhood-based approach in SWM

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Indicator** | **Response** | **Ward** | | | **Total** | **P-value** |
| **Kisiwani** | **Mnyamani** | **Madafu** |
| Outbreak of Diseases | Yes | 6(10.7) | 26(41.9) | 44(13.3) | 76(42.7) | <0.001 |
| No | 33(58.9) | 23(37.1) | 10(16.7) | 66(37.1) |
| DM | 17(30.4) | 13(21.0) | 6(10.0) | 36(20.2) |
| High accumulation of waste | Yes | 4(7.1) | 8(12.9) | 2(3.3) | 14(7.9) | <0.001 |
| No | 35(62.5) | 41(66.1) | 52(86.7) | 128(71.9) |
| DM | 17(30.4) | 13(21.02) | 6(10.0) | 36(20.2) |
| Loop for Thefts | Yes | 2(3.6) | 3(4.8) | 1(1.7) | 6(3.4) | 0.066 |
| No | 37(66.1) | 46(74.2) | 53(88.3) | 136(76.4) |
| DM | 17(30.4) | 13(21.02) | 6(10.0) | 36(20.2) |
| Bad smell | Yes | 22(39.3) | 26(41.9) | 18(30.0) | 66(37.1) | 0.008 |
| No | 17(30.4) | 23(37.1) | 36(60.0) | 76(42.7) |
| DM | 17(30.4) | 13(21.02) | 6(10.0) | 36(20.2) |
| Others | Yes | 13(23.2) | 10(16.1) | 8(13.3) | 31(17.4) | 0.018 |
| No | 26(46.4) | 39(62.9) | 46(76.7) | 111(62.4) |
| DM | 17(30.4) | 13(21.02) | 6(10.0) | 36(20.2) |

Source: Study Findings, 2014

Concerning the amount of money that is generated per month, the finding reveals that most of the respondents (24.2%) earn between 50,000-100,000 Tanzania Shillings. Other respondents reported that they earn <50,000 Tanzania Shillings per month (12.9%) while also 12.9% of the respondents earn above 100,000 Tanzania Shillings per month. However, most of the respondents did not want to disclose the amount they earn per month. Respondents in Kisiwani ward were more likely to report an income of above 100,000 Tanzania Shillings (25.0%) than those in Mnyamani (6.5%) and Madafu (8.3%) wards. The differences between wards are statistically significant (p<0.001).

Table 4.17: Income per month (Tshs.)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Indicator** | **Responses** | **Ward** | | | **Total** | **P-value** |
| **Kisiwani** | **Mnyamani** | **Madafu** |
| Income | <50,000 | 4(7.1) | 7(11.3) | 12(20.0) | 23(12.9) | <0.001 |
| 50,000-100,000 | 30(53.6) | 9(14.5) | 4(6.7) | 43(24.2) |
| >100,000 | 14(25.0) | 4(6.5) | 5(8.3) | 23(12.9) |
| DM | 8(14.3) | 42(67.7) | 39(65.0) | 89(50.0) |

Source: Study Findings, 2014

# CHAPTER FIVE

# 5.0 CONCLUSIONS AND RECOMMENDATIONS

# 5.1 Conclusions

1. Neighborhood based organization is a non- conventional approach which face many problems including lack of modern equipments for collection and transportation of solid waste, personal protective equipment, low wage, Poor community participation, lack of reliable market for recycled waste, modern composting plant, office space and low knowledge on the safe management of solid waste.
2. The neighborhood based organizations were effective in solid waste management as the majority of the respondents (89.9%), reported that the approach was useful as helps them to keep the environment clean, creates employment and prevent illegal dumping. Other problems were poor transport system for solid waste management from point of waste generation to the collection point, poor storage facilities at household level, and inadequate trucks for solid waste transportation.

