AN ANALYSIS OF PUBLIC PERCEPTIONS OF DOMESTIC SOLID WASTE MANAGEMENT: THE CASE OF THE MAKE ZAMBIA CLEAN AND HEALTHY PROGRAMME IN LIVINGSTONE

By

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DECLARATION

I declare that with the exception of the assistance acknowledged, this dissertation is the result of my own studies. This has not been accepted for any degree, and is not being currently submitted in candidature for any other degree. Any ideas presented earlier by other authors have been acknowledged.

Candidate' Signature.....

Date: .....

DEDICATION

To my daughters, Chipo and Kalinda, and my late parents, with whom I find inspiration.

CERTIFICATE OF APPROVAL

This dissertation of Chilinga Givers is approved as fulfilling the full requirements for the award of the Degree of Master of Science in Geography of The University of Zambia.

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ABSTRACT

Solid Waste Management (SWM) continues to be a major concern in Zambia. As such, the Government of the Republic of Zambia (GRZ), through the Ministry of Local Government and Housing (MLGH) in 2004 instituted the Make Zambia Clean and Healthy (MZCH) campaign aimed, in part, at enhancing solid waste collection and disposal to designated dumpsites countrywide. Therefore, a survey on public perceptions of Domestic Solid Waste Management (DSWM) was, between the March and April, 2013, conducted to evaluate the effectiveness of the MZCH campaign in the city of Livingstone. Three representative localities of the city, presumably of different socioeconomic status (with low, medium and high density households), were selected and surveyed. Although the study was largely quantitative, an eclectic approach was used to collect and analyse field data. A total of 202 respondents were successfully sampled through combined simple random and systematic methods. Coded data from the 202 respondents were entered into the SPSS version 16.0 to generate descriptive statistics, and application of Multivariate Analysis of Variance (MANOVA). MANOVA results show that only two independent variables (monthly income and residence classification) reached statistical significant multivariate differences at $p \leq 0.05$. For the monthly income variable, $F\ (6, 376) = 3.55,\ p=0.002;$ Wilks' Lambda (λ) = 0.89; partial eta squared = 0.054; and residence classification, $F\ (6,392) = 2.09,\ p=0.05$; Wilks' Lambda ($\lambda$) = 0.94; partial eta squared = 0.031. This MANOVA result indicates firstly that the demographic factors do not influence public perceptions of the effectiveness of the DSWM system under the MZCH programme. Secondly, there were no major differences in public perceptions of the DSWM system among the different socioeconomic households of the city of Livingstone. Further, the results of this study suggest that the campaign was generally viewed as being ineffective, as local community members largely felt they did not participate in the decision making and implementation of the programme. Overall, the findings of this study suggest that the goals of the campaign were not in tandem with the local community's preferred DSWM strategies. There is a need, therefore, to involve local community members in identifying future waste management solutions and to provide information to all concerned persons about practical aspects of waste management.

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ACRONYMS

ADB	African Development Bank
CBD	Central Business District
CSO	Central Statistical Office
DSW	Domestic Solid Waste
DSWM	Domestic Solid Waste Management
ECZ	Environmental Council of Zambia
GDP	Gross Domestic Product
GRZ	Government of the Republic of Zambia
ISWA	International Solid Waste Association
LCC	Lusaka City Council
MANOVA	Multivariate Analysis of Variance
MLGH	Ministry of Local Government and Housing
MSW	Municipal Solid Waste
MZCH	Make Zambia Clean and Healthy
RDC	Resident Development Committee
SCP	Sustainable Cities Programme
SLP	Sustainable Lusaka Programme
SW	Solid Waste
SWM	Solid Waste Management
UN	United Nations
UNCHS	United Nations Centre for Human Settlement
UNEP	United Nations Environment Programme
WB	World Bank
ZCCM	Zambia Consolidated Copper Mines
ZEMA	Zambia Environmental Management Agency

CHAPTER ONE

INTRODUCTION

1.1 Background

The processes of living, eating, working, playing, and dying all utilise consumer goods whose production and use, generate waste. The United Nations Centre for Human Settlement [UNCHS] (2002), estimated, for instance, that each person in the world generated 200 kg of solid waste per year in the late 1990s. According to the Zambia Environmental Management Agency [ZEMA], formerly, Environmental Council of Zambia [ECZ] (2008), the gross annual solid waste (SW) generated in Zambia as at December 2006 was estimated at 2,000, 000 tonnes; with only about 20 percent of the waste having been collected and disposed of at designated sites. The rapidly increasing quantity of waste generated was owed to industrialisation, population growth and the inadequate investment in infrastructure. Introduction of new consumer products on the market also contributed to the problem of waste management in Zambia. Similarly, Mukuka and Masiye (2002), revealed that there was a quasi- linear relationship between population growth and waste produced in Lusaka. Furthermore, the levels of economic development of a country or indeed a city or its part, and the affluence of its citizenry and thus the varying consumption patterns, life styles, public attitudes, and seasons of the year impact on how much and what type of solid waste is generated. Livingstone, by analogy, as another rapidly growing city, is expected to display a similar relationship. Indeed, humans are a wasteful lot on planet earth. They, however, do not mean to be, but this is an inherent and unavoidable feature of human society.

Waste collection, transport, and transfer have also presented a number of challenges in the Third World cities mainly in terms of equipment, personnel, finance, and above all lack of commitment by management. For example, Hardoy (1992), argued that the waste collection system in most developing countries is grossly inadequate and local authorities are blamed for inefficient and unreliable domestic waste collection, with 30 – 50 % of domestic waste generated left uncollected. In Lusaka, Zambia, the city authority managed to collect and dispose of a little more than 10 % of what it produced in the late 1990s (Nchito and Myers, 2004).

Domestic solid waste management (DSWM) in Zambia, like the rest of the developing world, has therefore, emerged as a dominant urban socioeconomic and environmental issue that has attracted academic, economic and media debates. However, despite all this formidable growth in content and general awareness, the DSWM system has either crumbled or is non-existent altogether in Zambia. This has had a telling effect on, not only the environment, but also on socioeconomic matters. Observing from the study carried out by Masundire and Sanyanda (1999), areas such as Kasane (Botswana), Victoria Falls (Zimbabwe) and Chirundu (Zambia), lacked storage containers (litter bins) in overcrowded residential areas of the towns which resulted in the prevalence of odours, housefly infestation, and visual pollution produced by exposed and decomposed garbage. All the above observations show that waste management has become a major concern in the Third World countries in general and Zambia in particular.

According to Akhtar (1987), public perceptions of health hazards (including Domestic Solid Waste [DSW]), particularly urban based ones, should form an important element of modern interventions in many health hazards. However, such vital approaches are rarely applied, especially in less densely populated cities of Zambia like Livingstone. Thus this study will focus attention on this area of Solid Waste Management (SWM) in the light of the Make Zambia Clean and Healthy (MZCH) programme in the City of Livingstone.

The MZCH programme is an ongoing, government led, multi-sectoral, multi-disciplinary campaign where all government line ministries, public and private institutions and/or organisations, individuals and the general public are encouraged to actively participate in its implementation. The programme involves a wide range of related activities that include SWM. As a way of providing national leadership, the MZCH campaign was launched by His Excellence the late President, Dr. Levy Patrick Mwanawasa, S.C., in 2007 (Ministry of Local Government and Housing [MLGH], 2010). Broadly, the campaign aims at making our cities, towns and villages clean in order to improve health standards of Zambians. Particularly on SW, the campaign aims to:

(i) reduce the generation of excessive waste;

(ii) have all garbage collected in time and disposed of at designated dump sites on a continuous basis.

Some of the suggested ways of implementing the MZCH programme included:

(i) placing large bins at strategic points where the public should dispose of DSW;

(ii) government providing at least a refuse collection truck to all urban areas;

(iii) members of the media and other key personnel in the area of communication focussing attention on raising awareness on the benefits of a clean environment to the public at large;

(iv) the local authorities and other relevant institutions like the Zambia Environmental Management Agency enforcing laws on waste management, for example the public Health Act; and

(v) the government adopting effective partnerships with all stakeholders, including the general public.

The key question, however, is 'How does the public perceive the effectiveness of the MZCH campaign as a purported participatory DSWM system in cities like Livingstone?'

1.2 Statement of the Problem

Over the years, several interventions such as the Sustainable Cities Programme (SCP), a broad programme that involved the cities of Lusaka and Kitwe between 1994 and 2007, and the ongoing MZCH campaign, have been adopted in Zambia. All such programmes are largely aimed at championing the challenges posed by SW. Despite such interventions, particularly the ongoing MZCH campaign, the city of Livingstone, like several others, however, has continued to face the problem of DSWM. For example, while the Central Business District (CBD) of Livingstone is kept fairly clean with regular collection services, areas outside the CBD are not serviced and waste in residential areas is either disposed of in backyards pits or dumped in open spaces, a matter that gives rise to vermin and diseases (UN-Habitat, 2009).

Reasons for the persistence of DSWM problems are, nonetheless, varied. An example of such major drawbacks faced is over-reliance on State or Municipal governments (top-down approach) in planning, executing and managing DSWM Systems. Furthermore, DSWM systems in Zambia have mainly applied technical issues in isolation of the non-technical ones such as public perceptions and attitudes. In this regard, some observers elsewhere have, for instance, argued that whereas the technical features of any DSWM system are crucial to its success, many of the technical inadequacies that are found in developing countries are as a result of non-technical shortcomings (Kayaga and Cotton, 2011). As was observed in some Asian cities by Smith and Scarpaci, (2000), in Zambia too, the results of the over-reliance on governments, and the exclusion of non-technical issues in planning and execution of DSWM interventions, have been either partially successful, short-lived strategies, or absolute failures. And so from a governance perspective, the recent upsurge in waste collection and disposal problems stems from the fact that attitudes and perceptions towards waste and the rating of waste management issues in people's minds and in the scheme of official development plans have not been adequately considered (Kendie, 1999; Akhtar, 1987). The city of Livingstone has not been spared in this regard.

Available literature about the City of Livingstone also suggest that no study has been done to evaluate the MZCH programme especially regarding public perceptions of its design and implementation, and effectiveness as a DSWM system. This study therefore is anticipated to generate the necessary information that could be a basis for more effective planning and implementation of DSWM systems such as the MZCH programme in Zambian cities.

1.3 Aim:

This study aims at analysing public perceptions of DSWM by evaluating the MZCH programme in Malota, Dambwa North, and a High cost residential area North-West of the CBD, Livingstone.

1.4 Specific Objectives

The specific objectives of this study are therefore to:

(i) analyse how the public views the current status of the DSW regarding collection and disposal in light of the MZCH campaign in the respective study areas;

(ii) assess what constitutes common DSW types as perceived by the local people;

(iii) ascertain the socioeconomic and environmental effects of the current DSWM systems from the point of view of residents in each study area; and

(iv) find out what the local communities' preferred effective DSWM strategies are in relation to the MZCH programme.

1.5 Research Questions

(i) Do the public's demographic characteristics determine and generalise their perceptions regarding DSWM system's effectiveness in the city of Livingstone?

(ii) Do people from low, middle, and high socioeconomic status households have different mean perception scores on the effectiveness of the MZCH programme as a DSWM intervention in Livingstone?

(iii) What are the most common DSW types generated and/or prevalent in each of the three study areas as perceived by the local people?

(iv) to what extent are the DSW socioeconomic and environmental concerns positively affected by the MZCH campaign in the study area?

(v) Are the MZCH programme's approaches in tandem with the local communities' perceived effective DSWM strategies?

1.6 Significance of the Study

Generally, as cities grow economically, business activities and consumption patterns often drive more SW (Strange, 2001). The increased generation of SW poses several socioeconomic and ecological challenges in many Third World cities, hence the many strides that are usually made aimed at reducing or eliminating SW challenges by governments and/or regional bodies. In

Zambia, the MZCH programme is one of the several mitigation efforts made so far.

However, despite all such often costly interventions, DSW challenges continue to ravage society perhaps due to failure by authorities to include certain non-technical attributes like public perceptions in planning of DSWM strategies. Consequently, what has developed to be a common public view is that DSWM is the preserve of local authorities (Hester and Harrison, 2002; Baud et al., 2004). The public domain therefore, continues to have minimal participation in issues of DSWM. The result of limited community participation has been less satisfactory DSWM systems (Smith and Scarpaci, 2000; Nchito and Myers, 2004; Kayaga and Cotton, 2011). Therefore, this study on public perceptions is desirable because:

(i) One of the influences upon successful implementation of SWM strategies lies in people's minds. Therefore, efforts aimed at successfully implementing such SWM mitigations should considerably begin by assessing and changing people's views on such subjects.

(ii) There is widespread global consensus since the 1990s that the implementation of sustainable development, including DSWM, should be based on local level solutions and community participation (Mwangi, 2000).

(iii) Available literature on SWM in Zambia suggests that most studies have been carried out mainly in large cities like Lusaka and Kitwe, and a few, if not none, in the relatively smaller cities and/or towns where socioeconomic influences on SWM may be different. Yet, additional literature further point out that no single solution has been identified that completely and wholesomely answers the question 'What should be done with SW' because every community or region has its unique profile regarding SW. This is mainly due to the diversity in socioeconomic backgrounds, hence, the divergent attitudes of people regarding waste practice (Akhtar, 1988). There is therefore, need to focus attention also on other areas of Zambia such as the city of Livingstone that may have different perceptual issues in SWM. In addition, by virtue of the city of Livingstone being a leading tourist capital of the country, the need for a waste-free environment in the city, cannot be over-emphasised.

(iv) In the case of Zambia in general, and the city of Livingstone in particular, there is still overwhelming evidence of SWM related problems despite several efforts at mitigating such problems. It was necessary to carry out a study on people's perceptions of SWM as a way of helping find reasons for the continued high prevalence of inadequate SWM systems and consequently formulating more effective mitigation strategies.

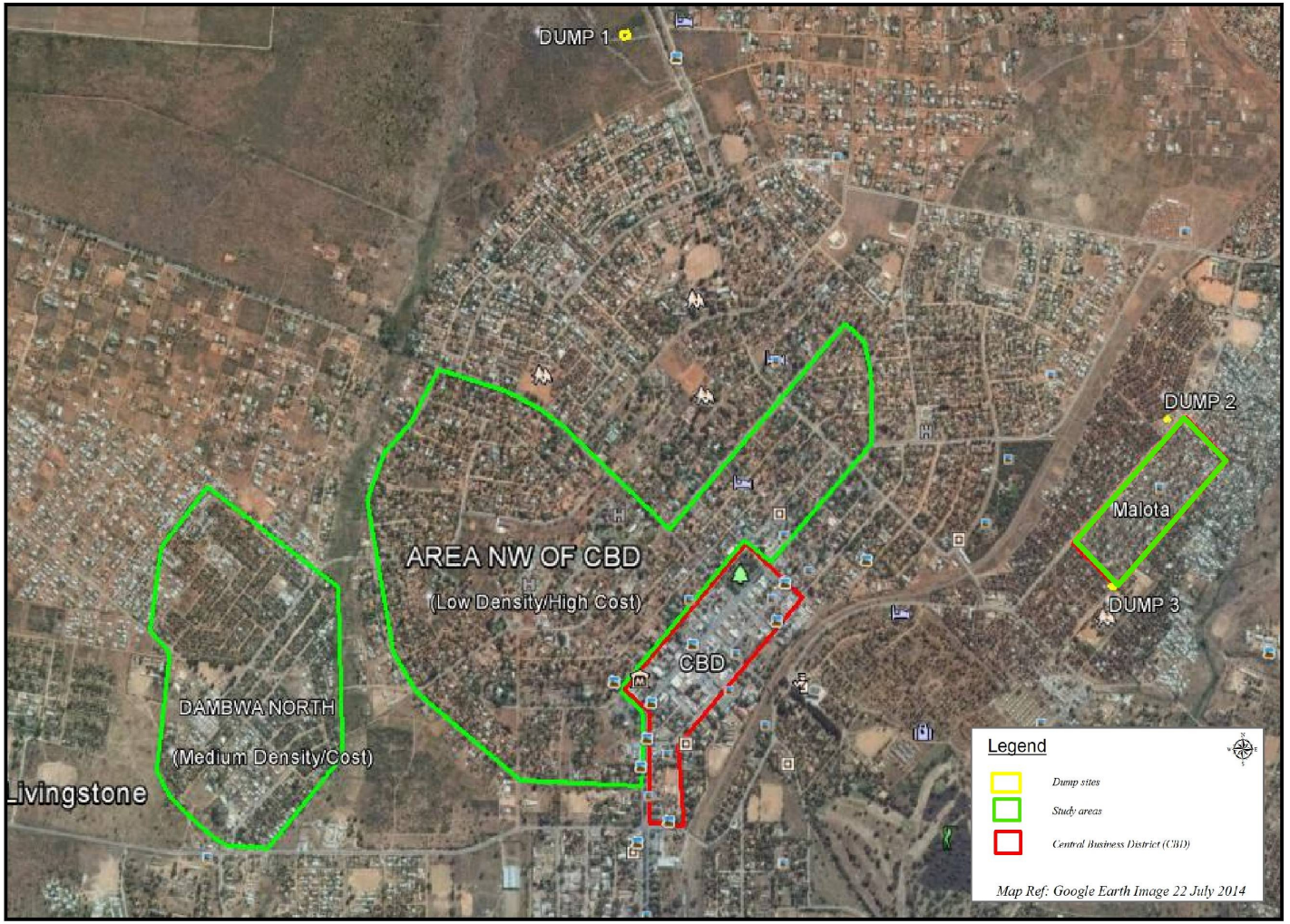
Due to the foregoing, this study therefore was envisaged as being a worthwhile activity as it would add new and necessary knowledge to the available collection of literature on DSWM. Thus, findings of this study are anticipated to be critical to policy makers, scholars, and the general citizenry in cities and towns in their quest for more effective DSWM strategies.

1.7 Study Area

1.7.1 Location and size

The City of Livingstone lies about 473 kilometres south of Lusaka, the capital city of Zambia. It is approximately defined by Latitude 17° 51'S and Longitude 25° 52'E. The City of Livingstone is spatially the smallest city in Zambia with an urban area of approximately 69 km². However, three localities were surveyed each representing a low density (area North-West of the city's CBD), a medium density (Dambwa North) and a high density (Malota) residential areas, respectively (Figure 1.1).

