A STUDY ON THE IMPACTS OF THE INISCRIMINATE DISPOSAL OF SOLID WASTE ON ENVIRONMENT: A CASE OF HARARE URBAN 2008-2017

BY

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A DISSERTATION SUBMITTED TO THE DEPARTMENT OF DEVELOPMENT STUDIES IN PARTIAL FULFILLMENT OF THE BACHELOR OF ARTS HONOURS DEGREE IN DEVELOPMENT STUDIES.

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DECLARATION FORM

I Blessing Shamiso Sikangela declare that this dissertation is my own original work and a product of my efforts. It has not been submitted to any other university or anywhere else. The sources used were duly acknowledged.

Date	May 2017
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The undersigned strongly certify that they have read and made recommendations to the Midlands State University for acceptance of a research project entitled: **A study on the impacts of the indiscriminate disposal of solid waste on environment: A case of Harare urban 2008-2017.** The project was submitted in partial fulfilment of the requirements of the Bachelor of Arts Honours degree in Development Studies.

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DEDICATION

This study is dedicated to the Lord Almighty for giving me the strength and courage to carry out this dissertation. I would also like to dedicate this work to my wonderful parents and sisters who tirelessly inspired me to realise my dreams and for the love and support they have showed me throughout the course of the study.

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ABSTRACT

The aim of this study was to investigate the impacts of indiscriminate disposal of solid waste on environment in Harare. It highlights as part of the objectives the factors affecting the proper management of solid waste, impacts on environment and suggestions brought forth by the respondents. To acquire adequate information the research used stratified sampling and purposive sampling to select five different areas and key stakeholders respectively to be a representation of Harare. Data sources included questionnaires, observations and interviews. Findings revealed that the challenges of solid waste management in Harare include lack of funding, irregular collection service due to shortages of resources and negative attitude of the residents. These challenges have triggered its illegal dumping leading to environmental degradation and pollution. Recommendations which emanated from the research included all stakeholder participation, establishment of sanitary landfills among others and these would go a long way in promoting sustainable development.

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ECZ	Environmental Council of Zambia
EMA	Environmental Management Agency
ESAP	Economic Structural Adjustment Programme
HCC	Harare City Council
ISWM	Integrated Solid Waste Management
NGO	Non- Governmental Organisations
OECD	Organisation of Economic Co-operation and Development
PSP	Private Sector Participation
SWM	Solid Waste Management
UN	United Nations
UNEP	United Nations Environmental Programme
UNICEF	United Nations International Children's Educational Fund
USEPA	United States Environmental Protection Agency
ZEMA	Zambia Environmental Management Agency
ZIMSTAT	Zimbabwe National Statistics Agency
ZINWA	Zimbabwe National Water Authority

CHAPTER 1

INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

Solid waste has become the greatest challenge currently being faced by many countries across the globe including Zimbabwe. Solid waste if not properly managed it can have detrimental effects to the environment and can be a huge set back to the attainment of sustainable development. In Zimbabwe solid waste management has almost entirely collapsed leading to its chaotic and illicit dumping Nhete (2005). Currently the situation in Zimbabwe is not satisfactory as people have resorted to the careless dumping of solid waste in open sites and drainages.

The situation is largely due to the internal challenges being faced by the city council and failing economy. It can be noted that with the increase in global population and the rising demand for food, there has been a rise in the amount of waste being generated daily by households. There has also developed a social culture where a lot of packaged goods and food stuffs are carelessly disposed of without considering the harm this might have on environment. Saungweme (2012) argued that the accumulation of waste on open spaces and road sides is a failure by city council to employ proper and efficient waste management strategies, which can cope with the rate of waste generation when population increases. Residents characteristically dispense off the waste they generate without regard for the environment as it is treated as common property.