# 5.2 Recommendation

The study came up with the following recommendations:

1. Since the issue of solid waste management is for every person, it is recommendable that the Ilala Municipality has to expand on community involvement, through public education, seminars, use of posters to increase awareness and change of attitude relating to solid waste management.
2. Supportive supervision should be conducted by the municipal Authority to ensure proper handling of solid waste done by the neighborhood based organizations.
3. Provision of standard transport facilities by the Ilala Municipality to improve collection and transportation of solid waste, could include: Trucks, Human pedal carts, Tractor with trailers, skip buckets and encourage people to use standard waste bins at household level which could facilitate the proper segregation of solid waste at generation point or source.
4. Provide enough space for neighborhood based organization activities which could be used as a waste collection point with provisions of Water supply, sanitary accommodation and office.
5. The Ilala municipality should encourage the public to apply recycling, re-using, composting as the principal methods in minimization of solid which could help to reduce operational cost in solid waste management.
6. The Ilala municipal Authority should train waste handlers on safe handling of solid waste and supply adequate personal Protective equipments (PPEs) for waste handlers.
7. The Ilala municipal council should construct a sanitary landfill which could be used as a final dumpsite for solid waste.
8. Construct or repair the roads regularly to facilitate transportation of waste throughout the year, like now during the rainy season most of the roads become broken and hinder the transportation process of solid waste to Pugu Kinyamwezi.

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# APPENDICES

Appendix 1: Questionnaire for Data Collection on Solid Waste Management in Ilala Municipality, Dar es Salaam

**Section A: General Information**

Date ..............Questionnaire Number....................

Village ...........Ward.................

Name of the Respondent...................

1. Age...........
2. Sex (a)male (b) female (tick correct response)
3. Educational level (tick one)
4. Primary education
5. Secondary education
6. High school
7. Tertiary education
8. No formal education

1. Marital status (tick one)
2. Single
3. Married
4. Widow

1. Occupation (tick one)
2. Farmer
3. Government employee
4. Private sector employee
5. Business
6. Pastoralist
7. What are the main sources of income in your Household? (circle)
8. Employment
9. Business
10. Agriculture
11. Others.................
12. What are the incomes earning in the family? ....................................................
13. What are other sources of income in the family? ..............................................

**Objective 1: To characterize the solid waste in Ilala Municipality**

9 (i) what are the types of solid waste generated in your area? (circle)

1. Broken glass
2. Metal scrap
3. Food left over, vegetable peels
4. Beer Bottles
5. Household sweep and cow dung
6. Bones, hooves, cattle/goat hones (slaughter waster)
7. Wood pieces
8. Waste textiles
9. Litter from chicken
10. Paper wrappers
11. Hair from Berber shops
12. Lawn cuttings

ii. What type of waste do you think is the problem in your compound?(tick one)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Type of waste** | **High** | **Moderate** |  | **Low** |
| Broken glass |  |  |  |  |
| Metal scrap |  |  |  |  |
| Plastic wrappers |  |  |  |  |
| Food remains, vegetable peels |  |  |  |  |
| Beer bottles |  |  |  |  |
| Household sweep and cow dung |  |  |  |  |
| Bones, hooves, cattle/goat horns |  |  |  |  |

**Others are**

|  |  |  |  |
| --- | --- | --- | --- |
| **Type of waste** | **High** | **Moderate** | **Low** |
| Wood pieces |  |  |  |
| Metal cans |  |  |  |
| Paper wrapping materials |  |  |  |
| Waste textiles |  |  |  |
| Litter from chicken |  |  |  |
| Hair from barbershops |  |  |  |

**Objective 2: to analyze Neighbourhood based waste collection methods**

10 (i) what among the following is applicable to the waste damped near your area

1. Stink
2. Attract flies
3. Source of feed for dogs, cats, and poultry (circle one)
4. Haven for rats

ii. What type of PPE do you use when handling solid waste? (circle)

1. Utility gloves
2. Gum boots
3. Masks
4. Aprons
5. Eye protection
6. Cap

iii. What are the sources of solid waste in the municipality? (mention)

iv. Types of carriage used to move solid waste

1. Tracks (lories)
2. Wheel-barrows
3. Ox-carts
4. Polythene bags
5. Plastic baskets
6. Tractor with trailer
7. Skip baskets

v. How do you rate the frequency of solid waste collection?