FIGURE 1.1 SATELLITE IMAGE SHOWING PART OF THE CITY OF LIVINGSTONE



1.7.2 Functions

The City of Livingstone, which was the capital of Northern Rhodesia (now Zambia) before independence and before Lusaka, is the tourist capital of Zambia. Arguably, it has potential to be the number one tourist destination in Southern Africa. Among the tourist attractions, the city boasts of the Victoria Falls, the Seventh Wonder of the World and a renowned world heritage site and the Mosi- oa- tunya National Park. The city of Livingstone continued to be the administrative centre of the Southern province of Zambia until recently (in the year 2011) when government made a pronouncement to shift this function to Choma (a town relatively occupying a more central geographical position of the province). Due to its border location, Livingstone City is a gate way by air, rail and road to the Southern African countries of Zimbabwe, Botswana and the Republic of South Africa. The foregoing therefore entails heightened human activities which consequently lead to increased generation of SW within the city.

1.7.3 Demographics of the City

The population of the City has been growing steadily over the years. However, due to the increase in the tourism activities, notably, after the year 2000, a corresponding rapid growth in population of the City has been observed. The city of Livingstone's total population stood at about 61,296 in 1980, 83,780 in 1990, 103,288 in 2000 and 136,897 in 2010 (Central Statistical Office [CSO], 2012). The average population growth rate of the city of Livingstone between 1990 and 2000 stood at 2.1 percent. The total number of households in the city in 2000 were about 18, 856. However, the number of households sampled from the three study areas of the city stood at 983 for the residential area North-West of the CBD, 1,626 for Dambwa north, and 1331 for Malota, giving a combined total of 3,940. It is worth noting that the 2010 Census estimates of the city of Livingstone households were not available at the time of the study. Furthermore, the likelihood of a significant change in the number of households was very minimal because the areas concerned were old where there has been less or no room for new structures (according to personal experience). Expectedly, an increase in the number of people in any given area often yields more SW, a situation that, therefore, calls for more very elaborate waste management systems.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

This chapter reviews some of the available relevant literature on SWM. This review, from global to local perspectives, focuses attention on DSW generation, collection and disposal, characterisation and classification. Further, examples of common interventions and the local community participation, and public perceptions have been discussed. Although all types of SW have from time to time been outlined, the review particularly places emphasis on DSW of the Municipal Solid Waste (MSW) stream. Concise theoretical and conceptual frameworks have been discussed too.

2.2.0 Theoretical and Conceptual Frameworks

This study applies the anomie theory and the concept of governance to discuss public perceptions of DSWM.

2.2.1 Anomie Theory Applied to Domestic Solid Waste Management (DSWM)

In order to implement successful DSWM policies and the bottom-up reorientation successfully, it is necessary to understand the various sectors of society's 'cultural' differences and therefore preferences. This study, therefore, borrows from the social scientist, Emile Durkheim's social stratification concept as adapted by Robert Merton (Merton, 1968). In this regard, this study applies the Anomie theory which is also referred to as 'strain' or 'means to ends' theory. This theory, from Merton (1968)'s perspective and thus, in this study discusses why the rates of deviance differ very dramatically in different societies and for different subgroups within society.

Working from within the overall functionalist perspective that puts a great deal of emphasis on the role of culture, Merton (1968), adapts the anomy concept to analyse situations in which culture creates deviance and disunity. He refers to a situation in which there is an apparent lack

of fit between the cultural norms about what constitutes success in goals (set objectives) and the cultural norms about the appropriate ways to achieve those goals – the means. In this vein, Anomie theory may be used as an explanation for the distribution of deviant behaviour across groups defined by, for example, socioeconomic classification of society. Therefore, culture is ambivalent (both positive and negative) about the appropriate means of being successful. In this regard, Moser (1983), in discussing community participation argued that people are mobilised with the purpose of achieving a desired outcome. In the case of the MZCH campaign, the main goal (objective) centres on the participation by all sectors of society in activities aimed at improving the cleanliness of the country through, for instance, the public participating in the desirable DSWM practices. This is commonly evaluated in terms of measurable outputs of the process.

From the foregoing, one would therefore argue that high rates of deviance and thus failure in most developmental agenda in, for example, developing countries like Zambia, are as a result of society's placing emphasis on success more than the approved (or preferred) means of achieving these goals, and the same kind of success for everyone (i.e. generalised application of intervention strategies to different groups of people). This is despite such issues as racial, ethnic and class stratification of society limiting the opportunities for success by those in the less privileged groups. For example, as Agbola (1993), aptly put it; the root cause of many nations' environmental problems (including DSW) can be traced to the way and manner in which the imbibed behavioural patterns and acquired values are superimposed on the environment. Arguably, imbibed behavioural patterns are cultural in origin. Therefore, the relationship between humans and the environment is thus a function of culture, the level of society's technological development, the perceived magnitude of existing environmental problems and the level of education (Agbola, 1993).

And so, applying the mode of adaptation, as depicted in Figure 2.1, to public perceptions of SWM, one would argue that the influence of perception describes how a person views himself and the world around him and how it tends to govern behaviour as explained by anomie theory which explains that deviance can arise by accepting culturally determined goals without the

acceptability of cultural means (Longe et al., 2009).

I	Conformity	+ +
II	Innovation	+ -
III	Ritualism	- +
IV	Retreatism	- -
V	Rebellion	x x

Where:

(a) "+" means acceptance, "-" signifies rejection, "x" means rejection of prevailing values and substitution with new ones, and

(b) The first symbol designates people's relationship to norms about the goals; the second symbol designates their relationship to norms about the means of achieving those goals.

Figure 2.1 Merton's Mode of Adaptation (How people respond to the disjunction of goals and means)

Source: Adapted from Merton (1968)

In this case, it translates into both the public accepting development interventions and accordingly participating in such strategies or the total rejection of their (developmental agenda) designs and implementation, thus spelling failure. It may therefore be argued that the concept of governance can play a vital role in taking on board the public in the developmental agendas if such were to be accepted and be successful. Hence the call for bottom-up rather than top-down approaches to sustainable development.

2.2.2 The Concept of Governance

Governance describes the sum decision-making processes and structures in the public sector, the 'rules of the game,' so to speak, with which the state organises the possible interventions in society and the private sector, as well as defines the relations between government and the governed. In other ways, governance implies transparency of decision-making processes and the responsibilities of the relevant actors. In this regard, arguably 'efficient governance appears to be a function of the reduction of state domination and the growth of vibrant spaces that constitute a crucial sign of political engagement' (Devas, 1999: 1). Nonetheless, Kendie (1999), stated that

lately there has been a tendency to concentrate on the design of waste management technologies and how to apply them in context rather than looking at the problem from a governance perspective.

2.3 Solid Waste Management – Generation Trends

Globally, SWM continues to be a major problem. The International Solid Waste Association [ISWA] observed, in 2011, that one of the main problems facing policy makers in the waste management sector is how to predict the amount of SW generated in the near future in order to devise the appropriate collection, treatment or disposal mechanisms. Many factors account for the generation of waste. Tchobanoglous et al., (1993), state, for example, that factors which affected waste generation rates include public attitudes and legislation. Further, ISWA (2011), asserts that the key parameters in establishing the waste quantities include the living standards and population size. This effect of population growth and the social living standards on the rate of waste generation was also stated by El – Haggar (2007), who argues that the rate of waste generation increased with population growth rate and social standards. This implies that the more advanced and wealthy societies (or individuals) become the more waste they produce.

Globally, waste generations vary from place to place. However, waste generation, both domestic and industrial; continue to increase in tandem with growth in consumption. For example, Nag and Vizayakumar (2005), observes that in the twentieth century, due to industrial revolution and technological development, consumption patterns of people, all over the globe, changed, implying that the use of natural resources and goods also increased manifold. Due to this, huge quantities of different types of solid wastes are then produced every day creating an alarming problem of their disposal. Similarly, El-Haggar (2007), also observes that many previous studies indicate that as Gross Domestic Product (GDP) per capita increases, per capita MSW generation and other types of wastes also increase. For instance, in developed countries, where there were larger GDP per capita; per capita waste generation correspondingly increased nearly three-fold over the two decades between about 1980 and 2002, reaching a level five to six times higher than in developing countries (African Development Bank [ADB], 2002). Indeed, the world is a wasteful society.

The main challenge, however, for a modern industrial country is to break the historic link between waste creation and wealth creation. Accordingly, Strange (2001:1), observes that:

> Over the years, per capita waste arisings and wealth (expressed as GDP) have appeared to grow inexorably – with waste production outstripping economic growth. Total reported waste generation within the EU and the European Free Trade Area (EFTA) increased by 10 percent between 1990 and 1995, over which period economic growth was 6.5 percent in constant prices. The European Environmental Agency (EEA) has demonstrated a close correlation between economic activity and municipal waste generation.

Although limited data hinder the development of projections for future waste trends, it is often considered by many scholars that globally most waste streams will probably continue to increase over the next several decades. For example, El-Haggar (2007), states that the amount of municipal waste stream for 2004 was about 1.87 billion tonnes with a seven percent increase compared to 2003. Further, the amount of this type of waste was estimated to rise by 31 percent in 2008 to reach 2.5 billion tonnes.

The production of some wastes is closely related to population size, while some production is more related to human practices in agriculture and manufacturing, which often correlate with the nation's state of development (Hinga and Batchelor, 2004). Similarly, ADB (2002), revealed that, with increases in populations and living standards, waste generation in developing countries was also increasing rapidly, and may have doubled in volume in the decade spanning from 2000 to 2010, and that if the current trends then continued, the world was expected to see a five-fold increase in waste generation by the year 2005. In this light, ADB (2002:9) states that;

> Worldwide, low income countries have the lowest percentage of urban populations and the lowest waste generation rates, ranging between 0.15 and 0.33 tonnes per person per year. All the countries that have Gross National Product (GNP) per capita of less than US$ 400 produce under 0.25 tonnes per person per year. As GNP increases toward the middle income range, the per capita waste generation rates also increase, ranging from 0.18 to 0.40 tonnes per year.

Arguably, MSW is one of the major global environmental problems in developing countries. In Indonesia, Otten (1997), reported that it was alarming that the region of Jabotatek, which includes Jakarta, where population growth was fast, the generation rate of waste was estimated at 50 000 m³ per day or seven million tonnes per year. Another example of a country illustrating this problem in the developing world, Africa in particular, is Kenya. According to Baud et al., (2004), the city of Nairobi (Kenya) was reportedly literally under garbage, generating 1,500 tonnes of solid waste daily. Other examples depicting high generation rates of SW in Africa include the city of Lagos in Nigeria, where a total of four million tonnes of MSW was generated annually in the city (ADB, 2002). An average Nigerian generated about 0.43 kg of SW per day (Sridhar, 2005). In Zambia, the annual waste generated, as at December 2006, was estimated at two million tonnes (ECZ, 2008). According to Kayaga and Cotton (2011), the estimated generation rate is 0.6 kilogrammes per capita per day for Lusaka. Further, Edema et al., (2012), argue that in Lusaka the annual average amount of SW has been increasing and is expected to grow from 220, 000 tons recorded in 1996 to 530, 000 tons in 2011, an increase of 141 percent. However, there is a challenge of record keeping of waste generated in most cities of Zambia which makes it difficult to get accurate statistics on the same.

2.4 Waste Collection and Disposal Trends

Historically, collected SW has been placed in the soil in the earth's crust or deposited in the rivers and oceans; nevertheless, land filling or land disposal is today the most commonly used method (Tchobanoglous and Kreith, 2002).

Of greater concern, however, is the fact that many cities globally, more so in the Third World, generate more SW than they can collect or dispose of, with the volume increasing with income. In this vein, the World Bank [WB] (1993), states that in low and middle income countries municipal waste services often swallow between a fifth and a half of city budgets, yet much SW is not removed. According to Adedipe (2004), the continuous efforts of increasing quality of life and high rates of resource consumption have had an unintended but negative impact on the urban environment by way of the generation of wastes far beyond the handling and treatment capacities of governments and agencies. This may be attributed to most SWM systems in many countries

that are characterised by inefficient collection methods, insufficient coverage of the collection system and improper disposal of MSW.

Anand (1999), laments that many visitors to cities in Africa, Asia and Latin America described them as 'filthy'. This is due to the large amounts of uncollected waste. For example, Pacione (2005), argues that in the Third World cities between one-third and one-half of the solid wastes generated remained uncollected and left to accumulate on wasteland and in the streets. This situation often posed serious human-induced environmental hazards. More than 30 percent of SW generated in Jakarta, four-fifths of refuse in Dar es Salaam, and more than two-thirds in Karachi went uncollected, though a much better service was achieved in various cities in South America, where, for instance, collection averaged between 91 and 99 percent in Caracas, Santiago, Buenos Aires, São Paulo and Rio de Janeiro (WB, 1993).

McDougall et al., (2001), observes that in India the problems of collection, transport, treatment and disposal of MSW were straining both financial resources of the local authorities and their physical capabilities. Similarly, ADB (2002:9) revealed that;

> The major cities in West Africa (for instance) produced between 150 000 and 300 000 tonnes of MSW per year, and waste management absorbed 50 percent of the municipal budget, yet only 40 to 60 percent of this budget was even collected. … generally, collection rates in Africa range from 20 to 80 percent. A common feature of the African municipalities is that they are ineffective, under-equipped and poorly maintained (usually vehicle immobilisation rates reach as high as 70 percent), inadequately and poorly funded.

Another example of serious problems with the SWM system was observed in Zambia. For example, in Lusaka 90 percent of the 1 400 tonnes of MSW produced daily, is left uncontrolled, even though the private collectors complement the local authority by collecting two percent of MSW on a commercial basis (Nkausu, 1999; Hampwaye, 2007). In the city of Ndola, Zambia, until the early 1990s, SW was collected from residential areas at no cost to households; because like many other urban areas of Zambia then, the city council could afford a free collection and disposal of SW due to a vibrant city economy (Edema et al., 2012). However, due to most

companies which were either privatised or had ceased to operate due to lack of capacity to compete with imports beginning the year 1991, the Council's revenue base drastically reduced. SWM on the Copperbelt in general and Ndola city in particular, completely collapsed in 2000 especially with Zambia Consolidated Copper Mines (ZCCM) having been privatised and that the new owners were no longer interested in SW collection and disposal. The new mine owners on the Copperbelt wanted to concentrate on the core business of mining. Similarly, in the city of Livingstone (Zambia), the underlying causes of the majority of the environmental problems are attributed to inadequate spatial planning, unemployment and poverty as well as the poor management practices and a variety of challenges the city faces such as a high rate of waste generation. Other than inadequate investment in waste management at the city level, the problems are also as a result of human activities at personal, household, and community levels (UN-Habitat, 2009). The UN-Habitat (2009), further revealed that while the CBD in the city of Livingstone is kept fairly clean with regular collection services, areas outside the CBD are not serviced and waste in residential areas is either disposed of in backyard pits or dumped in open spaces, a matter that give rise to vermin and diseases.

2.5 DSW Types and Receptacles

There are different types of wastes, taking the form of either gas, liquid or solid (McDougall et al., 2001). Therefore, it can be deduced that waste is heterogeneous in nature. Hence, wastes are differently generated and so present themselves in many types. People in different localities also view what constitutes waste differently. This may be attributed partly to the varying levels of economic development of any given area (whether a country, city, or part of a city), and the affluence of people which result in different consumption patterns, life styles, and public attitudes (Mukuka and Masiye, 2002). Furthermore, population growth and size, to a large extent, also determines the amount and type of waste generated in a given area.

McDougall et al., (2001), identifies several forms in which waste exist, namely, the physical state, its original use, material type, physical properties, and origin. Other classifications of waste include safety levels. In terms of waste generated from original use, it may be derived from packaging materials, food, among others, that produce remains that are rendered useless and so

termed as waste. By material type, McDougall et al., (2001), refers to waste defined according to its constituents. For instance, waste may comprise glass and paper materials. On the other hand, the physical properties discuss waste in terms of whether it is combustible, compostable or recyclable. Waste defined and classified according to its origin refers to the sources from which waste is generated i.e. whether it is from domestic, commercial, agricultural or industrial sources. Waste may also be classified according to the safety levels. Under this group, waste can either be hazardous or non-hazardous.

In Zambia, ZEMA, formerly ECZ (2008), recognises three broad categories of waste, namely, MSW, Industrial Waste, and Hazardous and Special Waste. According to the United Nations Environment Programme [UNEP] (1988), Municipal Waste (MW) is the trash collected from households, commercial establishments and small industries. This is usually of solid in nature, thus, collectively referred to as MSW. It is this type of waste that is commonly found in residential areas of most cities and towns in Zambia, including Livingstone. Domestic waste refers to all materials from households that range from a single family to multi-family dwellings (ECZ, 2008). Commercial waste, on the other hand, is generated from commercial and business houses (e.g. stores, restaurants, markets, and office buildings). MSW therefore, normally consists of such materials as paper, food wastes, textiles, cardboard, plastics, metals, ashes, and general packaging waste, among many others.