The indiscriminate disposal of solid waste however can be a major threat to the environment and human health. The dumpsites could turn into sources of health and environmental hazards since the waste is characterised by vegetative matter, tins, plastics and others objects which are hazardous. This cancer which has emerged in the form of indiscriminate solid waste disposal has however not been given much attention. Thus this study therefore seeks to investigate and explore in greater detail the impacts of indiscriminate disposal of solid waste on environment in Harare urban and provide solutions and strategies where possible that can be put in place to effectively address the issue of poor waste management.

1.2 BACKGROUND TO THE STUDY

The management of solid waste continues to be a major challenge in urban areas throughout the whole world particularly in the rapidly growing cities of the developing world. According to World Report of June (2012) solid waste is a silent problem that is growing daily. A high rate of population growth and increasing per capita income have resulted in the generation of enormous volume of waste which poses serious threat to environmental quality and human health. Solid waste according to Jackson and Jackson (1998) can be defined as a movable substance or material that is perceived to be of no further use and therefore should be discarded.

Paying close attention to the concept of solid waste management it can be noted that centuries ago solid waste management was not much of an issue; this is because slightly a few people occupied the earth Ezeah (2010). Sewage and solid waste could be disposed of by individuals on their own property, however with the beginning of industrial revolution in Europe the problems of managing waste grew far more serious. In Europe city populations accumulated from rural areas to work in town factories. The population increase generated unprecedented quantities of solid waste. By 1900 smog flooded Europe and all kinds of waste were dumped into seas. Scientist and other experts tried to warn others that poor waste

management was a threat to the environment but unfortunately it fell on deaf ears only concerned in maximising personal gains. Burning of waste was seriously contaminating the air. Air and water in lakes and rivers were becoming chocked with chemicals that were killing the fish and other aquatic species. It was until the 20th century when measures were put in place to develop waste management strategies. Chidavaenzi (2006) note that while cities in developed world generate large amounts of solid waste they have developed adequate facilities and competent institutions for managing solid waste.

Unfortunately the same cannot be said for African countries. Rapid urbanisation and population growth has contributed in Africa to the straining of social amenities including solid waste management. Technological and economic advancement has made types of solid waste very diverse and more complex. There is irregular collection of waste from most high density suburbs and this leads to illegal dumping on nearby spaces. Sule (2011) reported that urban centres through Africa collect less than half of the solid waste produced and 95% of that amount is either indiscriminately thrown away at various dumping sites on the periphery of urban centres. Jibril et al (2012) throughout most of Sub Saharan Africa solid waste generation exceed collection capacity as shown in Zambia, Tanzania and Zimbabwe. Jibril etal (2012) argue that very few urban areas in the developing world will have adequate and sustainable waste disposal systems. This gives rise to irregular collection of solid waste hence the uncollected waste is dumped in unauthorised areas such as open fields, ditches and streets which poses serious environmental challenges.

In Zimbabwe, the attainment of independence saw the easing of colonial policies which were restrictive in terms of population movement Tsiko (2012). This triggered the free movement of people and large numbers were moving from rural areas to urban areas to pursue better livelihoods in terms of employment opportunities and access to social services Tsiko (2012). This contributed to the population increase with major cities acquiring over 5% increase per

annum throughout the 1980s. This is noticeable in Harare which has experienced an exceptional population increase of about 2 million as of 2010 (Central statistics office). The city of Harare however as an economic structure is facing challenges as it is characterised by a city council which relies heavily on government funding which does not increase in proportion to match this population growth , thus contributing to declining municipal revenues and expenditures. This excruciating cycle continues to undermine the city councils ability to effectively administrate and provide adequate services and manage the environment.

Harare city authorities are seen as incapable of dealing with the rapid problems of urbanisation. Kaseke (2005) the number of households that have sprung up throughout Harare and the large waste being produced have left the city overwhelmed and unable to efficiently collect and dispose solid waste giving birth to the problem of solid waste management. Urban waste collection was reported by Practical Action Southern Africa (2006) to have dropped from 80% to 30% in large cities, thereby triggering widespread illegal open dumping. The poor solid waste management has become one of the major concerns for a number of environmental factors such as land, air and water pollution, destruction of small living organism and destruction of ecosystem.