1. Not collected at all
2. Rarely collected
3. Somewhat collected (tick appropriate answer)
4. Frequently collected

vi. Does the local authority control waste collection schedules (tick one)

* Yes
* no

If yes, explain the control measures taken........................

1. Which of the following methods for solid waste collection exist in the area? (tick appropriate)

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Commonly used** | **Somewhat used** | **Not used** |
| 1. Household level |  |  |  |
| 1. Collection points |  |  |  |
| 1. Collective waste containers |  |  |  |
| 1. Roadside uncontrolled dumping |  |  |  |

**Objective 3: To assess neighbourhood based waste storage methods.**

11 (i) How is waste stored in most households in the compound area? (tick appropriate )

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Commonly used** | **Somewhat used** | **Not used** |
| 1. Old buckets |  |  |  |
| 1. Plastic bags |  |  |  |
| 1. Hessian sacks |  |  |  |
| 1. Standard dust bins |  |  |  |

ii. Are waste collection workers trained,( circle appropriate) (a) yes (b) No

If yes, in above, what was the duration of the course?(tick one)

1. 5 days
2. One week
3. Other specify…………………….

iii. Do you remember what the course content was? (a) Yes (b) No (tick one)

iv. If yes in above, mention the content of the course

..................................................................

...................................................................

.....................................................................

**Objective 4: To examine the effectiveness of Neighborhood based organizations in solid waste disposal methods**

12 (i) In your opinion, what do you think is the quantity of solid waste generated daily?

1. Small
2. Moderate (tick correct response)
3. Large

ii. Is there any dumping place in your area?(circle one)

1. Yes b) No

If yes, how far is located from your Households (in meters)?

* 0 – 100 m
* 101 – 500 m
* > 500 m

iii. Is the solid waste washed into any water body during rain spell?

1. Yes
2. No (tick correct response)
3. Don’t know

iv. How do you describe the solid waste situation in municipality?

......................................................................................................

.......................................................................................................

....................................................................................................

v. In your opinion, what is the fate of the generated solid waste?

1. Some of the solid waste is burnt
2. Most solid waste is deposited in landfill

(tick correct response)

1. Don’t know

vi. Is incineration practiced in the municipality?

1. Yes
2. No (tick correct response)
3. Don’t know

If yes, where is it done? .......................................................

.............................................................................................

.............................................................................................

vii. How would you index your level of satisfaction in solid waste management services practiced by the LGA?

1. Very satisfactory
2. Satisfactory
3. Fair

d) Not satisfactory (tick correct response)

e) Very unsatisfactory

viii. Are you aware of laws regulating waste management?

1. Yes
2. No (tick correct response)

If yes explain the answer: ......................................................................

...............................................................................................................

ix. Is public education on waste management provided?

1. Yes
2. No (tick correct response)

If yes, on what parameters................................................................................

..........................................................................................................................

If yes, who conducts the training?.....................................................................

...........................................................................................................................

x. Please list one factor that could constitute barriers to sustainable solid waste management in the municipality

..............................................................................................

................................................................................................

................................................................................................

xi. In your opinion, who is best equipped to manage the solid waste problem in the town?

1. Government agencies
2. Private organizations
3. Joint of government and private sector (tick correct response)
4. Households

xii. Do you have market for recycled materials (a) Yes (b) No (tick one)

If yes, in above, mention who does buy the materials

xiii. Do you have composting plant in your area? (a) Yes (b) No (tick one)

xiv. Are the equipment for recycling, composting and separation of solid waste sufficient? (a) Yes (b) No (tick one)

if yes, in above question please mention them

............................................................................................................................................................................................................................................................................

xv. Is there any advantage and disadvantage of neighborhood based approach in solid waste management in your area? (a) Yes (b) No (circle one)

If yes in the above question, mention the advantage and disadvantage

Advantages…………………………………….

Disadvantages………………………………….

xvi. Income ranges per month (TSHs)

* <50,000
* 50,000 – 100,000 (tick appropriate response)
* >100,000
* Others specify