Previous studies suggest, for example, that in low income cities of India, about 15.62% of domestic waste is vegetable matter, 4.35% is paper, 0.55% is rubber and leather, 0.62% are plastics, 4.00% are rags, 0.40 % wooden paper, and 0.62% are metals; with the rest presumably comprising other assorted materials (Bhatia, 2003). In Jakarta, Indonesia DSW was about 82% putrescibles, whereas in Lagos, Nigeria DSW constituted 60% putrescibles (Cointreau, 1982). The study by Manyanhaire et al., (2009), revealed that waste components in Sakubva high density suburb, Mutare (Zimbabwe) included 32% food residue, 27% paper, 23% plastics, 6% metals, 5% glass, 3% textiles, rubber (no figure given by source), and 1% wood. In Lusaka, the composition of waste generated was 8.7% paper and card board, 0.9% ferrous materials, 0.7% nonferrous materials, 7.3 % plastics, 2.1% glass, 1.3% rags (cloth), 40.4% putrescibles and

38.6 % others (Lusaka City City[LCC], 2003; Hampwaye, 2007). In Chirundu, Zambia, previous studies indicate that 10% of the household waste was paper, 7% plastic, 6% metal, 72% food waste; and the rest presumably others (Masundire and Sanyanga, 1999). In the city of Ndola, Zambia, the research by Edema et al., (2012) indicates that food waste was found to be the most abundant of wastes generated in that area, comprising about 50%[1] from the low density area, 45%[1] from the medium density area and 25%[1] in the high density which was followed by paper waste that was the same in all the three areas at 5%. However, plastics represented 10% of waste generated in low and medium density areas and 5% of waste generated in the high density area. Garden waste made up 30% of waste produced in the low density area while the medium and high density produced 20 and 30%, respectively (Edema et al., 2012). Others were less than 2%.

Often waste receptacles used for storage vary. For instance, residents in the city of Mutare, Zimbabwe used different types of waste receptacles, which were either formal or informal such as hard plastic bins which were used by 60% of the residents, 17% used sacks, 9% cardboard boxes, 4% metal bins, and 1% bulk containers (Manyanhaire et al., 2009). The waste receptacles differed in type, shape, size and nature of material they were made of and on average were filled in seven days.

2.6 SWM: Public Perceptions, Attitudes and Participation

Globally, waste management has continued to be a major problem because of several reasons. For example, Hester and Harrison (2002: v) notes that;

> It is not that the technologies do not exist; they do, and have done for many years. The main issue is that of acceptability. The public expect to be able to produce household waste in a largely controlled manner and are accustomed to an efficient local service of removal.

According to dalla Torre (1992), many different actors have experimented with various

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[1](Note: only a portion of food waste for each locality is reported here; the rest is made up other materials combined)

technological options to find viable alternatives for appropriate collection and disposal of waste, and established that SWM is not just a technical issue. Equally important, SWM has socio-political and cultural dimensions that need solutions through imaginative policies and an informed population, among others. Similarly, Strange (2001), argues that many of the technical issues surrounding waste management can be regarded largely as being understood and solved but it is in the area of our own attitudes that we must seek the most effective, enduring solutions to sustainable consumption. Further, Akhtar (1987), who studied perceptions of the public on health hazards in Lusaka, contends that public perceptions of health hazards (including DSW), particularly urban based ones should form an important element of modern interventions.

Although there is a substantial gap between perception and reality, in the City of Madras, India, it was observed however, that the solution to MSW lay in the participation of the local people who generated the waste (McDougall et al., 2001). In the same vein, results from three community based SWM systems that were studied in Hanoi, Vietnam, suggest that the success of sustainable urban social infrastructure programmes lies in the involvement of local communities as major stakeholders and decision makers (Richardson, 2003). Specifically, the communities given the opportunity are capable of adequate waste management.

Based on literature outlined in above, it can be confirmed that many urban governments in African countries are facing serious problems with SWM. In this regard, Richardson (2003), asserts that because many Third World local governments lack the appropriate financial, technical and human resources, they are neither able nor willing to manage SWM systems. For example, in many Asian cities, private or public systems are only able to collect between 30 and 50 percent of SW and many dispose of waste in many ways that are detrimental to the environment (Richardson, 2003). Additionally, because the private or public DSWM systems did not take into account the involvement of the urban poor, they caused damage to the economies and livelihoods of the poor, at the same time, instead of protecting the environment, ended up damaging it. Arguably, SWM is a complex task which depends much upon organisation and cooperation between households, communities, private enterprises and government authorities as it does upon the selection and application of appropriate technical solutions for waste collection, transfer, recycling and disposal (Richardson, 2003). Further, it has been argued however, that

solutions developed for the north (the developed world) are usually not appropriate to contexts in the south (developing world) because social relations characterising primary waste collection, for instance, in African cities, have certain peculiarities (ADB, 2002). Therefore, the potential social impact of changes resulting from the introduction of new waste management methods need to be carefully considered.

Historically, the concerns in SWM were viewed as a sole responsibility of local authorities (Baud et al., 2004). Sadly, until the 1980s, SWM policies and programmes in most African cities were formulated and implemented by government agencies without significant public participation. In this regard and according to Richardson (2003), a drawback that resulted is the over-reliance on the state or local municipal governments in planning and implementing of waste management systems. More specifically, some observers have suggested that community-based waste projects often fail because of low participation from households if and when SWM is not a 'felt need.' Consequently, there have been many problems in the overall management schemes that end up either with partial success, mostly short-lived, or absolute failure for SW policies. However, political and social changes across the continent in the 1990s, including the rise of non-governmental organisations (NGOs) have fostered an increased awareness of environmental issues among the public (ADB, 2002). Mockler's study in Indonesia carried out in 1998 indicates, for example, that a 'felt need' is a necessary pre-requisite for the successful implementation of community-based SWM systems (Richardson, 2003).

On the other hand, a study by Omran and Gebril (2011), on the attitude of households, their awareness as well as the problems which were related to failure of the recycling campaign in Malaysia, revealed that 90% (311) indicated that the campaign had failed. Reasons cited included not having enough facilities provided by the local authorities; many people did not know the location of the nearest collection point, location of collection points is either not good or too far. Further, Omran and Gebril (2011)'s study in Perak state of Malaysia, found that more than 52% of the respondents complained that a waste facility could not be easily accessed; therefore, undoubtedly the householders were discouraged to engage in meaningful DSWM. Similarly, Adenso-Díaz (2005), concluded that distance and access to the bins is obviously an

incentive to waste management. Therefore, it was easier for residents to throw the recyclablesthan to bring them to collection points. Other reasons for the unsuccessful campaign included lack of community participation. On the same, Omran and Gebril (2011), concludes nonetheless, that it is interesting to note that the lack of support and participation of households in Perak on recycling are not due to their negative attitude towards recycling but due to misinformation on the part of the authorities. According to Rahardyan et al., (2004) and Lima (1996), it was observed that the citizen's perceptions and attitudes depend on the knowledge they had about a facility.

In Zambia, the government has attempted framing several systems of managing SW. For example, through the joint government and donor funding, the Sustainable Cities Programme (SCP) in Zambia was designed and implemented in the Cities of Lusaka and Kitwe between 1994 and 2007 (UN-Habitat/UNEP, 2009). The SCP was designed out of the realisation that environmental planning and management was weak due largely to inappropriate planning, such as the reliance on out-dated Master Plans and lack of stakeholder participation in the planning process (UN-Habitat/ UNEP, 2009). For example, while the Lusaka City Council (LCC) was reportedly using an out-dated Master plan of 1979 which had been overtaken by developments on the ground, Kitwe City Council had no Master Development Plan at all; instead, planning in Kitwe was ad hoc (UN-Habitat/UNEP, 2009).

Under the SCP, through the Sustainable Lusaka Programme (SLP), in Lusaka's Chibolya, Chinika, and Mandevu/Marapodi settlements, communities were asked to identify their needs, prioritise them and formulate programmes to address them. These needs included the concern of poor and inadequate SWM. With the help of Ireland Aid, one of the financiers of the SLP, Ng'ombe, Marapodi, and Kamanga compounds were selected as pilot project areas emphasising enhanced community-based participation, building capacity for the communities and creating networks and linkages among stakeholders such as NGOs, public and the private sectors (Nchito and Myers, 2004). However, even with SCP in general and the SLP in particular, having officially come to an end in 2001, the problem of SWM continued in the City of Lusaka due to

several constraints such as poor responsiveness to the community demands by the city council (Hampwaye, 2007).

An evaluation of the SLP in some of the peri-urban areas of the City of Lusaka that was conducted between 2002 and 2003 by Nchito and Myers (2004) assessed four areas that included the examination of the depth of the cooperation between communities and community organisations, and how transparent various stakeholders were (Hampwaye, 2007). One of the lessons that were drawn from the implementation of SCP in Kitwe and SLP in Lusaka was that sustainable planning and implementation of SWM systems must involve the community right from the inception and through all programme phases (UN-Habitat/UNEP, 2009). This entails adopting a bottom-up approach as it is seen to foster a smoother flow of information about a given development in a community and leaves little room for misinformation. However, critics of the SCP in general and the SLP in particular, seem to suggest that the top-down approach predominated in the planning and execution of SWM strategies as opposed to the bottom-up approach. This resulted in low success. For example, Nchito and Myers (2004:129), observed that;

> Despite attempts in recent times not to force projects on communities, it seemed that some prioritised issues are those of instigators and not totally of the community. In some cases the community may identify priority areas but the solutions are brought in either by a donor or some external 'stakeholder.'... As a consequence, for instance, in the case of Ng'ombe and Kamanga residential areas, despite sensitisation there was still mistrust between the community and the community based enterprises (CBEs) members, where it was observed that it was often those with education or exposure who ended up belonging to CBEs and this increased the perception of the members (of *CBEs*) as the 'elite' among the poor. This further alienated the CBE members from the rest of the community, and so well meant agendas lacked success.

From the foregoing, one would therefore argue that the lack of assessment and inclusion of the public perceptions of DSWM issues has been one of the major challenges to successfully design

and implement many SWM strategies in most urban areas especially in the developing world. The continued problems of SWM in most cities and towns of Zambia perhaps justified the need for the Government of the Republic of Zambia (GRZ) to introduce the MZCH campaign in 2004. Ideally, the MZCH programme is meant to be holistic in that it is supposed to involve all the public and private institutions and/or organisations, and the general public to ensure that SW is collected and disposed of appropriately (MLGH, 2010). However, based on the above literature generally, and specifically according to Kendie (1999), who stated that lately there has been a tendency to concentrate on the design of waste management technologies and how to apply them in context rather than looking at the problem from a governance perspective; the question that can be posed regarding the MZCH campaign as a DSWM system could be "How effective has the MZCH campaign been in implementing a sustainable DSWM system through community participation from the point of view of the local community in which it is being implemented?"

CHAPTER THREE

METHODOLOGY

3.1 Overview

This chapter outlines the methods employed to collect and analyse data on public perceptions of DSWM in the city of Livingstone. The following sections are covered in this chapter; research design, survey instrument, data collection and analysis procedures.

It can be argued that the effectiveness and sustainability of SWM systems depend on the degree to which the served population identifies with and takes ownership of the systems and facilities. To this end, it is imperative that the local people are involved from the outset in the planning of the local segments of waste management systems. Community involvement in decision – making is particularly important regarding issues of DSW collection and disposal. The goal of this study was to analyse public perceptions of DSWM by evaluating the MZCH programme in the city of Livingstone. Therefore, this study analyses the basic assumption, that 'perceived lack of local community involvement at the designing stages rendered the MZCH programme ineffective as a DSWM intervention in the City of Livingstone'.

Three residential areas of the city were selected and surveyed to provide a representative sample. Understandably, each area served as representing a low-density (high income), medium density (middle income) and high density (low income) settlements of the city, respectively (Figure 1.1).

3.2 Research Design

The design of this study is a survey. A survey design enables obtaining of research data aimed at generalising, in this case, public perceptions, from the sample to a population so that inferences can be suggested (Creswell, 2003). Also, three other recognisable advantages of the survey method include the rapid turnaround in data collection, suitability to obtaining the targeted sample size and the economy of the design (Creswell, 2003). To collect and analyse the field data, several materials and methods were employed as outlined in the succeeding sections (3.3.0, 3.4.0 and 3.5.0).

3.3.0 Survey Instruments

3.3.1 Questionnaires (Scheduled, Structured Interviews)

A questionnaire or structured interview schedule (Appendix I) was administered to households by the researcher with the help of research assistants. By proxy, 210 (i.e. 10 more than the targeted minimum of 200, as one of the cushions against the risk of spoiled questionnaires that may have in turn substantially reduced the sample size) mature (age ranging from 18 to 81 years) household respondents were selected to answer the questionnaire. Further, in order to maximize the retention of the distributed questionnaires and enhance data collection within the limited time period, the researcher and/or research assistant interviewed the respondents in the appropriate language. Thereafter, the researcher filled in the questionnaire on behalf of the respondents especially where evidence or a suspicion existed that the respondents were of the low education standard (or illiterate) and which would inhibit the understanding, and therefore diligent answering of this research instrument.

This survey instrument was designed to collect information and data on the following nine themes: respondent's demographic characteristics, public perceptions on the importance of DSWM, awareness (knowledge) of the existing DSWM system, and the effectiveness of the MZCH programme. Other areas included the public perceptions on what constitutes common DSW, extent of local community's participation, socioeconomic and ecological affects, ability of the public to improve DSWM and preferred DSWM approaches. In total, 71 items were listed under the above mentioned sections or themes of the questionnaire.

Using the survey questionnaire to capture respondents' demographic characteristics (i.e. sex, marital status, highest level of education attained, employment and their position in the household) – factual information; the respondents were asked to state the category that they belonged to. Regarding the age and residence variables, the questionnaire was deliberately designed in such a way that respondents provided the actual years and stated names of their residential areas, respectively, by filling in the blanks, respectively. However, for items of the questionnaire like perceived; importance of problems of community, DSW composition (types), challenges of the MZCH campaign, and preferred effective DSWM strategies, the respondents

were asked to rank them. Ranks ranged from 1 (most important) through to 5 (least important). Further, the respondents were asked to rank the level of perception of various DSWM concerns such as importance, awareness, community participation, socio-economic effects and effectiveness on a five point Likert Scale. The Likert Scale is used in order to measure the strength of the respondents' perception of the domestic waste management issues under consideration (Page-Bucci, 2003; Isa *et al*., 2005; Uebersax, 2006). Likert scaling ranged from 1 to 5 for categories like; 'ineffective' to 'very effective' for the outcome (or effectiveness) measure, 'strongly disagree' to 'strongly agree' for the public participation's influence measure, very low to very high for the public participation rating and system's affects on socioeconomic and ecological issues measures, and 'not important at all' to 'very important' for the importance rating measure. Other categories included; 'not informed at all' to 'very well informed' for the awareness rating measure; and 'never' to 'very frequently' for the frequency of the community members' working together measure, respectively. By Likert's method, a person's perception and hence attitude are measured by combining (adding or averaging) one's responses across all items.

3.3.2 Non- Scheduled Structured Interviews

Information and data from key informants were acquired through interviews. With the initial target key informants comprising the Livingstone city council employees (MLGH), the other key informants were established by applying a snowballing sampling technique. Two authorities at the Livingstone City Council were interviewed, namely, the Deputy Director and the SW Manager, both from the Public Health and Social Services Department. Further, two community leaders (one from Dambwa North) and another from Malota were also interviewed. And finally, two employees of a private firm that is involved in the collection of domestic garbage from private homes and organisations were also interviewed. These were the Director and a refuse truck driver (as one directly in daily waste collection) of the firm called Essential Environmental Services based in Elaine Britel in the city of Livingstone. The firm operates as a franchise. It is worth mentioning here that the actual names of the key informants have deliberately been concealed because the researcher assured anonymity to the respondents.

3.4.0 Data Collection Procedures

Preliminary (secondary) data was collected through a review of available literature as outlined in Chapter two.

The collection of primary data was carried out between March and April, 2013. Initially, the researcher identified and employed a total of seven research assistants bearing in mind that there was limited time within which to do the exercise and also that the sample size was too large for one person to handle effectively. A one day training meeting was facilitated by the main researcher to acquaint the research assistants with interviewing skills and terminologies used in the survey instrument, and the sampling formalities (Sections 3.4.1 and 3.4.2). Thereafter, the exercise began, strictly following procedures outlined in Sections 3.4.1 and 3.4.2 below. The main researcher was also actively involved in data collection as much as providing the necessary supervision to the assistants. However, the collection of data from key informants was solely carried out by the main researcher. This was after all the data was collected from the households in the three localities. This was done within the same period mentioned above.

All in all, from the 210 administered questionnaires, a total of 202 questionnaires were successfully filled in and retained for the data analysis of this research, which represented a more than 100% response rate since initially the targeted sample size was only 200 (Table 3.1).

3.4.1 Sampling Frame

The sampling frames used in this study were Zambia's national population census reports of 2000 and 2010 by the CSO from which the study areas' population and consequently sample sizes were obtained.

3.4.2 Sample Size

Considering that the combined total number of households for the three sampled study areas was 3,940 (CSO, 2003)[2], a total of 202 (out of the about 210) respondents from a random sample of

[2](Note: The 2010 census estimates of the city of Livingstone households were not available at the time of the study).

multi-persons households in single - family dwellings were selected to represent the target population for this study. This is in accordance with the recommendation by White (2005), for a minimum five percent sample size requirement where there is a population of between 1001 and 10,000.

However, using stratified random sampling, proportionately 43 (21.3%) respondents were selected from the high income - low density residential area North-West of the city's CBD; 75 (37.1%) respondents from Dambwa North (middle income – medium density residential area); and 84 (41.6%) respondents from Malota (low income – high density residential area), respectively (Table 3.1). A $\frac{1}{20}$ ratio[f] (or 5%) was used to derive the number of respondents per study area (i.e. f=$\frac{n}{N}$ [Aggarwal, 1988; Bless and Achola, 1988]; where f is the ratio used to calculate the number of respondents per area of study, *n* is the sample size, and *N* is the population size).

Table 3.1 Classification of residential areas and corresponding number of households selected

Classification of Area	Total Households (*N*)	Selected No. (*n*)	%	Area Name
Low Income/High Density	1680	84	41.6	Malota
Middle Income/Density	1397	75	37.1	Dambwa North
High Income/Low Density	863	43	21.3	Area NW of CBD
TOTAL	**3940**	**202**	**100**	

Source: Adapted from CSO (2003) Report

3.4.3 Sampling Procedure of Respondents

Through a systematic (interval) sampling method, the household units were selected from which respondents by proxy were obtained. The following formula was applied to arrive at the interval length *(k)* for households from which respondents were obtained in each socioeconomic household stratum.

Formula: $k = \frac{N}{n}$ (Bless and Achola, 1988), where;

- k is the interval length (i.e. in this case, implies that every k-th household in a given number of households [population]);

- N is the size of the population (total number of households); and

- n is the size of the sample (number of households/respondents).