1.3 STATEMENT OF THE PROBLEM

Currently in Zimbabwe the increase in population and urbanisation has triggered solid waste generation and the amount of waste being produced continues to rise faster than the ability of city authorities to provide adequate resources required to reduce the quantities of waste being generated Makware (2011). The city council is facing challenges in solid waste management and the collection services have reduced. This has resulted in people resorting to the indiscriminate disposal of waste. Litter and heaps of garbage has become a common feature in Harare and not much attention has been given to the harm this might have on environment

and human health. It is against such a background that this research seeks to investigate the impacts of indiscriminate disposal of solid waste on environment and come up with suitable solutions to promote sustainable management of solid waste.

1.4 THEORATICAL FRAMEWORK

This study is anchored on the theory of urban ecology. Urban Ecology integrates the notion that human beings influence the natural environment in their towns. This theory was born from the biological phenomenon of the relationship between living organism and environment in the days when towns were not regarded an area of research Marcotullio et al (2003). The belief that cities were ecosystems also created an opportunity for the investigation of cities and created a platform to incorporate other elements to the understanding of ecology such as human behaviour and its impact on the natural environment and researches on urban growth and its impact on the environment. The purpose of urban ecology is to study the effects of population growth on environment. It seeks to study the relationship between human populations and their communities as well as their relationship to environmental factors.

Human beings are the driving force behind urban ecology and influence the environment in a variety of ways. Human beings through social and economic activities produce various forms of solid waste such as garbage, rubbish and dirt that accumulate in residential towns and cities. Makwara and Magudu (2013) aptly describe solid waste as the unwanted, useless and discarded materials. Solid waste is considered hazardous and therefore toxic to the biological environment. Refuse generation due to population increase has attendant effects on the quality of environment.

Human beings tend to ignore and take the environment for granted. They also exploit the environment however this exploitation has worsened due to urbanisation thereby endangering the environment and human health Makwara (2013). The changing lifestyles and

consumption patterns of urban residents have increased waste generation thereby reducing collection levels leading to the indiscriminate disposal of solid waste. This has threatened ecosystem balance and human health alike because solid waste has the potential to contaminate natural environment.

1.5 CONCEPTUAL FRAMEWORK

ENVIRONMENT

According to Marcotullio (2003) environment can be defined as the sum total of all living organism and their surroundings which facilitate growth and development. The environment however can be a source of danger and damage. Overall environment is water, air and land and the interrelationship between these factors with each other and also with the human beings Sule (2011). Environmental studies facilitate the understanding of environment and influence of human activities on environment. It deals with the assessment of all processes in water, land and air which leads to pollution and degradation of the environment. Environment includes all physical, biological surrounding and their interactions.

SOLID WASTE

Solid waste has been variously defined. Jackson and Jackson (1998) define waste as a movable substance or material that is perceived to be of no further use and therefore should be discarded. Generally waste can be regarded as any material that is discarded because it has saved its purpose or is no longer useful. However not all waste should be discarded as some can be transformed into useful products through recycling Miller (2000). Solid waste comes in various forms such as garbage, rubbish, trash and dirt that accumulate in residential, commercial and industrial areas of towns and cities Botkin and Keller (2000). Therefore solid waste is unwanted, useless and discarded non liquid waste materials arising from domestic, commercial and industries. Ireen (2008) solid waste is considered hazardous and

therefore toxic to the environment and urban lifestyles. Hence there is need for proper management of waste as it poses danger to the environment and human health.