Therefore, applying the above formula and starting with a randomly chosen household unit between 1 and k, both 1 and k inclusive, from a pre-determined street in each study area, the following pattern was followed in selecting the household units from which respondents were obtained.

Given that n=200, N=3940, it follows therefore that $k = \frac{3940}{200} = 19.7 \approx 20$. This means that the researcher began with selecting a randomly identified household unit between 1 and 20 (both 1 and 20 included) in a pre-determined street, and then picked a respondent from every 20^{th} (k-th) household unit in each study area.

3.5.0 Data Analysis

3.5.1 Overview

Most of the data in this study was collected using the interview schedule (questionnaire). As such, most of the data was analysed quantitatively. Analyses involved obtaining descriptive statistics (percentages and frequencies, means and standard deviations), and applying a one-way between groups Multivariate Analysis of Variance (MANOVA) to examine whether the population's public perceptions are different by demographic characteristics or socioeconomic status of households. Some qualitative data obtained from the seven key informants through interview guides were analysed thematically. These data and information (qualitative) were fused into the quantitative data to solidify the findings on DSWM system in the city of Livingstone.

The coded data from the 202 correctly completed questionnaires were entered into the Statistical Package for Social Sciences (SPSS) version 16.0 to perform quantitative analyses. Respondents on average gave responses to 71 attributes of public perceptions of DSWM in the city of Livingstone. Data analysis procedures and brief discussions for each analysis follow.

3.5.2 Descriptive Statistics

Descriptive statistics were generated from the coded survey questionnaire data using the SPSS Version 16.0. These statistics (percentages, frequencies, means and standard deviations) were used to analyse most of the specific objectives and their respective research questions. Key descriptive statistics were tabulated to enable ease of presentation and discussion of the survey findings.

3.5.3 Multivariate analysis of variance (MANOVA)

To examine whether the public's demographic factors can generalise their perceptions of DSWM in the city of Livingstone, MANOVA was conducted. The independent variables were eight demographic factors: gender/sex, age/generation, marital status, education, employment, monthly income, residence, and position in family. The three dependent variables were perceived public awareness, participation and effectiveness of the MZCH campaign.

Procedurally, the three dependent variables were entered simultaneously while the eight independent variables were entered individually. In accordance with guidelines by Tabachnick and Fidell (2001), some groups of five variables were collapsed to obtain better statistical results in this study since some original categories had small samples or too few responses (Table 4.2.1). In this regard the *age* variable was collapsed into three groups, namely: young (18 – 28 years) – 35.1% (71), mature (29 – 40 years) – 34.7% (61) and older (40+ years) – 30.2% (61). The *education* variable was also collapsed into three groups: up to primary – 18.8% (38), secondary – 53.0% (107), and post – secondary – 28.2% (57). Continually, the *marital status* variable was re-coded into two groups. Hence, the resulting marital status variable had categories as follows; unmarried – 39.6% (80) and married – 60.4% (122). Further, some groups of *monthly income* variable range were combined and resulted in a total of three groups: income range less than ZMW500 – 25.3% (49), income range between ZWM501 and 2000 – 50.0% (97), and income above ZMW2000 – 24.7% (48). The *position in family* or household variable was collapsed into three groups: household head – 43.1% (87), spouse (female) of household head - 35.6% (72), and household representative – 21.3% (43).

Preliminary assumptions that were tested to find out whether the data conform to MANOVA application include: sample size, normality, outliers, linearity, multicollinearity and singularity, and homogeneity of variance-covariance matrices (Pallant, 2005). However, some of these tests (e.g. normality) are not strictly necessary given this study's relatively large sample size of 202 subjects that is far much greater than the minimum sample size requirement of 30). In addition, a brief discussion of MANOVA follows.

MANOVA is an extension of analysis of variance (ANOVA) for use when you have *more than one* dependent variable; therefore, it is used to compare two or more groups in terms of their means on a group of dependent variables (Hair et al., 2005; Pallant, 2005). These dependent variables should be related in some way, or there should be some conceptual reason for considering them together. MANOVA compares the groups and tells you whether the mean differences between the groups on the combination of dependent variables are likely to have occurred by chance (Pallant, 2005). To do this MANOVA creates a new summary dependent variable, which is a linear combination of each of one's original dependent variables.

For MANOVA to be valid, three of the several assumptions that need to be met are: (1) observations must be independent – responses in each cell are not made independently of responses in any other group, (2) variance-covariance matrices must be equal for all treatment groups – in MANOVA, Box's Test of Equality of Covariance Matrices shows whether this assumption is violated or not (Hair et al., 2005). A significance value that is larger than 0.001 means no violation of this assumption (Pallant, 2005), and (3) normality – this assumption is that all the variables are multivariate normal. Although it underlies most multivariate techniques, there is no direct test available for multivariate normality (Hair et al., 2005). Considering the fact that univariate normality of each variable is tested, Mahalanobis distance is commonly used (Pallant, 2005). Mahalanobis adjustment application also helps to answer the question 'Do levels of each of the statistically significant independent variables differ on all of the dependent measures, or just some?' In its simplest form this involves dividing one's original alpha level *(p)* of 0.05 by the number of analyses that one intends to do (Pallant, 2005). Like the application of analysis of variance (ANOVA), the null (H_o) and alternative (H_1) hypotheses were stated

accordingly as follows:

H_o: $\mu_1 = \mu_2 = \mu_3$ (the population means are the same i.e. the mean public perception scores of the effectiveness of the MZCH programme as a DSWM system are the same for the three socioeconomic status households),

H_1: At least two mean public perception scores of the MZCH programme as a DSWM system between the three socioeconomic status households differ.

CHAPTER FOUR

RESEARCH RESULTS

4.1 Overview

This chapter presents the results of the data analysis performed to evaluate the MZCH campaign from the Livingstone city community's perspectives. As noted earlier, the majority of the information used in this study was derived from questionnaire data. Two hundred and two completed questionnaires were coded, and the raw data were transferred into SPSS version 16.0 for data analysis to generate various statistics. Importantly, to screen data for analysis of the study, descriptive tests for variables were used in order to check errors of the data. After errors of the data were corrected, tests were repeated to double-check for occurrence of errors.

4.2 Sample Profiles

The study focused on three community settlements chosen for inclusion in the field surveys. Results show that the surveyed communities are not homogeneous groups in terms of their number of households and therefore selected number of respondents per residence (Table 4.2.1). The participants for this survey comprised 38.6% (78) males and 61.4% (124) females giving a total of 100% (202). This sample consists of a broad cross-section age range of 18 to 81, with a mean age of 35.4 years. It is worth noting however, that the age variable was collapsed into three age-groups for ease of statistical data analysis particularly for MANOVA. Expectedly, the percentage distribution of respondents across most of the demographic variables varied unevenly. The survey's overall demographic characteristics frequencies are presented in full in Table 4.2.1.

Table 4.2.1 Demographic characteristics of respondents (n= 202)

Variable	*n*	%	Variable	*n*	%
Sex			**Employment (Collapsed)**		
Male	78	38.6	Formal	73	36.1
Female	124	61.4	Informal & unemployed	127	62.9
Education			**Marital Status**		
None	8	4.0	Single	60	29.7
Primary	30	14.9	Married	122	60.4
Secondary	106	52.7	Separated	6	3.0
College	46	22.9	Divorced	4	2.0
University	11	5.5	Widowed	10	5.0
Residence			**Monthly Income**		
Malota (High Density)	84	41.6	≤ ZMW500	49	25.3
Dambwa North (Medium density)	75	37.1	ZMW501 – ZMW2000	79	50.0
CBD Area (Low Density)	43	21.3	ZMW2001 – ZMW3500	36	18.6
Position of Respondent in Household			ZMW3501 – ZMW5000	9	4.5
Male Head	57	28.2	Below ZMW5000	3	1.5
Female Head	30	14.9	**Age Group (Collapsed)**		
Spouse of Head	72	35.6	Young (18 – 28 years)	71	35.1
Household Representative	41	20.3	Mature (29 – 40 years)	70	34.7
RDC Leader	2	1.0	Older (above 40 years)	61	30.2

(Source: Field Data, 2013)

4.3 Perceptions of the importance of community problems including Domestic Solid Waste (DSW)

One of the questionnaire items asked respondents to rate by ranking in order of importance issues believed to have an impact upon waste management. Ratings were made according to ranks ranging from one (1^{st}) [the most important] and then perceived importance decreasing in that order to five (5^{th}). A similar analysis of ranked data was carried out in an investigation of employee perceptions of the SWM system operating in a large Australian contracting organisation: implications for company policy implementation (Lingard et al., 2000). The process is mathematical and involves translating a series of rated data into ranks to allow

comparisons to be made among subpopulations. Results indicate a high degree of variations in responses between different socioeconomic status households as summarised in Table 4.3.1. From Table 4.3.1 it is clear that, respondents in different communities faced different challenges in varying degrees. Most important is the observation that, with the exception of respondents in Dambwa North, the problem of waste was perceived as a leading community problem.

Table 4.3.1 Survey results of major community problems ranked in order of perceived importance from (i) – most important to (v) - least important)

Malota (*n*=84)	**Dambwa North (*n*=75)**	**CBD Area** (*n*=43)
(i) Waste all over the place (60.7%)	erratic electricity supply (72.0%)	waste all over the place (48.8%)
(ii) Bad roads (53.4%)	bad roads (65.3%)	bad roads (39.5%)
(iii) Not enough toilets (owing to clogged old sewers) and other sanitary services (50.0%)	waste all over the place (61.3%)	not enough toilets & sanitary services (owing to clogged old sewers)/ erratic electricity supply (37.2%)
(iv) Not enough drinking water (47.6%)	not enough drinking water (54.7%)	not enough drinking water (16.3%)
(v) Erratic electricity supply (36.9%)	not enough toilets and other Sanitary services (30.7%) (owing to clogged old sewers)	too many diseases like malaria (13.9%)

(Source: Filed data, 2013)

However, when asked about whether or not the residents viewed the issues of DSW collection and disposal important, 70.8% (143) respondents from the three residences surveyed combined perceived the two issues important. This left a smaller percentage (29.2% or 59 respondents) who felt the two issues were unimportant (Table 4.3.2). However, variations in the perceptions of the same issues were observed by respondents in the respective localities, with the high density residence's respondents having a higher perception percentage. In this regard, respondents in Malota 78.6% (66) viewed the problems as important. On the same, 64.0 % (48) respondents in Dambwa North said the problems were important. Further, 67.4% (29) of the respondents in the low density residential area North-West of the city's CBD perceived DSW collection and disposal as important. A summary of the descriptive statistics is tabulated in Table 4.3.2. Further, of all the 143 respondents who viewed DSW collection and disposal as important issues

in their localities, 53.1% (76), when asked to rate the importance of the two issues, rated them as being very important. However, the rating of the two issues as being very important, varied only slightly across the three localities surveyed (Table 4.3.3). In this regard, 49.25% (33) of the respondents in Malota rated the issues as being very important while 53.0% (26) in Dambwa North and 56.6% (17) in the low density residential area North-West of the city's CBD, did so, respectively.

Table 4.3 Results of household survey perceptions of importance of SW collection and disposal in Livingstone

	Malota (*n*= 84)		Dambwa North *(n*=75)		CBD Area *(n*=43)	
4.3.2: Do you think domestic solid waste collection and disposal are important issues in your community/residence?						
	n	***%***	***n***	***%***	***n***	***%***
1. Yes	66	78.57	48	64.00	29	67.44
2. No	18	21.43	27	36.00	14	32.56
4.3.3: If yes to Question item 4.3.2, how do you rate the importance of the collection and disposal of solid waste from your household/establishment? Likert Scale (5-1)						
Very important	33	49.25	26	53.00	17	56.62
Important	31	46.27	22	45.00	10	34.48
Indifferent	0	0.00	1	2.00	1	3.45
Less Important	3	4.48	0	0.00	1	3.45
Unimportant	0	0.00	0	0.00	0	0.00

(Source: Field data, 2013)

4.4 Public Perceptions of the Current DSWM Practices in Livingstone

From the household survey questionnaire, results show that public perceptions regarding waste management practices varied from one locality to another (Table 4.4). When asked about their view on the most common waste collection system in their communities, most of the respondents in the high and medium density residential areas said none existed, that is, 60.7% (51) respondents in Malota and 58.7% (44) of respondents in Dambwa North. However, in the low density residential area, the majority (44.19% or 19) of the respondents, elected o*thers,* that included the residents paying for the collection service to a private collection firm and what they

termed personal arrangements. By and large, it is clear from the survey results that the city authorities did not collect waste regularly from the households as evidenced by only 7.1% (6), 4.0% (3) and 9.3% (4) of the respondents in Malota, Dambwa North and the residential area North-West of the city's CBD, respectively who felt the council did collect.

Asked about the main reasons for the non-collection of waste, responses varied from one residential area to another. For example, the majority of the respondents in Malota, that is, 55.13% (43), stated that the city council authorities do not collect waste. In contrast, most of the respondents in Dambwa North (about 53.1% or 26 surveyed individuals) and the low density residence North-West of the city's CBD (58.6% or 17 participants) perceived other reasons to have been more important. However, one common major reason among respondents in the three localities was lack of dumping sites (Table 4.4.2).

When asked about what they did with their own waste, the survey results suggest that composting, recycling and re-using of waste were not common methods used among the respondents in all the three surveyed communities. However, as was anticipated, most of the respondents in the three localities indicated that burying, burning and dumping anywhere within the yards were prominent ways of disposing waste (Table 4.4.3). For example, as regards burying or dumping of waste in a pit within the yard, 22.6% (19), 33.3% (25), and 44.2% (19) of the respondents in Malota, Dambwa North and the low density residential area North-West of city's CBD perceived the method as being a major one, respectively.

One method that was, however, peculiar in the high density community (Malota) involved residents taking the DSW to a communal collection point, where approximately 29.8% (25) of the respondents, said this was how they managed their waste. Notably, two communal collection points were said to have been located at the extreme north (dump2 near Mbita on Figure 1.1) and south-ends (dump3 near Syanalumba on Figure 1.1) of the residential area, respectively, a matter that was perceived to have been yet another hindrance to effective DSW management in the area. Furthermore, through an interview with a former Resident Development Committee (RDC) member, it was also learnt that residents of this area complained of irregular waste collection by the city council from these communal collection points for eventual disposal at the designated

dumpsite of the city said to have been located at the extreme north-end of the city. The former RDC leader further highlighted that, residents ultimately resorted, more often than not, to burning of these mountains of garbage that accumulated over time at communal collection points. The burning of the waste was said to have caused a common nuisance of air pollution within the community and to areas in the vicinity. Meanwhile, while waiting to finally dispose of their garbage at the communal collection points, respondents generally said that empty maize-meal bags (often ones used for packaging 25 kg of maize meal) were used as receptacles to temporarily store the waste within their yards. Few respondents, however, said they buried waste in pits within their backyards.

When asked about how long they handled waste this way, there were slight variations in the responses across respondents as has been tabulated in Table 4.4.4. However, it is clear that the majority of the participants in the survey indicated that the above practices have been going on for a long time. For example, 41.7% (35), 48.0% (36), 37.2% (16) of the respondents in each of the three communities surveyed, namely, Malota, Dambwa North, and area North-West of the CBD, respectively, listed that they had managed the waste by either burying or burning it within their yards as far back as 1964.

With regard to the type of receptacles the residents had commonly used, it is clear from the respondents that an assortment of receptacles were used. Mostly, respondents indicated that they had improvised all sorts that included plastic bags (often those they got after buying groceries from Shoprite and Spar chain stores), carton boxes and others (Table 4.4.5). Plastic bags were said to have been commonly used by most respondents in all the localities of the city surveyed e.g. 35.7% (30) in Malota, 16.0% (12) in Dambwa North and 27.9% (12) in low density area North-West of the city's CBD elected this as the receptacle they had commonly used. Notably, about 45.2% (38) of the respondents in Malota also said empty maize-meal bags were listed among the other common receptacles used. Insignificant as it may appear, it is important to mention that there was quite a sizeable number of respondents (10.0% or less) across all surveyed communities who indicated that they were not using any receptacles.

Table 4.4 Public perceptions of the current DSWM practices in Livingstone

	Malota		Dambwa North		CBD Area	
	n	%	*n*	%	*n*	%
4.4.1 In your own view, what is the most common waste collection system existing in your community?						
1. All households have their waste collected regularly by city authorities	6	7.14	3	4.00	4	9.30
2. All households pay private firms for their waste collection	9	10.71	7	9.33	7	16.28
3. Not aware	15	17.86	18	24.00	13	30.23
4. None	51	60.72	44	58.67	0	0.00
5. Other (specify)	3	3.57	3	4.00	19	44.19
4.4.2 If waste is NOT collected in your residence/community, what do you think is the main reason?						
1. People around are not aware that waste is a problem	2	2.56	0	0.00	0	0.00
2. The city council does not collect	43	55.13	0	0.00	1	3.45
3. No one offers to collect	2	2.56	1	2.04	1	3.45
4. There are no dumping places	20	25.64	22	44.90	10	43.48
5. Other(s) [Specify]	11	14.11	26	53.06	17	58.62
4.4.3 What do you do with your own solid waste at home?						
1. Burry/dump it in a pit within the yard	19	22.62	25	33.33	19	44.19
2. Burn it within the yard	13	15.48	15	20.00	10	23.25
3. Dump it anywhere within the yard	26	30.95	28	37.43	9	20.93
4. Take it to a communal collection point	25	29.76	7	9.33	5	11.63
5. Compost, recycle and reuse it	1	1.19	0	0.00	0	0.00
4.4.4 For how long have you been handling domestic solid waste this way (as in 4.4.3 above) in your community?						
1. Since independence (1964)	35	41.67	36	48.00	16	37.21
2. Since 1980	3	3.57	4	5.33	4	9.30
3. Since 1990	7	8.33	11	14.67	5	11.63
4. Since 2000	21	25.00	13	17.33	6	13.95
5. Since 2010	18	21.43	11	14.67	12	27.91
4.4.5 What type of receptacle does your household/establishment have for waste storage on your premises?						
1. Metal or plastic	3	3.57	18	24.00	9	20.93
2. Basket or carton	7	8.33	33	44.00	9	44.19
3. Bag (plastic)	30	35.72	12	16.00	12	27.90
4. Other type of container (specify)	38	45.24	4	5.33	0	0.00
5. None	6	7.14	8	10.67	3	6.98

(Source: Field data, 2013).

4.5 Perceptions about awareness of the Make Zambia Clean and Healthy (MZCH) Programme in the city of Livingstone

The findings of this survey show that the community perceptions regarding their awareness of the campaign when asked whether or not the public had heard of the MZCH campaign's existence revealed that overall; about 77% (156) believed that they had heard about the MZCH campaign. However, the perceived awareness percentage of the campaign varied among the three localities. For example, it was lowest among residents from Malota (72.6% of the 84 respondents) and highest among the participants from the low density residence (86.9% of the 43 respondents) as shown in Table 4.5.1. Nonetheless, of the 156 out of the 202 individuals surveyed who believed they had heard about the campaign, when asked about how well informed they felt they were about the campaign, the majority of the respondents said their awareness of the campaign ranged from being less informed, fairly informed to well informed. Only a few said that they were very well informed.

Interestingly, over 45% (28) of the respondents in Malota said they felt they were well informed; which was notably higher than for the respondents in Dambwa North and the low density residential area North-West of the CBD (Table 4.5.2). Although there was no questionnaire item asking the respondents about how they got to be informed about the MZCH campaign, information given by the former RDC member through an interview, however, showed that it was through commemoratory meetings that were organised by the government through the city council in the high density locality. Further, the former RDC member revealed that such commemoratory meetings were held at market grounds or open spaces. This therefore, may explain the observed apparent higher awareness percentage of the existence of the campaign among the participants in the high density residential area than the other two communities.

Table 4.5 Survey results of residents' awareness perceptions of the Make Zambia Clean and Healthy Campaign in the city of Livingstone

	Malota		Dambwa North		CBD Area	
	n	%	*n*	%	*n*	%
4.5.1 Have you heard of the Make Zambia Clean and Healthy campaign in your locality/residence?						
1. Yes	61	72.62	58	77.33	37	86.95
2. No	23	27.38	17	22.67	6	13.95
4.5.2 If Yes to 4.5.1 above, how well informed do you think you are about the MZCH campaign as a DSWM system in your community? Likert Scale (5 – 1)						
Very well informed	2	3.28	6	10.17	2	5.41
Well informed	28	45.90	18	30.51	12	32.43
Fairly informed	14	22.95	16	27.12	11	29.73
Less informed	10	16.39	8	13.56	5	13.51
Not sure	7	11.48	10	18.64	7	18.92

(Source: Field data, 2013).

4.6 Residents' Perceptions of their Participation in the Waste Management System Decision Making Processes

With regard to public participation in the campaign, results of this study revealed very little degree of differences in responses among all respondents in the three communities. The majority of the respondents felt their participation ranged from being very low (0-20%) to being average (41-60%). About 37.9% (31), 28.0% (21) and 37.2% (16) of the respondents surveyed in Malota, Dambwa North and the low density residential area North-West of the city's CBD, respectively, perceived their rate of participation in decision making for waste management pertaining to the MZCH campaign as being very low (Table 4.6.1). Nonetheless, when asked whether or not respondents thought by working together with the city council authority, community members could positively influence decisions about waste collection and disposal, most of the respondents agreed. For example, approximately 54.0% (46), 55.0% (42) and 74.0% (32) of the participants in Malota, Dambwa North and the low density residential area North-West of the city's CBD, respectively, agreed that by working together with the city council authorities, residents would positively influence decision making processes on waste management (Table 4.6.2).

When responding to the survey item about who the survey participants perceived to have been making decisions regarding DSWM, responses across the three surveyed localities were largely

homogeneous except for the respondents from the low density residential area. In this regard, over 55.0% (47), 57.0% (43) and 72.0% (31) of the residents in Malota, Dambwa North and the low density residential area North-West of the city's CBD areas, respectively, said they did not know who made the decisions (Table 4.6.3). This may however, imply that local communities were not part and parcel of the crucial decision making process as regards DSWM strategies. Expectedly, therefore, the majority of the respondents, that is, 61.9% (52) in Malota, 74.66% (56) and 69.77% (30) in the low density residential area North-West of the city's CBD, indicated that they had never attended any meeting in their communities which addressed DSWM issues (Table 4.6.4).

Table 4.6 Residents' perceptions of their participation in the MZCH campaign

	Malota		Dambwa North		CBD Area	
	n	%	*n*	%	*n*	%
4.6.1 In your own view, how would rate the spirit of your participation in decision making for waste management (collection and disposal) strategies in your community today (currently or lately)?						
Very Low (0 – 20%)	31	37.90	21	28.00	16	37.21
Low (21 – 40%)	19	22.62	13	17.83	5	11.63
Average (41 – 60%)	24	28.58	25	33.34	13	30.23
High (61 – 80%)	7	8.33	12	16.00	5	11.63
Very High (81 – 100%)	3	3.57	4	5.57	4	9.30
4.6.2 Do you think by working together with the city council authorities, people in your community/residence can positively influence decisions about waste collection and disposal?						
Strongly disagree	1	1.19	3	4.00	0	0.00
Disagree	1	1.19	2	2.67	1	2.33
Indifferent	3	3.57	3	4.00	0	0.00
Agree	46	54.76	42	56.00	32	74.41
Strongly agree	33	39.29	25	33.33	10	23.26
4.6.3 When there is a decision to be made pertaining to waste collection and disposal; does the entire community in our locality get called for this purpose?						
The city council leaders decide and inform us	10	11.90	8	10.67	2	4.65
The local community leader(s) seek(s) our opinion & decide	11	13.10	10	13.33	8	18.61
We as community members hold discussions/decide together	6	7.14	3	4.00	1	2.32
I do not know who decides	47	55.96	43	57.33	31	72.09
Others, specify	10	11.90	11	14.67	1	2.33
4.6.4 In the past five to ten years, how often have you joined with others in your community to address common DSW issues such as collection and disposal?						
Never	52	61.90	56	74.66	30	69.77
Once	23	27.39	13	17.33	11	25.58
A few times (2 – 5 times)	6	7.14	4	5.33	2	4.65
Frequently (at least 5 times)	3	5.57	1	1.34	0	0.00
Very frequently (> 15 times)	0	0.00	1	1.34	0	0.00

(Source: Filed data, 2013).

4.7 Public Perceptions about the MZCH campaign's Outcome/effectiveness

One of the main questionnaire items asked respondents to give their opinion on how effective the SWM campaign was. On the same, in Malota, about 67.9% (57) said the campaign was perceived as being ineffective (0-20%) to being barely effective (21-40%), while only 7.1% (6) and 2.4% (2), believed that it was effective to very effective, respectively. On the other hand, about 53.3% (37) of respondents in Dambwa North perceived the programme as being ineffective to barely effective. However, only 16.0% (12) and 9.3% (7) of the respondents in Dambwa North said the campaign was effective (61-80%) to very effective (81-100%), respectively. Similarly, about 44.2% (19) respondents in the residential area North-West of the city's CBD viewed the campaign as having been ineffective to barely effective, while only 18.6% (8) felt that the campaign was effective to very effective (Table 4.7.1). Interestingly, those respondents who viewed the campaign as being fairly effective did not show marked differences across the three surveyed localities. Approximately, 22.6% (19) and 21.3% (16) of the respondents in Malota and Dambwa North, respectively, felt that the campaign was fairly effective (Table 4.7.1), although perception of the effectiveness was slightly higher (37.2% or 16 respondents) in the low density residential area North-West of the city's CBD.

However, when asked to voice their opinion on the waste collection and disposal system under the MZCH programme, the majority of the respondents in all the three surveyed residences felt that DSWM had not improved as compared to the pre-MZCH campaign period. In this regard, 70.2% (59), 36.0% (27) and 53.5% (23) of the respondents in Malota, Dambwa North and the low density residential area North-West of the city's CBD perceived the status of DSWM as being the same as before the launch of the campaign in the city (Table 4.7.2). Only 13.1% (11), 12.0% (9) and 11.6% (5) of the respondents in Malota, Dambwa North and the low density residential area North-West of the city's CBD, respectively, said that the DSWM system was more effective after the campaign launch period. The rest of the participants either felt that the waste management system was less effective, did not know, or were not sure (Table 4.7.2).

The downside, nonetheless, of the MZCH campaign in enhancing DSWM was that many of the respondents felt that the programme did not exist. Approximately 46.4% (36), 40.0% (30),

44.2% (19) respondents in Malota, Dambwa North, and low density area North-West of the city's CBD, respectively, believed that the campaign did not exist. Furthermore, of those who thought the campaign existed, a good number of the respondents said the campaign was an event (that is, it was commemorated only at particular times of the year as opposed to it being an all year round activity). In this regard, 30.9% (26) of the respondents in Malota said the campaign was an event. Similarly, 36.0% (27) and 41.9% (18) of the participants in Dambwa North and the low density residential area north-west of the city's CBD, respectively, described the campaign as an event.

The rest of the participants in each of the three surveyed communities either felt the campaign was a habit (an all year round activity), too new a concept for them to comment on or felt indifferent about its existence and effectiveness (Table 4.7.3). Clearly, as tabulated in Table 4.7.3, even when combined, this category of respondents were in the minority.

Table 4.7 Perceptions about the effectiveness of the MZCH campaign

	Malota		Dambwa North		CBD Area	
	n	*%*	*n*	*%*	*n*	*%*
4.7.1 In your own view, how effective is the current solid waste management (MZCH) campaign in your area? (%)						
Ineffective (0-20%)	36	42.86	25	33.33	16	37.21
Barely effective (21-40%)	21	25.00	15	20.00	3	6.98
Fairly effective (41-60%)	19	22.62	16	21.34	16	37.21
Effective (61 -80%)	6	7.14	12	16.00	6	13.95
Very effective (81-100%)	2	2.38	7	9.33	2	4.65
4.7.2 What is your view on the DSW collection and disposal system in your community under the MZCH programme compared to its (MZCH) pre-launch period?						
More effective than before	11	13.10	9	12.00	5	11.63
Same as before	59	70.23	27	36.00	23	53.49
Less effective than before	2	2.38	13	17.33	3	6.97
Do not know	4	4.77	7	9.34	12	27.91
Not sure	8	9.52	19	25.33	0	0.00
4.7.3 About the MZCH programme, what is your opinion about it (MZCH Campaign) as a SWM enhancement system in your community? (%)						
It is an event	26	30.95	27	36.00	18	41.86
It is a habit	6	7.15	8	10.67	5	11.63
It does not exist	39	46.42	30	40.00	19	44.18
It is too new a concept, so no comment	9	10.72	1	1.33	1	2.33
Indifferent	4	4.76	9	12.00	0	0.00

(Source: Field data, 2013).

The respondents were asked to give their opinion on the ongoing MZCH campaign hosted by the MLGH. On the question about how effective the campaign was, overall, 82.7% (167) of all the

survey respondents believed that the campaign's outcome ranged from being ineffective to being fairly effective. This leaves a meagre 17.3% (35) of the respondents who perceived the programme as having been effective to very effective. Asked for the reasons for the failure or challenges of the campaign, their responses can be divided into the following five broad categories in order of ranks from first [major challenge] to fifth [least challenge] (Table 4.7.4).

Table 4.7.4: Perceived major challenges to the MZCH campaign

Malota	Dambwa North	CBD Area
(i) Less information about it (MZCH campaign), as such most of the local community members are unaware of it.	Less information about it (MZCH) campaign), as such most of the local community members are unaware of it.	Lack of communal collection points and bins
(ii) Nobody cares because there are more other pressing issues in community like water and poverty	Long distance to dumpsite	Less information about it (MZCH campaign), as such most of the community members are unaware of it
(iii) Unavailability of garbage bins due to high cost as most people here are unemployed.	Lack of communal collection points and bins	Unavailability of bins due to high cost as most people here are unemployed
(iv) Lack of communal collection points and bins	Local council authorities decide what to do without us	Local council authorities decide what to do without us
(v) Long distance to dumpsite.	High illiteracy levels among community members, waste not regarded a problem	Long distance to dumpsite

(Source: Field data, 2013).

4.8: Demographic Characteristics and DSWM Perceptions

One of the specific objectives of this study was to analyse how the public views the current status of the DSW regarding collection and disposal in light of the MZCH campaign in the respective study areas in the city of Livingstone. In this regard, one research question was; 'Do people from low, middle, and high socioeconomic status households have different mean perception scores on the effectiveness of the MZCH programme as a DSWM intervention in the city of Livingstone? Therefore, to analyse this objective and the subsequent research question, demographic characteristics of the survey sample were used, as indicators of DSWM concerns, to define and categorise the households into the three socioeconomic statuses. Despite the mixed results and arguably a weak technique, using demographic characteristics as a predictor of DSWM perception is a popular tool for consumer and/or socioeconomic profiling because demographic information is relatively easy to obtain (Diamantopoulos et al., 2003). Furthermore,

the technique is considered an easy method to identify market and/or social status segmentation (Straughan and Roberts, 1999). Eight demographic variables to which MANOVA was applied are; sex (gender), age (generation), education, monthly income, residence class, employment, marital status and position in family.

A one-way between-groups MANOVA was performed to examine public perception differences of the MZCH campaign's effectiveness in enhancing DSWM in the city of Livingstone by demographic (socioeconomic status) variables. The three (3) dependent variables were perceived public; awareness, participation and effectiveness of the MZCH campaign as an enhancement for waste collection and appropriate disposal. The independent variables used were the eight (8) demographic factors namely; sex (gender), age (generation), education, monthly income, residence classification, and employment status. Others were position in family and marital status. Preliminary assumption testing was conducted to check for: (1) sample size, (2) normality (the test check yielded a Mahalanobis distance value of 10.22, which was less than the critical value of 16.27), (3) linearity, (4) univariate and multivariate outliers (found no Mah_1 or case value larger than the critical value of 16.27), (5) homogeneity of variance-covariance matrices (Box's Test Sig. values of 0.692, 0.360, 0.774, 0.198, 0.694, 0.172 and 0.450 for the independent variables, of which all were greater than 0.001) and (6) multicollinearity. Following the preliminary assumptions testing, clearly no serious violations were noted.

Results (as presented in Table 4.8) show that only two independent variables (monthly income and residence classification) reached statistical significant multivariate differences ($p \leq 0.05$). Specifically, the monthly income variable showed multivariate statistical significant difference on the combined dependent variables (perceived awareness, perceived public participation and perceived effectiveness) of the system: F (6, 376) = 3.55, p=0.002; Wilks' Lambda (λ) = 0.89; partial eta squared = 0.054. However, when the results for the dependent variables were considered separately using a Bonferroni adjusted alpha (p) level of 0.017 (i.e. original alpha level of 0.05 divided by 3 – the number of dependent variables), only two differences reached statistical significance. One such dependent variable that was significant was perceived awareness: F (2, 190) = 4.29, p = 0.15, partial eta squared= 0.043; and the other was perceived

public participation: F (2, 190) = 4.34, p = 0.014, partial eta squared= 0.044. These effect sizes (partial eta 0.043 and partial eta squared = 0.044) for the two significant independent variables only accounted for 4.3 percent and 4.4 percent, respectively, of the variation in the respective dependent variables. According to generally accepted criteria, both cases are considered quite small effects (Cohen, 1988).

Similarly, the residence classification (low, middle and high density) variable showed a multivariate statistical significant difference on the combined dependent variables (perceived awareness, perceived public participation and perceived effectiveness): F (6,392) = 2.09, p=0.05; Wilks' Lambda (λ) = 0.94; partial eta squared = 0.031. Nonetheless, when the results for the dependent variables were considered separately, no difference reached statistical significance, using a Bonferroni adjusted alpha (p) level of 0.017.

It is worth noting that no follow-up analyses (post-hoc tests) were conducted to identify where the significant differences (i.e. is Group 1 different from Group 2?; is Group 2 different from Group 3? etc.) lied considering that in both statistically significant cases, the independent variables had three levels.

Table 4.8: MANOVA Results by demographic (Independent) variables

Independent Variables	Wilks' Lambda (λ)	*F* value[a]	*P* value	Partial Eta Squared
1. Gender/Sex (df=1)	0.99	0.43	0.73	0.007
2. Age/Generation (df = 2)	0.97	1.04	0.40	0.016
3. Marital Status (df = 1)	0.99	0.14	0.94	0.002
4. Education (df = 2)	0.95	0.69	0.22	0.025
5. Monthly Income (df = 2)	0.89	3.55	0.00	0.054
6. Residence Classification (df = 2)	0.94	2.09	0.05	0.031
7. Employment (df = 1)	0.98	1.35	0.26	0.020
8. Position in Family (df = 2)	0.98	0.61	0.73	0.009

(*Source: Field data, 2013).* *Note: $p \leq 0.05$*

4.9 The public's perceptions about the socio-economic and ecological affects of the MZCH Programme

The provision of waste collection, transfer and appropriate disposal services by the local community can have a substantial impact on the local environment. It can, for instance, improve the community appearance, increase the value of personal property and improve the health and wellbeing of residents (community). Results from the survey questionnaire on perceptions of the community about socioeconomic and ecological affects revealed the following.

Approximately, 48.8% (41) of the respondents in Malota were of the view that since the launch of the MZCH campaign, the programme's waste collection system had only a very low (0-20%) to low (21-40%) positive effect on their health. Notably, about 35.7% (30) indicated though that the campaign had a much (61-80%) to very much (81 -100%) positive effect on their health (Table 4.9). Information supplied by a former RDC member, nonetheless, suggested that people in this residential area believed that because of lack of irregular collection of waste from the two communal collection points, namely, Dump 2 (Figure 1.1) in the extreme north-west of Malota and dump 3 (Figure 1.1) the extreme south of Malota by the city council, their health was not assured. This was despite their (residents') efforts not to litter within their yards. Arguably, the positive impact is difficult in this respect to solely and directly apportion to the launch of the campaign. Interestingly, about 49.3% (37) of respondents in Dambwa North felt that the campaign had a lesser impact (reported positive effect ranged from very low to low) on their health. This was similar to their perception of the programme (44% or 33 respondents) having had a much, to very much positive effect on the respondents' health (Table 4.9). Similarly, in the low density residential North-West of the city's CBD, 48.8 % (21) of the respondents indicated that the campaign had a low to very low effect on their health (Table 4.9).