CLASSIFICATION OF SOLID WASTE

Solid waste is generally classified as the following on the basis of source generation

1. Domestic – vegetative matter, left over food, plastics and clothes
2. Commercial – glasses, metals and food stuffs generated from stores and markets
3. Institutional – paper, plastics, glasses generated from educational buildings
4. Industrial – processes of waste, wood, glasses, construction waste
5. Clinical – needles, syringes, drugs and other pharmaceutical products

SOLID WASTE MANAGEMENT

Solid waste management refers to a range of activities in the handling of waste and should be understood to mean activities such as waste generation, storage, collection, transportation, processing treatment and disposal Booth et al (2001). Waste disposal should be done in accordance with the principle of public health and other environmental considerations. Regular collection and transportation prevents the piling up of garbage which would become breeding sites for pathogens. Solid waste management should be done in the framework of administrative, financial, legal and planning functions. According to Chiwandamira (2000) the goal of waste management is to ensure that its disposal does not lead to pollution and environmental degradation. This means that waste management should be undertaken in such a manner that garbage handlers, the public and environment are not endangered in any way Makwara (2011). Booth (2001) contends that the disposed waste should be covered with soil or be sprayed otherwise careless handling of waste will lead to serious environmental challenges.

1.6 AIM OF THE STUDY

The main objective of this study is to explore in greater detail the impacts of the indiscriminate disposal of solid waste on environment. This research also seeks to bring to the attention of key players in solid waste management strategies that can be put in place in order to improve waste management.

1.7 OBJECTIVES OF THE STUDY

2. To find out factors leading to the indiscriminate disposal of solid waste.

3. To investigate the impacts of indiscriminate disposal of solid waste on environment.

4. To highlight suggestions and strategies to the problem of poor waste management.

1.8 RESEARCH QUESTIONS

1. What are the factors or causes that lead to the indiscriminate disposal of solid waste in Harare?

2. What are the environmental impacts of indiscriminate solid waste disposal?

3. What are the strategies and suggestions that can be employed in order to address the problem of poor waste management?

1. 9 SIGNIFICANCE OF THE STUDY

This study is of significance largely to city authorities and the Zimbabwean population. There are set to benefit a lot from this study as it shall provide lessons, ideas and solutions on waste management. It seeks to draw the attention of stakeholders to the problems associated with poor solid waste management. Kaseke (2005) note that within the past few years population in Harare has increased and this has resulted in increased waste generation which in turn has

heightened the pressure on resources and has left the city council overwhelmed and unable to efficiently collect and dispose solid waste. Solid waste management has gradually deteriorated in the once clean residential area of Harare.

The poor management has become one of the major concerns as it poses threats to human health and environment. Hence there is need for city authorities and urban councillors to be on the guard and facilitate change in solid waste management to ensure that the issue of indiscriminate disposal is addressed. The study will help the city authorities to make a call for a sustainable environmental management system in which waste management and disposal are given first preference for the benefit of the present and future generation.

This study will guide parent ministries in policy formulation. The legislation requires a lot of adjustments and this call for an all stakeholder intervention to ensure that new ideas are brought in. The Zimbabwean population will also benefit as they also need environmental education on how to manage it properly and bringing the effects to their attention is the best starting point.

1.10 DE LIMITATION

The study is restricted to Harare however due to its huge population this study focused on five different areas with both the high density suburb and low density suburb represented.

1.11 LIMITATIONS OF THE STUDY

TIME

The research required a lot of time for planning and developing questions as well as preparing for interviews since it encompassed many high density suburbs which was really quite a challenge for the researcher to balance it off given the time frame for the research. Also some respondents failed to fill out the questionnaires on time which was a challenge because the researcher had to repeatedly make follow ups, which was both costly and time

consuming. Some council officers cancelled the appointment which meant that the researcher had to reschedule the meetings.

COOPERATION FROM THE PEOPLE

The respondents during the research were pre occupied with their own businesses so they could not fully cooperate. This made it difficult for the researcher to collect enough information. The researcher acknowledges the differences in personality but other respondents were just too reserved hence they were not willing to give information.

TRANSPORT COST

Most high density suburbs which the author visited are situated far away from each other hence money was therefore needed to meet all transport costs which were incurred during visiting the areas to collect data on poor waste management practices experienced in those residents. Money to buy stationary and printing was also needed.