Apparently, the campaign was perceived to have had little impact on the community's aesthetics (or environmental health or appearance) generally. Albeit many residents, however, notably having had a waste management system where they took waste to communal collection points, approximately, 44.0% (37) of the respondents in Malota said the campaign had a very low to low effect on their environmental health (Table 4.9). This was, as observed from information obtained through the interview conducted by the researcher with a former RDC member,

attributed mainly to the failure by the city council authorities to regularly collect waste from the two communal collection points for disposal to the city's only designated dump site (dump 1 on Figure 1.1). This was viewed to have resulted, more often than not, in some of the waste, especially of the leafy, plastic and paper bags type, flying around the community making the surroundings littered again and thus making them unsightly. Nonetheless, approximately 20.2% (17) and 35.7% (30) respondents said the programme had a moderate (41-60%), and a much (61-80%) to very much (81-100%), respectively, positive impact on the environmental appearance, respectively (Table 4.7). The situation was not very different from those respondents from Dambwa North residential area. About 48.0% (36), 10.7% (8) and 41.3% (31) of the participants felt the programme had only an up to 40%, 41-60%, and more than 60% positive impact on the aesthetics, respectively. Similarly, almost 46.5% (20), 16.3% (7) and 37.2 (16) of respondents in the low density residential area North-West of the city's CBD viewed the MZCH programme's effect on their surroundings as being of less impact of up to 40% (low to very low), between 41 and 60% (moderate), and more than 60% (much to very much), respectively (Table 4.9).

The campaign's overall positive effect on the state of sewer lines and/or drains was perceived almost in the same way by respondents across all residential areas surveyed. Approximately 48.8% (41), 21.4% (18) and 29.8% (25) of the respondents in Malota were of the opinion that the campaign had a very low to low (up to 40%), moderate (41-60%) and much, to very much (61-100%) positive effects on community's sewer lines and/or drains, respectively. On the same issue in Dambwa North, about 66.7% (50), 5.3% (4) and 41.3% (31) of the respondents said the MZCH campaign's impact was perceived as being very low to low, moderate, and much to very much, respectively. Similarly, 46.5% (20), 2.3% (1) and 37.2% (16) respondents in the low density residential area North-West of the city's CBD viewed the programme's impact on sewer lines and/or drains as being very low to low, moderate and much to very much, respectively. The meaning of such a perception generally may be summarised as a less positive effect. Information as provided by former RDC members from the three surveyed communities suggest that the challenges of blocked sewer lines and clogged drains were still a common feature in localities. This means that in spite of the ongoing MZCH campaign, garbage remains a problem. A summary of the perceived positive effect of the programme is presented in Table 4.9.

Regarding odours that result from the presence of uncared for waste, about 59.5% (50), 61.3% (46), 67.8% (27) of the respondents in Malota, Dambwa North, and low density residential area North-West of the CBD, respectively, viewed the campaign as having a very low to low positive effect (Table 4.9). This implies that the waste remains a challenge in all the communities.

Although the study did not include an item that would enable the results to directly relate the occurrence of diseases such as malaria and cholera to the presence of waste, some respondents added during the course of the interview, their opinion on whether or not the campaign had a positive effect on disease outbreaks. In this regard, majority of the respondents (60.7% or 51 participants) in Malota felt the campaign had a very low (0-20%) to low (21-40) impact. The situation was not different from those participants from Dambwa North and the low density residential area North-West of the city's CBD where about 64.0% (48) and 62.8% (27) respondents, respectively, indicated that the programme had a very low to low effect. Table 4.9 illustrates the summarised statistics on community perceptions on this matter.

When asked about what the respondents thought was the positive effect of the campaign on household expenditure, the majority of the respondents indicated that the launch of the MZCH campaign had a very low to low (up to 40%) impact (Table 4.8). This was assessed on the basis of whether or not time dedicated previously to managing waste (e.g. sweeping, collecting, transferring waste from their households) had reduced, which time if 'freed' would afford residents chances to embark on other economic activities. Equally important, this aspect was analysed in terms of the cost associated with DSWM when transferring waste to communal collection points or dump sites, unblocking of sewer lines, among other concerns. What was clear, from the respondents in this area was the fact that not much positive return or effect from the campaign was realised. In this vein, 54.8% (46) of respondents in Malota felt the programme had a very low to low positive effect on family income and expenses. Similarly, approximately 73.4% (55) and 69.7% (30) respondents in Dambwa North and the low density residential area North-West of the city's CBD were of the same view as those from Malota (Table 4.9).

Table 4.9 Community perceptions about socioeconomic and ecological affects of the MZCH Campaign

To what extent (%) do you think the introduction of the MZCH Campaign in your community positively affects the following issues?

	Malota					Dambwa North					CBD Area				
	n= 84					*n*=75					*n*=43				
	≤20	21-40	41-60	61-80	≥81	≤20	21-40	41-60	61-80	≥81	≤20	21-40	41-60	61-80	≥81
Public health	26.2	22.6	15.5	16.7	19.0	26.7	22.7	6.7	17.3	26.6	41.9	6.9	6.9	9.4	34.9
Aesthetics/ Environmental health	27.4	16.7	20.2	23.8	11.9	30.7	17.3	10.7	22.7	18.7	44.2	2.3	16.3	7.0	30.2
Sewer lines/drains	26.2	22.6	21.4	8.4	21.4	28..0	37.3	5.3	10.7	18.7	39.5	25.6	11.6	4.7	18.6
Odours	28.6	30.9	14.3	7.1	19.1	29.3	32.0	9.3	12.1	17.3	41.8	20.9	4.7	7.0	25.6
Disease outbreaks	26.2	34.5	26.2	4.8	8.3	28.0	36.0	10.7	5.3	20.0	39.5	23.3	11.6	7.0	18.6
Family expenses	42.9	11.9	25.0	13.1	7.1	61.4	12.0	10.6	8.0	8.0	58.1	11.6	9.3	11.6	9.3

(Source: Filed data, 2013).

4.10 Public perceptions of what constitutes common DSW types

The changing economic trends and rapid urbanisation complicate SWM in developing countries. Consequently, solid waste is not only increasing in quantity but also changing in composition from less organic to more paper, packing waste, plastics, glass, metal wastes among other waste, a fact leading to the low collection rates (Bartone and Bernstein, 1993). The results of this study indicate that in the city of Livingstone, Zambia, the composition of waste is perceived slightly different in each of the three socioeconomic residential areas surveyed (Table 4.10). One common waste material found in most of city's communities was plastic paper. In Malota, a whopping 91.7% (77) ranked plastic paper as the most common DSW type. Similarly, 97.3% (73) and 90.7% (43) in Dambwa North and the low density residential area North- West of the city's CBD ranked plastic paper as the most common waste material in their localities, respectively. Both plastic and glass bottles, ranked second among the respondents surveyed in Malota. In this regard, approximately 67.9% (57) participants indicated that this type of waste was common in this high density residential area. In contrast, though, glass ranked second among the individuals surveyed in Dambwa North and the low density residence North-West of the city's CBD, where about 57.3% (43) and 53.5% (23), respectively said glass was perceived

as such.

Ironically, about 47.6% (40) of the participants in Malota felt organic waste in form of food remains and vegetative materials ranked third as common DSW types, while respondents in Dambwa North and the low density residential area North-West of the city's CBD ranked the same as the fifth dominant types within their localities (Table 4.10). However, approximately 52.0% (39) and 48.8% (21) respondents from Dambwa North and the low density residential area North-West of the city's CBD, respectively believed that plastic and glass bottles ranked third as most common DSW. Ranked as fourth most common waste type in Malota were human excreta as highlighted by about 42.9% (36) respondents surveyed? In sharp contrast, however, both groups of respondents in the middle and low density areas viewed cans as fourth most common waste type found in their localities. Approximately, 48.8% respondents in both Dambwa North and the low density residential areas North-West of the city's CBD listed cans as most common waste type. Ranked fifth by about 28.6% (24) of the respondents in Malota were all sorts of cans.

Table 4.10 Perceived most common waste types – ranked (%) from 1 (most common) through to 5 (least common)

Malota *(n=84)*	**Dambwa North *(n=75)***	**CBD Area *(n=43)***
1. Plastic & paper (91.7%)	plastic & paper (97.3%)	plastic & paper (90.7%)
2. Glass & plastic bottles (67.9%)	glass (57.3%)	glass (53.5%)
3. Organic waste [food & vegetative] (47.6%)	glass & plastic bottles (52.0%)	glass & plastic bottles (48.8%)
4. Human excreta (42.9%)	cans (48.0%)	cans (48.6%)
5. Cans (28.6%)	organic waste [food & vegetative] (34.7%)	organic waste [food & vegetative] (20.9%)

(Source: Field data, 2013).

A host of other waste types were listed also by surveyed respondents but this study was limited to discussing only those ranked between first and fifth in importance. Such waste types in the minority included (not in any order) scrap metal, hospital waste, pesticides and paints, wood shavings and textile materials.

4.11 Public perceptions about more effective (preferred) DSWM Strategies

One of the study objectives involved establishing what the public perceived as the more effective DSWM strategies. In this regard, when asked about their opinions about the preferences on interventions, the respondents highlighted the following, ranking the perceived effective strategies in order of importance. Clearly, although respondents from the three surveyed communities perceived prioritised DSWM interventions differently, their differences were not strikingly marked.

In Malota, out of 84 respondents:

(i) A total of 59.5% respondents perceived the idea where the city council authorities collected and transported waste from households to the designated dumpsite as the most effective;

(ii) Fifty two point three percent of the respondents believed that the local community members should decide DSWM strategies together with the local council authorities, if DSWM interventions should be effective;

(iii) Next in the order of the perceived more effective interventions, was that of controlled dumping of waste where the city council provides communal collection points in the residential area. This was indicated by 48.8% (41) of the respondents;

(iv) Jointly, 35.7% of the respondents ranked controlled dumping of waste (no land filling or burying within the yards) and community members having to pay for a collection to a service provider like they did with water and electricity as a more effective strategy;

(iv) Thirty one percent of the respondents said formation of community based organisations (CBOs) should sensitise community members on the value of waste free localities, as one of the more effective strategies.

On the other hand, out of 75 respondents in Dambwa North:

(i) Seventy four percent (54) of the respondents felt that the most effective way of managing DSW was having the city council authorities collecting and transporting waste from community households to the designated dumpsite of the city;

(ii) Sixty one point three percent of the respondents ranked the strategy where there would be 'controlled dumping of waste by the city council authorities provided communal collection points' in the strategic areas of all residential areas as the second most effective.

(iii) Controlled dumping of waste where households do not land fill or bury waste within the yards, was ranked third most effective intervention by 50.7% of the respondents.

(iv) A total of 45.3% respondents said the introduction and implementation of extended producer responsibility was the way to effectively manage DSW;

(iv) Ranked as the fifth most effective strategy was having the community members paying for the collection service to service provider like they did with water and electricity.

As noted, a total of 43 participants in the low density residential area North-West of the city's CBD gave their opinions about what they thought were the most effective DSWM strategies. Ranked in order of importance, the following pattern was observed.

(i) Like in the other two surveyed communities, the majority of the respondents (72.1% or 31 respondents) indicated that the most effective strategy was having the 'city council authorities to collect and transport waste from households to the designated dumpsite'.

(ii) Interestingly, a substantial number of participants (48.8%) perceived the idea of

community members paying for the collection service like they did with water and electricity as the second most effective approach to DSWM;

(iii) A total of 44.2% participants said controlled dumping of waste where the city council provided communal collection points as the third most effective DSWM strategy;

(iv) Furthermore, 39.5% listed the approaches where the local community members made decisions on DSWM together with local council authority by forming community based organisations (CBOs) to sensitise community members on the value of waste free localities as some of the effective ways of managing waste.

CHAPTER FIVE

DISCUSSION

5.1 Overview

The main aim of this study was to analyse public perceptions of DSWM by evaluating the MZCH programme in Livingstone. This chapter therefore is designed to provide further insight on the important results of this study as they relate to the findings of the existing literature as outlined in Chapter two (2.0). First, the public perceptions of DSWM in terms of current practices pertaining to the effectiveness of MZCH campaign are discussed and compared to the previous relevant literature. This includes a discussion of demographic factors as they relate to public perceptions of the ongoing MZCH campaign. Second, findings on the public perceptions of what constitutes common DSW types are compared to previous research in the area of the study subject. Third, this study discusses socioeconomic and ecological affects of the MZCH campaign from the local community's perspectives. Lastly, local community's preferred DSWM strategies study findings are compared and contrasted with previous literature. In all the above cases, inferences and/or implications of this study's findings are simultaneously made.

5.2 Public Perceptions of the Importance, Practices, Awareness, Participation in, and Outcomes of, the DSWM system

The first research point that guided this study was whether a gap existed between the overall current DSWM practices and the public perceptions of the degree of effectiveness of the MZCH campaign. Foremost, findings of this study revealed that the majority (70.8%) of all the respondents viewed the problem of waste as an important concern in the city of Livingstone. This was in relation to other community problems such as water supply, erratic electricity supply, bad roads and sanitary conditions that may influence, directly or otherwise, one's perception and attitude towards waste management. About the current recognisable collection system, the majority of the respondents in the high and medium density residential areas generally said there was no officially recognisable waste management system.

Regarding why respondents felt there was no recognisable collection system; most (over 90%) of

all the respondents of this study cited the reason that the local city council authority was not collecting waste from residential communities. According to the interview with the Livingstone city council's SW manager, the manager who confirmed that the city council had not been collecting waste from residential areas said the reasons for the non-collection of waste from residential areas were due to the city council's lack of capacity in terms of finances and transport facilities. In this regard, in a similar manner, past research in India and Kenya suggest that historically, the public held the view that the concerns in SWM were viewed as a sole responsibility of local authorities (Baud et al., 2002). This situation is also similar to the findings of Edema et al., (2012)'s study in the city of Ndola, Zambia, where it was found that the majority (76%) of the respondents also felt that waste collection and disposal was the sole responsibility of the government (city council), which unfortunately, was largely incapacitated in terms of finances, skilled manpower and transport logistics. This was owed mainly to the collapse of most companies and the subsequent reduction in revenue base of the city. Edema et al., (2012), particularly point out that the SW collection system in Ndola completely collapsed in 2000 because the Zambia Consolidated Copper Mines (ZCCM) that also ran a vibrant DSWM system was privatised. Similarly, a previous study carried out in Hanoi, Vietnam by Richardson (2003), where it was found that local authorities faced inadequacies in labour force, finances and other logistics, attest to this.

However, the difficulty of accessing the designated dump site, now that this study indicates that the city council did not provide the collection service to households, was one of the other major reasons for the perceived absence of a recognisable collection system at household level. This compares well with the research by Omran and Gebril (2011) in Perak state of Malaysia who found that more than 52% of the respondents complained that a waste facility could not be easily accessed; therefore, undoubtedly the householders were discouraged to engage in meaningful DSWM. In the same vein, Adenso-Díaz (2005), concluded that distance and access to the bins is obviously an incentive to waste management. Consequently, findings of this study show that burying, burning and dumping within the respondents' yards were the most prominent ways of disposing waste in all communities surveyed. This result is similar to that of UN-Habitat (2009)'s study which revealed that waste in residential areas of Livingstone is either disposed of

in backyard pits or dumped in open spaces. What was peculiar about the high density community (Malota) was a popular method that involved residents taking the DSW to communal collection points. This may be owed mainly to the limited space within their household yards where they could position pits for waste disposal. As such, most residents are, it may be suspected, were compelled to transfer the waste generated from their households to the nearest communal collection point.

Regarding receptacles commonly used, this study indicates that there is an assortment of improvised waste receptacles as perceived by most participants in this survey. Major among them were; plastic bags and carton boxes, in all the three localities of the city surveyed. Interestingly, in the high density residential area (Malota), the majority of the respondents, however, said most of the community members used empty (and often used) maize meal (25kg) sacks as receptacles. This may be explained in terms of the need by most households in this locality having had to store their waste while awaiting the eventual transfer of waste to the relatively distant communal collection points. A study by Manyanhaire et al., (2009), in Mutare, Zimbabwe, revealed a largely similar picture where they found that residents used different types of waste receptacles, which were either formal or informal such as; hard plastic bins which were used by 60% of the residents, 17% used sacks, nine percent cardboard boxes, four percent metal bins and one percent bulk containers.

With regard to the public's perceived awareness of the campaign; overall a substantial number of respondents believed that they had heard about the MZCH campaign. The perceived public awareness of the campaign varied among the three localities, nonetheless. It was comparatively lowest among the high density residents and highest among the low density community members. Ironically, in terms of those respondents who felt they were well-informed about the campaign, the percentage was highest among respondents from the high density residence (Malota); supposedly because often commemorations of the programme were conducted in or near such localities. However, results of this study show that overall; only a few community members thought they were very well informed about the campaign.

About the perceived public's participation in decision making of the programme, even though

results of this study show that there is not too much degree of differences in responses among all respondents in the three communities; unfortunately, the majority of the respondents felt their spirit of participation only ranged from very low (0-20%) to average (41-60%). Evidently, this study reveals that most of the participants indicated that local community members had never attended meetings in their communities that addressed DSWM issues. This (not holding meetings) may justify further the result that there was not much participation in DSWM decision making processes by the local community members. This result is comparable with the findings of Nchito and Myers (2004)'s study in Ng'ombe and Kamanga high density residential areas in Lusaka where; they concluded that despite attempts in recent times not to force projects on communities, it seemed that some prioritised issues are those of instigators and not totally of the community. The same can be said about the research in Malaysia by Omran and Gebril (2011), who indicated that despite the efforts, little has been achieved due to the lack of participation from the households. Nonetheless, the majority of the respondents strongly agreed that by working together with the city council authorities, community members could positively influence decisions about waste collection and disposal. In the same vein, in a study in Hanoi, Richardson (2003), stated that, the local communities once given the opportunity to make decisions and being stakeholders to developmental strategies, they are capable of engaging in adequate waste management.