1.12 CHAPTER SUMMARY

This chapter has highlighted the problem of solid waste disposal and its setting. The chapter gave background of the challenges of solid waste management across the globe and in Harare. This introductory chapter elaborated the situation currently being faced in Harare. Research objectives and aims of the study and its significance were also highlighted. The chapter also provided the theoretical framework guiding the study.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Various studies have been carried out relating to the issue of solid waste disposal and management and an evaluation of the views given by various scholars discloses a number of interesting arguments. This chapter serves to review various literatures on solid waste management from challenges surrounding the concept and the impacts on health and environment in Zimbabwe and across the globe. The main focus of this chapter is to identify previous findings made by other scholars regarding the topic under study and identify gaps in knowledge.

2.2 CONCEPTUALISATION OF SOLID WASTE

Ali (2006) highlighted that solid waste is not an easy concept to define as it is complex in nature. He further notes that the understanding or conceptualisation of solid waste is not depended upon its definition but rather its classification. Ali failed however to classify and bring to light the categories of solid waste. Beukering et al (1999) indicated that various materials can be regarded as waste for instance household garbage, organic waste, containers and plastic bottles as well as industrial waste. Beukering (1999) goes on to say human beings activities breeds all kinds of solid waste from different sources, hence the term solid waste should be associated with the way individuals behave. Chandrasekar (2002) on the other hand conceptualise solid waste as materials or objects which are disposed as useless or unwanted, having no future value from a production process. However this definition is confined to the manufacturing processes disregarding domestic solid waste which play a significant role in solid waste generation.

Ludwig et al (2003) defines solid waste as ineludible substances resulting from domestic activities or industrial operations which have no economic value and should be discarded. This definition however is lacking because it assumes that all solid waste has no value. Geoffrey (2005) perceives solid waste as any material or object which individuals discard or are required to dispose of by law. He added that solid waste comprises of all objects which people finds useless or those things which people are compelled to dispose by law due to the hazardous nature of the items for example tinned foods. In support Basel convention indicated that solid waste is a substance or material which is discarded or required to be disposed by the provisions of national laws. This thinking however fails to acknowledge the fact that not all waste is hazardous waste.

In this study solid waste is conceptualised to mean any material that is disposed because it has saved its purpose and has no future value. However this study goes on to illustrate that not all waste should be disposed as some can be transformed into useful products, the above mentioned literature failed to identify this aspect of recycling hence this study seeks to bridge the gap in knowledge by highlighting that some solid waste can be recycled into useful products or can be given away to others who might actually consider them to be useful.

2.3 GLOBAL VIEW ON SOLID WASTE MANAGEMENT

Solid waste has become a topical issue across the globe due to the harm it poses to the environment and human health Mazzanti and Zaboli (2008). The challenge of solid waste management dates back to the time of civilisation Priestly (1968). Small amounts of waste were generated during this time and could be discarded off by a series of natural occurrences. Priestly notes that it was when the cities began to expand due to population growth that the problem began to manifest and large volumes of waste were being generated. This growth as indicated by UNEP (1995) placed a tonne amount of pressure on local authorities responsible for the collection of waste as they could not keep up with the growing population rates. This

inefficiency gave birth to a throw away culture as individuals could carelessly dispose waste in streets and open lands. According to Priestly (1968) in Europe these awful conditions brought forth epidemics such as the 'the Black Plague' which decimated large numbers of people during the 14th century. The increase in waste generation today is posing serious threats to ecosystems and human wellbeing. The World Watch Institute conducted a survey in (2012) and indicated that population growth and urbanisation has increased the amount of waste being produced particularly in urban areas and is expected to double by 2025.

According to the World Bank future predictions indicate that the world's waste generation could reach up to 27 billion tonnes by 2050 with a large proportion being generated in developing countries. Idris et al (2004) highlighted that industrialisation and urbanisation results in changes in consumption patterns and ways of living thereby affecting the composition of solid waste. Ali (2006) further elaborated the struggles and inadequacy of the improper management of waste across the world mainly in developing countries indicating that the municipalities and authorities in charge are struggling to deal with the increasing demands as solid waste has become complex.