Further, pertaining to how effective the campaign was perceived, overall 82.7% (167) of the respondents believed that the campaign's outcome ranged from being ineffective to being fairly effective. Perceived major challenges mentioned included, foremost, less information about the MZCH campaign. This was elected by the majority of the respondents from the low and medium density residential areas. Similarly, according to the study by Rahardyan et al., (2004), it was observed that the citizen's perceptions and attitudes depend on the knowledge they had about a facility. Important also was the lack of communal collection points and bins as was perceived by most of the respondents from the low density residential area surveyed. Others were; apparent long distances to the designated dump sites; and nobody cared because there were more other pressing issues in the community like water and poverty, local council authorities having had decided without community members' inputs; and high illiteracy levels for most respondents.

Despite this study's finding of lack of communal collection points and bins in the surveyed localities in the city of Livingstone, elsewhere, Lima (1996), argued that the benefit a facility (in this case, a dumpsite or collection point) may bring to local residents is influencing public perceptions and attitudes of a DSWM system. In this vein, Adenso-Díaz (2005), commented that when citizens who are environmentally concerned have, for example, bins (or dumpsites/collection points) near to their homes, they appear to be willing to engage in DSWM than when they have to walk for a longer time to drop off the waste at dump facility, due also to the inconvenience of carrying the large volumes that this type of waste usually occupies.

Similarly, results from the MANOVA show that only two (out of eight) independent variables, namely; monthly income: $F\ (6, 376) = 3.55,\ p=0.002;\ \lambda = 0.89;$ partial eta squared = $0.054,$ and residence classification: $F\ (6, 392) = 2.09,\ p=0.05;\ \lambda = 0.94$; partial eta squared = 0.031, reached statistical significant multivariate differences at $p \leq 0.05$. This translates into very little variance in the public perceptions between respondents from the different socioeconomic status households on the effectiveness of the campaign. This result further justifies the overall perceived ineffectiveness of campaign. However, according to the research by Longe et al., (2009), in Lagos State, Nigeria, this perception is stronger among the low income socioeconomic group. Although, public perceptions of DSWM in Livingstone, according to this study, suggestively are not influenced by the public demographic factors; however, it should not be outrightly said that these factors are invalid to examine the public perceptions. This study infers, however, that if the demographic factors are used in combination with other circumstances (although out of the scope of this study); the results may be more consistent and significant.

Although, the overall public perception about the importance of waste was substantially similar across the three surveyed areas, perceptions of current DSWM practices largely varied, nonetheless. Therefore, it can be deduced that there was a gap between perceived importance of current waste management practices, and MZCH campaign goals and implementation approaches. Similarly, in a study by Omran and Gebril (2011), in Malaysia on household attitudes towards recycling of solid waste campaign, 90% of the respondents indicated that the campaign had failed due to non-participation of local community members. In the context of the

anomie theory, as aptly put by Longe et al., (2009), which explains that deviance can arise by accepting culturally determined goals without the acceptability of cultural means, the public may have accepted the MZCH intervention but did not participate in it fully or totally rejected its design and implementation strategies, thus spelling failure of the campaign.

5.3 Perceived composition of major waste types

The second objective that this study sought to analyse was ascertaining what constitutes the most common DSW types as perceived by the local people. Arguably, the changing economic trends and rapid urbanisation complicate SWM in most urban areas of Zambia. Consequently, SW is not only increasing in quantity but also changing in composition. The findings of this study indicate that although the composition of waste is perceived slightly different in each of the three socioeconomic (and/or residential) areas surveyed, nevertheless, plastic and paper, were collectively perceived to be the most common nuisances in all the communities surveyed. Others, in order of importance were; glass (assorted) and cans. However, there is an apparent variation in perceptions of the local community across the three surveyed localities regarding food remains and vegetative matter. These types of waste were collectively perceived to have been the third ranking in importance by respondents from the high density residential area (Malota), while the same were least ranked in the medium and low density residential areas. This variation may be accounted for by differences in 'economies of scales', population densities, life styles and attitudes as was asserted by Mukuka and Masiye (2002). Although not clearly so from the findings of this study, often, it is assumed that the majority of the people from the low and medium density residential areas were more 'educated' (of higher literacy levels) and therefore presumably understood the budgeting concepts at household levels more than most of their counterparts in the high density localities. Hence, expectedly, high density residential community members may have tended to be more 'generous' and wasteful than those from the medium and low density areas.

Although similar to the research findings by Manyanhaire et al., (2009), in Mutare, Zimbabwe, where they found 47% (plastic and paper) and 32% (food residue), most recent findings elsewhere are however notably different compared with the findings of this study. For example,

Edema et al., (2012), suggest that most of the waste found in Ndola city, Zambia, comprised food waste (50% of household waste in low density areas and 45% in medium density areas), while paper was among the least. Similarly, it was 72% (food remains) and 17% (plastic and paper) in Chirundu (Mausundire and Sanyanda, 1999); 40.4% (putrescibles) and 15.8% (plastic and paper) in Lusaka (Hampwaye, 2007); and 15.62% (vegetables); and 5.0% (plastic and paper) in low income cities of India (Bhatia, 2003). These differences however, may be due to the fact that most of these recent research findings are those of MSW aggregately and not particularly household (DSW) waste type except for the Ndola city case study.

Worth noting also is the finding that one perceived common waste type peculiar to the high density residence (Malota) is human excreta. Although only ranked fourth by respondents in this locality, it cannot be ignored as it may be an indication of inadequate sanitary facilities such as toilets in this community.

Overall, perceptions regarding what constituted most common waste types show some notable degree of variations among the three (high, medium and low density) communities surveyed. This may generally be a result of slight differences in life styles of the residents of the three localities as explained by Merton (1968)'s Anomie theory. In light of Anomie theory Agbola (1993) states that the relationship between humans and the environment is a function of, among other things, the level of society's technological development, the perceived magnitude of existing environmental problems and the level of education.

5.4 Public Perceptions about Socioeconomic and Ecological Effects of the MZCH Campaign

Another objective that guided this survey was to assess the socioeconomic and environmental (ecological) effects of the current MZCH campaign from the point of view of residents. On the same, overall, results from this survey revealed that the campaign generally had a low (0-20%) positive effect on all the aspects assessed. Areas measured were: public health, aesthetics, sewer lines and other drains, odours, disease outbreaks and household income and/or expenses.

Clearly, a minimum of 48.0% of the respondents across the three surveyed areas, namely the low, medium and high density localities felt the MZCH campaign had a low positive impact on

the health of the public. Similarly, regarding the community appearance, between 44.0% and 46.5% of the respondents in all the three surveyed areas thought the campaign had a low positive impact. This may be as a result of the substantial waste amounts that were mainly uncollected that made the community to largely remain unsightly. The situation was no better regarding issues of sewer lines and other drains; odours; disease outbreaks such as Malaria, and the households' expenditure on efforts of managing the waste and related issues. Literally, this low public perception on the positive impact of the campaign on the preceding community issues implies that: sewer lines and other drains were still facing the challenge of regular clogging; bad smells, and disease outbreaks resulting from large amounts of uncollected waste, remained a serious threat like before.

Similarly, results of this study imply that there is no significant reduction on how much households expend on DSWM. In this vein, slightly more than 50.0% of the respondents aggregately felt that the positive effect was low (between 0 and 20%). In contrast, although with slight variations among the communities surveyed, results of a study carried out in Hanoi, Vietnam; by Richardson (2003) on effects of a SWM system on socioeconomic and environmental issues reveal some notable perceived general positive impact of the system on most of the issues. For example, 35% of the respondents felt the system had substantially improved their health; notably 28% of the respondents felt community appearance had been improved by more than 75%; between 30-50% of the respondents did say that they thought that there had been a slight reduction in the cost associated with painting their steps, sweeping their steps or the street in front of the houses of respondents; indirectly, perhaps a positive economic return from the waste collection system (Richardson, 2003).

The overall implication of the findings of this study of largely perceived low positive effect of the MZCH campaign on all socioeconomic and ecological issues analysed in Livingstone is that the campaign was largely ineffective and therefore was to a large extent unsuccessful. Hence, the need for more participatory strategies in the planning stages of such future programmes, as demanded by the governance concept that seeks transparency of decision-making processes and responsibility of the relevant actors. In this vein, efficient governance appears to be a function of

the reduction of state domination and the growth of vibrant spaces that constitute a crucial sign of political engagement (Devas, 1999).

5.5 Perceived Community Preferred more Effective Strategies

The final study objective involved finding out what the local communities' preferred effective DSWM strategies were. Although respondents from across the three surveyed communities perceived prioritised DSWM interventions differently, their differences were not strikingly marked, nonetheless. In this respect, overwhelmingly, most of the respondents across the three surveyed localities ranked the strategy where the local council authorities collected and transferred the waste from households to the designated dumpsite as the most important approach. This was seen as the most effective collection system for refuse in the city. In tandem with results of a study by Edema et al., (2012) in the city of Ndola, until the late 1990s, solid waste was collected from residential areas at no cost to households by local authorities in the city. Similarly, other past studies suggest that the public expect to be able to produce household waste in a largely controlled manner and are accustomed to an efficient local service of removal (Hester and Harrison, 2002).

On the other hand, a small number of respondents indicated willingness to pay for the service. Evidently, albeit this strategy having been viewed as the second most important by respondents from the low density locality (area North-West of the CBD), sadly, the same was only ranked 4th and 5th most important strategy by respondents from the high (Malota) and medium (Dambwa North) density residences, respectively. This may infer that unless the city council authorities were sufficiently funded in this regard and hence showed practical and consistent commitment to providing this service, the implementation of the same may be futile as most residents may not co-operate. However, according to the SW manager of the Livingstone City council, this strategy (collecting waste from all localities of the city at a fee) was envisaged to begin in earnest by the end June 2013. On the same, the SW Manager said that the city council authority was anticipating receiving from the central government ten refuse collection trucks to help implement this strategy. The manager, however, indicated that specific service charges (fees) were, at the

time of the interview with the researcher, not yet finalised although the SW manager indicated that there was a likelihood of discriminating the same among the different residential areas based on perceived differences in income.

Other perceived important strategies are: ranking second in the high and medium density residential areas were issues of controlled dumping pertaining to the council expected to place waste collection bins at strategic points within the communities; ranked third by respondents from the medium and low density residential areas was the issue of community members needing to participate in decision-making, whereas the same was ranked as the fourth most effective approach by respondents from the high density residential area. This strategy (all inclusive decision-making) was envisaged to include the formation of Community Based Organisations (CBOs) that could be charged with the responsibility of sensitising the community populace. This result is similar to those of other studies in Madras, India; and Hanoi, Vietnam; where it was found that the solution to MSW lied in the participation of the local people who generated the waste (McDougall et al., 2001; Richardson, 2003). Although the introduction of the extended producer responsibility was identified only by respondents from the medium density residential area and that in this area, it was merely ranked fourth most effective strategy, its significance should, in the view of the author, not be underestimated considering that most of the generation rate of waste in the city outpaces the local city council's capacity to collect and dispose all the waste appropriately.

CHAPTER SIX

CONCLUSION, RECOMMENDATIONS AND STUDY LIMITATIONS

6.1 CONCLUSION

6.1.1 Overview

This section highlights the important results that this study brought to the fore.

6.1.2 Summary and Inferences

DSWM has continued to be a major challenge to most households in Livingstone city based on the findings of this study. It is evident that most households in all the three socio-economic households surveyed are of the opinion that DSWM is a very important activity. However, overall results of this study give a clear indication that the MZCH campaign spearheaded by the MLGH under the auspices of the Livingstone city council to a large extent is ineffective and unsuccessful in the city of Livingstone. It is clear from the foregoing that overall, the participants (respondents) were of the view that the programme failed to enhance DSWM in the residential areas of the city.

Even though the majority of the respondents across the three surveyed areas agreed that they had heard about the MZCH campaign; most thought, nevertheless, that it was either non-existent on the ground or was an event that was commemorated only at particular times of each year. Furthermore, many of the respondents felt their spirit of participation in the programme designing and implementation was very low. The main reasons, as indicated by results of this study, are due to less information about the campaign, lack of or inaccessibility to, the designated dump site, and lack of communal waste collection points. However, from the city council authority's perspective, as provided by the SW manager, the major reason for the failure of the campaign was as a result of transport logistical problems. Consequently, most of the respondents indicated that burying, burning and dumping anywhere within their yards were prominent ways of disposing of waste, as notably, no recognisable well organised DSWM system existed in the city's residences. Worth noting is that this study suggests that in order to attain improvement in

the designing and implementation of DSWM initiatives, authorities should take into consideration not only adherence to suggested guidelines but also the degree to which the public embrace the new initiatives. That is, the root of commitment by the community within which initiatives are to be implemented should be cultivated to realise success.

Furthermore, the result of a one-way between-groups MANOVA performed to examine if public perception differences of the MZCH campaign's effectiveness in enhancing DSWM in the city of Livingstone by demographic (socioeconomic status) variables existed, indicates that only two (monthly income and residence classification) out of eight independent variables reached statistical significant multivariate differences at $p \leq 0.05$. It can therefore be inferred that the public perceptions of the MZCH campaign are not generally determined by the demographic factors (socioeconomic status) in the city of Livingstone. This means also that there were no major differences in the public perceptions of the MZCH programme's effectiveness across respondents of different socioeconomic households in the city. The practical implication of this finding is that; regarding future waste management programmes, arguably one largely similar waste management system can be successfully designed and implemented across the city of Livingstone. About the same inference, however, slight adjustments may be adopted in various localities depending on each community's socio-economic standing. For example, as the SM manager said the city of Livingstone council authority had envisaged implementing a system of collecting waste from all or at least most of the city's localities at a fee before the end of the year 2013, where service charges would not be uniform across the city. In short, high income residents would be levied slightly more than the lower income households.

In the final analysis, in spite of the overall public perception of this study about the importance of waste having been substantially similar across the three surveyed areas, perceptions of the current DSWM practices notably varied, nonetheless. Although, only three areas of different socioeconomic (low, medium and high density) status households were surveyed; nonetheless, this study does provide a good indicator of the public perceptions of the community-based DSWM in and around the entire city of Livingstone.

Overall the findings of this study suggest that the composition of waste is perceived slightly

different in each of the three socioeconomic residences surveyed. Nevertheless, plastic and paper, are collectively perceived to be the most common waste types in all the three communities surveyed and presumably in the entire city of Livingstone. Others, in order of importance, were glass (assorted) and cans. What was strikingly important to note from the findings of this study was that there was a clear variation in public perceptions across the three surveyed localities regarding food remains and vegetative matter. This study shows that food wastes and vegetative matter were ranked more important in the high density residential area than in the medium and low density localities. This variation suggests a slight difference in the income levels, consumption patterns and life styles of the people in the three socioeconomic localities of the city. About the same waste types, another notable aspect is that other studies elsewhere show that these waste categories were ranked as the most common types.

Results of this study indicate that overall, the MZCH campaign had a low (0-20%) positive effect on all the socioeconomic and ecological aspects assessed. Areas measured were: public health, aesthetics, sewer lines and other drains, odours, disease outbreaks and household income and expenses. This implies that the campaign was largely ineffective and therefore was to a large extent unsuccessful. Specifically, it can be said that where people do not perceive the relationship between waste collection (cleaning of public space) and an improved community appearance and the local environment with subsequent health and socioeconomic benefits, they are less willing to participate in the system.

Finally, this study suggests that although most of the respondents from across the three surveyed communities perceived prioritised DSWM interventions differently, their differences were not strikingly marked. Generally, most of the respondents felt that the historical approach where the city council collected waste from local community households would be the most effective strategy of managing waste in the city. However, there were pockets of respondents who thought paying for the collection service would be a more effective strategy of DSW management in the city. Furthermore, this study indicates that the introduction of the extended producer responsibility strategy, although only elected and ranked as the fourth most effective strategy by respondents from the medium density residential area of the city, it is an important approach

especially that the local city council is evidently facing a number of challenges that include underfunding and poor transport facilities. Largely, because the MZCH programme was viewed ineffective, it can therefore be concluded that its goals are not in tandem with the local community's preferred DSWM strategies.

All in all, where institutions promote collective action and resident participation in decision making, residents are more willing to participate in the new interventions. Similarly, a lack of communication between communities and the government may influence people's perceptions of the environment and waste management as it limits the community's sense of ownership of the management system. Hence the need to look outside the box and begin to adopt new all inclusive waste management approaches in the city of Livingstone.

6.2 RECOMMENDATIONS.

Based on the findings of this study, this research seeks to make the following recommendations.

1. In order to attain improvement in the designing, implementation and effectiveness of DSWM initiatives, authorities should take into consideration, not only adherence to suggested guidelines but also the degree to which the public embrace those initiatives. The root of commitment by the community within which initiatives are to be implemented should be cultivated through information provision to the public (awareness raising) in order to realise success.

2. For the future interventions, in order to attain more effective DSWM in the city, authorities should consider promoting a recycling policy now that this study identified a large composition of recyclable materials such as paper and plastics.

3. Considering that the Livingstone city council continues to face major financial and transport logistical problems, among others, this study therefore recommends adopting a cost effective integrated approach where the 'extended producer responsibility' strategy is seriously taken on board in DSWM systems in the city. This involves authorities responsible for the generation of particular waste types being responsible for the same's

management.

6.3 STUDY LIMITATIONS AND FUTURE WORK

1. This research did not consider the role of gender, per se, on public perceptions of waste management systems. It is for this reason that this study suggests that future research work could be carried out to determine the role of gender on waste management considering that there was a clear imbalance between the number of male and female respondents in this study.

2. Considering the fact that this study only considered the DSW stream, it would be interesting to do a study in future, on the effectiveness of SWM system on MSW type in its entirety in the city.

3. This study was carried out at the time when the city was in the midst of preparing to jointly host the United Nations World Tourism Organisation (UN-WTO) conference. Therefore, the author of this report suspected that the city council authority interviewed may have had reservations in providing detailed information to the researcher. As such some of the findings from that perspective may not be very accurate.

4. This study did not take into consideration legal implications; as such future work may be undertaken in this regard.

5. Because this study was based on public perceptions, the observation method was not employed to collect data. This clearly explains the absence of pictorial records.

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Appendix I: Questionnaire (Scheduled, Structured Interview) for households and community leaders such as RDCs chairpersons

Dear respondent,

My name is Givers Chilinga. I am a Master of Science in Geography student at the University of Zambia now in part II (Research) of my study programme. I am analysing Domestic Solid Waste Management in the City of Livingstone in light of the ongoing Make Zambia Clean and Healthy campaign. The main purpose of this study is to determine whether or not the residents of the city of Livingstone perceive the campaign effective in the area of solid waste collection and disposal. I would therefore appreciate your participation and cooperation in providing me with information and data that will assist me with my study.

This study is purely for academic purposes. All of the information and data that you will give me will be for this purpose only and will be held confidential. Your anonymity will be assured. I will not refer to individuals in the research report and none of the information you will provide shall be traced back to you. Only statistical data and general information will be used to determine the general picture.

Questionnaire Serial No.: ..... (E.g. *001 to 200).*

Unless otherwise stated, please cross [X] against your choice(s) appropriately.

A. General Information (Bio-data)

1.0 (a) Sex: 1. Male ….. [ ] 2. Female ….. [ ]

(b) Age (in years – preferably 18 and above) …….

(c) Marital Status: 1. Single..... [ ] 2. Married..... [ ] 3. Separated..... [ ] 4. Divorced [ ] 5. Windowed [ ]

(d) Education: 1. None ….. [ ] 2. Primary ….. [ ] 3. Secondary ….. [ ] 4. College ….. [ ] 5. University ….. [ ]

(e) Residence (Name area of residence, e.g. Malota): ……

(f) Employment: 1. Formal….. [ ] 2. Informal ….. [ ] 3. Unemployed..... [ ]

(g) Monthly Income (Provide estimated average in case of informal):

1. below ZMW500 ….. [ ] 2. ZMW500 – ZMW2, 000 ….. [ ] 3. ZMW2, 001 – ZMW3, 500 ….. [ ] 4. ZMW3, 501 – ZMW5, 000 ….. [ ] 5. Above ZMW5, 000

(h) Position of the respondent (mark one): 1. Male head of the household… [ ] 2. Female head of household….. [ ] 3. Spouse of head of the household…. [ ] 4.Household member (18 years or older) …. [ ] 5. Leader or representative of the Resident Development Committee …. [ ]

B. Public Perceptions of the *Importance* of Domestic Solid Waste Management

2.0 Which of the following do you think is the most important problem in your community/residence? (Please rank 1st, 2nd, 3rd, 4th, and 5th).

Not enough drinking water..... [ ] Not enough toilets, drains and other sanitary services….. [ ] Too many diseases like Malaria….. [ ] High Crime rate ….. [ ] Bad Roads ….. [ ] Waste all over the place ….. [ ] Erratic electricity supply..... [ ]

3.0 Do you think domestic solid waste (DSW) collection and disposal are important issues in your community/residence?

1. Yes [ ] 2. No [ ]

4.0 If yes to 3.0 above, how do you rate the importance of the collection and disposal of solid waste from your household /establishment?

1. Like any other community issue ….. [ ] 2. Less Important ….. [ ] 3. Indifferent (average)….. [ ]
4. Important..... [ ] 5. Very important ….. [ ]

C. Public Perceptions of *Current DSWM Practices*

5.0 In your view, what is the most common waste collection system existing in your community/residence?

1. All households have their waste collected regularly by city authorities ….. [ ] 2. All households pay to private firms for their collection waste ….. [ ] 3. Not aware ….. [ ] 4. None ….. [ ] 5. Others; Specify …….....

6.0 If waste is NOT collected in your residence/community, what do you think is the main reason?

1. People around are not aware that waste is a problem ….. [ ] 2. The City council does not collect ….. [ ]
3. No one offers to collect …. [ ] 4. There are no dumping places ….. [ ] 5.Other(s), specify: .....

7.0 What do you do with your own solid waste at home? 1. Bury/dump it in pit within the yard ….. [ ] 2. Burn it within the yard ….. [ ] 3. Dump it anywhere within yard ….. [ ] 4. Take it to a communal collection point ….. [ ] 5. Compost, recycle and re-use it ….. [ ]

8.0 For how long have you been handling domestic solid waste this way (as in 7.0 above) in your community?

1. Since independence (1964) [I hear] ….. [ ] 2. Since 1980 ….. [ ] 3. Since 1990 ….. [ ] 4. Since 2000 ….. [ ] 5. since 2010 ….. [ ]

9.0 What type of receptacle does your household (or establishment) have for waste storage on your premises?

1. Metal or plastic container …. [ ] 2.Basket or carton container … [ ] 3. Bag (plastic) … [ ] 4.Other type of container (specify)..…….... 5. None … [ ]

D. Public Perceptions about *awareness* of the MZCH programme as a DSWM System

10.0 Have you heard of the Make Zambia Clean and Healthy (MZCH) campaign in your locality/residence? 1. Yes ….. [ ] 2. No ….. [ ]

11.0 If yes to 10.0 above, how *well informed* do think you are about the MZCH as a domestic solid waste management system in your community?

1. Not sure ….. [ ] 2. Less informed ….. [ ] 3. Fairly informed ….. [ ] 4. Well informed ….. [ ] 5. Very well informed ….. [ ]

E. Public Perceptions about local community members' *participation* in the MZCH programme

12.0 In your own view, how would you rate the spirit of your participation in decision-making for waste management (collection and disposal) strategies in your community today (currently or lately)?

1. Very low (0-20%) ….. [ ] 2. Low (21-40%) ….. [ ] 3. Average (41-60%) ….. [ ] 4. High (61-80%) ….. [ ] 5. Very High (81 – 100%) ….. [ ]

13.0 Do you think by working together with the city council authorities, people in your community/residence can positively influence decisions about waste collection and disposal?

1. Strongly disagree ….. [ ] 2. Disagree ….. [ ] 3. Indifferent ….. [ ] 4. Agree ….. [ ] 5. Strongly agree ….. [ ]

14.0 When there is a decision to be made pertaining to waste collection or disposal; does the entire community in your locality get called for this purpose?

1. The city council leaders decide and inform us ….. [ ] 2. The local community leader(s) seek(s) our (public) opinion then makes a decision on our behalf ….. [ ] 3. We as community members (the public) hold discussions and decide together …… [ ] 4. I do not know who decides ….. [ ] 5.Others, specify: …….....

15.0 In the past five (5) to ten (10) years, how often have you joined with others in your community to address common domestic solid waste issues such as collection and disposal?

1. Never ….. [ ] 2. Once ….. [ ] 3. A few times (2 -5 times) ….. [ ] 4. Frequently (at least 5 times) ….. [ ] 5. Very frequently (more than 15 times) ….. [ ]

F. Public Perceptions about the *Socioeconomic and Ecological Effects* of the MZCH system

16.0 To what extent (%) do you think the introduction of a solid waste management system (the MZCH programme) in your community positively affects the following?

(a) *Public health:* 1. Very Low (< 21%) ….. [ ] 2. low (21 - 40%) ….. [ ] 3. Moderate (41 - 60%) …. [ ] 4. Much (61 - 80%) ….. [ ] 5. Very much (> 80%) ….. [ ]

(b) *Aesthetic/environmental health (community's appreciation of the environmental appearance/beauty):* 1. Very Low (< 21%) ….. [ ] 2. low (21 - 40%) ….. [ ] 3. Moderate (41 - 60%) …. [ ] 4. Much (61 - 80%) ….. [ ] 5. Very much (> 80%) ….. [ ]

(c) *Sewer lines and other drains:* 1. Very Low (< 21%) ….. [ ] 2. low (21 - 40%) ….. [ ] 3. Moderate (41 - 60%) …. [ ] 4. Much (61 - 80%) ….. [ ] 5. Very much (> 80%) ….. [ ]

(d) *Odours (bad smells)*: 1. Very Low (< 21%) ….. [ ] 2. low (21 - 40%) ….. [ ] 3. Moderate (41 - 60%) …. [ ] 4. Much (61 - 80%) ….. [ ] 5. Very much (> 80%) ….. [ ]

(e) *Disease outbreaks such as malaria, and cholera:* 1. Very Low (< 21%) ….. [ ] 2. low (21 - 40%) ….. [ ] 3. Moderate (41 - 60%) …. [ ] 4. Much (61 - 80%) ….. [ ] 5. Very much (> 80%) ….. [ ]

(f) *Family (household) expenses/budgets (in Zambian Kwacha) on championing DSW issues*: 1. Very Low (< 21%) ….. [ ] 2. low (21 - 40%) ….. [ ] 3. Moderate (41 - 60%) …. [ ] 4. Much (61 - 80%) ….. [ ] 5. Very much (> 80%) ….. [ ]

G. Public Perceptions of *what constitutes DSW*

17.0 What types of DSW do you think constitute major problems in your locality/community? (Rank in order of importance: 1st, 2nd, 3rd, 4th, and 5th)

- ✓ Metal..... [ ]
- ✓ Canes..... [ ]
- ✓ Glass ….. [ ]
- ✓ Paper, plastic ….. [ ]
- ✓ Bottles (glass and plastic) ….. [ ]
- ✓ Hospital waste ….. [ ]
- ✓ Pesticides, paints ….. [ ]
- ✓ Batteries ….. [ ]
- ✓ Food/vegetative waste ….. [ ]
- ✓ Human excreta ….. [ ]
- ✓ Wood shavings …… [ ]
- ✓ Cloth rags and tailoring cuttings ….. [ ]
- ✓ Others; Specify: …… [ ]

H. Public Perceptions about the *Outcomes (i.e. effectiveness)* of the MZCH System

18.0 In your own view, how effective is the current domestic solid waste management (the MZCH campaign) system in your locality?

1. Ineffective (0-20%) ..... [ ] 2. Barely effective (21-40%) ….. [ ] 3. Fairly effective (41-60%) ….. [ ]
4. Effective (61-80%) ….. [ ] 5. Very effective (81 -100%) ….. [ ]

19.0 What is your view on the DSW collection and disposal systems in your community under the MZCH programme compared to its (MZCH) pre- launch period?

1. More effective than before [ ] 2. Same as before ….. [ ] 3. Less effective than before …. [ ] 4. Do not know ….. [ ] 5. Not sure …... [ ]

20.0 About the MZCH programme, what is your opinion about it as a SWM system in your community?

1. It is an event (i.e. observed only at certain times of the year) ….. [ ] 2. It is a habit (i.e. it is observed by all community members all year round) ….. [ ] 3. It does not exist ….. [ ] 4. It is too new a concept, so no comment ….. [ ] 5. Indifferent ….. [ ]

21.0 What do you think are the major challenges of the MZCH campaign as a DSWM system in your locality? (Rank in order of importance: 1st, 2nd, 3rd, 4th, 5th).

- ✓ Less information about it, so most local community members unaware of it [ ]
- ✓ Local city council authorities decide what to do without us [ ]
- ✓ Unavailability of garbage bins due to high cost as most people here are unemployed [ ]
- ✓ Long distance to dump sites [ ]
- ✓ Lack of communal collection points and bins [ ]
- ✓ Local city council authorities lack capacity to collect waste from communal collection points/households [ ]
- ✓ Poor/impassable roads which inhibit garbage collection by city authorities [ ]
- ✓ High illiteracy levels among community members so waste not considered a problem [ ]
- ✓ Nobody cares because there are more other pressing issues in community like water and poverty [ ]
- ✓ Other (specify): ..... [ ]

H. Public Perceptions about more *effective (preferred)* DSWM Strategies

22.0 Which options do you think are preferably more effective to solve DSWM problems in your locality? (Rank in order of importance: 1st, 2nd, 3rd, 4th and 5th

- ✓ Reduce production of waste e.g. carry one's own bag to the market and large shops like Shoprite [ ]
- ✓ Introduce and implement ***'producer (pays) responsibility'*** system [ ]
- ✓ City council authorities to collect and transport waste from households to designated dump sites [ ]
- ✓ Select collection, sorting, recycling including composting and re-use of waste at household level [ ]
- ✓ Controlled dumping of waste (no land filling or burying within yards) [ ]
- ✓ Controlled dumping of waste (city council provides communal collection points) [ ]
- ✓ Let local community members decide DSWM strategies together with local council authorities [ ]
- ✓ Community members pay for a collection service like they do with water and electricity [ ]
- ✓ Form CBOs to sensitise community members on value of waste free localities [ ]
- ✓ Others; Specify: …… [ ]

End of questionnaire. Thank you for your patience and participation

Appendix II: None Scheduled Structured Interview Guide for Ministry of Local Government and Housing senior officials at district, provincial and national levels; and Ministry of Healthy (Southern province).

My name is Givers Chilinga. I am a Master of Science in Geography student at the University of Zambia now in part II (Research) of my study programme. I am analysing Domestic Solid Waste Management in the City of Livingstone in light of the ongoing Make Zambia Clean and Healthy campaign. The main purpose of this study is to determine whether or not the residents of the city of Livingstone perceive the campaign effective in the area of solid waste collection and disposal. I would therefore appreciate your participation and cooperation in providing me with information and data that will assist me with my study.

This study is purely for academic purposes. All of the information and data that you will give me will be for this purpose only and will be held confidential. Your anonymity will be assured. I will not refer to individuals in the research report and none of the information you will provide shall be traced back to you. Only statistical data and general information will be used to determine the general picture.

1. (a) Name: …… (b) Designation: …….....
   (c) Organisation/Department ……/…….....
2. When was the Make Zambia Clean and Healthy initiated under your jurisdiction? …….....
3. What is the campaign's overall objective as regards domestic solid waste management?
   ……..……

4. Which localities (residential areas) of Livingstone city is the *make Zambia clean healthy* programme being implemented? …….....

5. What strategy or organisational structure has been adopted and/or recommended in the designing and implementing of the domestic solid waste management (MZCH) programme at community levels in the various urban areas.

   .....

6. Usually new interventions of various kinds are designed with evaluation of its effectiveness in mind. To what extent would you say that the make Zambia Clean and Healthy campaign as a domestic solid waste management programme has achieved its overall objective? …….....

7. Any areas of improvements required so far observed about the on-going SWM system in the city? …….....

8. Does the programme (MZCH) involve the local community in its designing and implementation of domestic solid waste management in residential areas? If so, how is this ensured?

   ……

9. What is your comment on the community's cooperation in the programme's implementation so far?

   …….....

10. If you rate public cooperation relatively low (not sufficient to achieve programme objective very satisfactorily), what do you as an organisation attribute this low public participation to? …….....

11. Often, many domestic solid waste interventions like the MZCH programme are usually perceived by the general public as ***events (one-off activities) that are usually imposed on the community*** and so usually terminate as soon as they begin without much success. As an organisation, what is your position regarding this programme with respect to this common perception?

    ……

12. Any other comments about the status of domestic solid waste under the on- going *Make Zambia Clean and Healthy* programme? …….....

End of Interview. Thank you for your patience and participation.

Appendix III: Interview Guide for Private firms proprietors or representatives dealing with the domestic solid waste management activities such as collection

I am a Master of Science in Geography student at the University of Zambia now in part II (Research) of my study programme. I am analysing Domestic Solid Waste Management in the City of Livingstone in light of the on-going Make Zambia Clean and Healthy campaign. The main purpose of this study is to determine whether or not the residents of the city of Livingstone perceive the campaign effective in the area of solid waste collection and disposal. I would therefore appreciate your participation and cooperation in providing me with information and data that will assist me with my study.

This study is purely for academic purposes. All of the information and data that you will give me will be for this purpose only and will be held confidential. Your anonymity will be assured. I will not refer to individuals in the research report and none of the information you will provide shall be traced back to you. Only statistical data and general information will be used to determine the general picture.

1. General Information of Interviewee and organisation represented

(a) Name: ……..... (b) Designation: ……...

(c) Organisation/company name: ……..... (d) Year registered: …….....

2. What is your jurisdiction as a SWM organisation? …….....

3. As a private sector organisation involved with domestic solid waste management, do you operate as a franchise or under contract from the Livingstone City Council? …….....

4. Briefly explain your solid waste activities that you carry out and the area(s) of the city (residential) you operate from?

(i) Area(s) of operation …….....

(ii) Type of activity involved in *(e.g. collection, recycling, disposal*)…….....

5. How do you collaborate with the city council authorities in carrying out this role? …….....

6. (i) Have you heard of the *Make Zambia Clean and Healthy* campaign? Yes [ ] No [ ]

(ii) If yes, what do you know about it in relation to domestic solid waste management in the city of Livingstone, how do you position yourself in his programme?

What I know is that: …….....

Our organisation fits/positions itself in the programme by: …….....

7. (a) Do you face some challenges in your business of domestic solid waste management? Yes [ ] No [ ]

(b) If yes, briefly outline the major challenges that you experience. …….....

8. What would you say about the extent to which the community is involved in domestic solid waste management? …….....

9. What is your comment about the status of domestic solid waste in the area(s) that you operate from *pre- and post-* the introduction of the *make Zambia clean and Healthy* campaign?

Comments:

(a) Pre-make Zambia clean and healthy campaign period: .....

(b) Post- make Zambia clean and healthy campaign period: .....

10. Generally, what would you say if any, are the pitfalls (shortcomings) of the *make Zambia clean and healthy* campaign as a domestic solid waste management strategy in the city's residential areas? .....

11. Often, many domestic solid waste interventions like the MZCH programme are usually perceived by the general public as ***events (one-off activities) that are usually imposed on the community*** and so usually terminate as soon as they begin without much success. As an organisation, what is your position regarding this programme with respect to this common perception? …….....

12. How best do you think domestic solid waste management should be done? ……

13. What are your general remarks as regards domestic solid waste management in the city of Livingstone? ……

End of Interview. Thank you for your patience and participation.