Couth and Trois (2010) noted that various factors have contributed to the increase in waste generation pointing out that city authorities mainly in Africa lack information, financial and technical resources. He goes on to say in Africa 20-50% of the city authorities budget is spent on waste management which hardly covers half of the population, collection of waste seem to be exhausting municipalities budgets leading to open dumping as the main method of waste disposal thereby exposing human and environment to danger. Feresu (2010) estimated that global solid waste will increase yearly at 3.2 - 4.5% in developing countries and 2 - 3% in developed countries, the increase is aggravated by economic growth and population growth. The above scholars gave a general overview of solid waste management across the globe.

However this study will be looking particularly on the status and challenges of solid waste management in Harare Zimbabwe.

The levels of waste management in developed and developing countries however differs this is due to the financial and economic status of a particular country. A study by Feresu (2010) showed that in countries like Japan, England and Australia solid waste is well treated and disposed. ZWLA (2009) notes that developed countries like Japan and USA are working tirelessly in promoting sustainable solid waste disposal systems and promoting Zero waste. ZWLA indicated that zero waste as a concept is gaining more popularity as an instrument to overcome the challenges of the improper disposal of waste across the globe.

Morra et al (2009) notes that it is imperative to ensure that citizens are using sustainable methods when disposing waste. He goes on to say this is because solid waste if improperly disposed leads to environmental pollution and the disruption of ecosystems. Morra et al (2009) environment is an important aspect to consider when choosing viable disposal options. The World Book Encyclopaedia 1994 indicated the main strategies used to discard domestic solid wastes which are land filling, recycling and incineration. Developed countries mainly use land filling and incineration due to high technology and financial stability. The global review published by US Environmental Protection Agency indicated statistics from a research on waste disposal and showed that in high income areas they have very few dumps about 0.05 and vast landfill accruing up to 250 and 122 incineration plants. While in low income areas they have many open dumps about 0.47 and only 2.2 landfills.

Holmes (1984) indicated the challenges being faced by some countries particularly the developing world in solid waste management is due to the fact that sanitary landfills and incineration are highly costly. Thus solid waste management for all intents and purposes has collapsed, setting its chaotic and illicit disposal. The studies above have indicated disposal

practices currently being employed across the globe and those best suited, however this study shall go on to further examine the disposal methods and practices used in Harare because solid waste management and disposal varies from country to country.

2.4 EMPIRICAL EVIDENCE OF SOLID WASTE MANAGEMENT IN AFRICA

Hardoy et al (2004) indicated that the challenge of solid waste cuts across all developing countries and is posing serious environmental problems. Developing countries are failing to manage solid waste from solid waste generation to solid waste disposal. Various surveys have been conducted across Africa and the results are discussed below

Anchakeng (2003) highlighted that solid waste administration is one of greatest service provision challenge confronting municipalities in Africa. United Nations Environmental Programme (2008) noted that a large portion of the urban populace in Africa do not have satisfactory and adequate solid waste disposal systems. Environmental Council of Zambia (2004) noted that the situation in Zambia has become undesirable as citizens continue to carelessly dispose of solid waste. This is as noted by Zambian Environmental Management Agency as a result of disposal sites which are inadequately managed. Less than 14% of waste generated in Zambia is properly discarded. ZEMA (2012) indicated that the growing waste have not been contained or controlled by any form of legislation. Manthuli (2011) notes that in Zambia waste administration has become insufficient as shown by the illicit dumping and the multiplication of the now apparently perpetual heaps of refuse in some business, industrial and urban communities. The city fathers are failing to effectively enforce by laws to manage the situation.

Smith et al (2001) conducted a study in South Africa and indicated that various issues continue to affect the establishment of solid waste management in South Africa. His study which was qualitative in nature reported that in South Africa inefficient data collection, lack of public education and awareness and high operational cost were the major contributory

factors leading to the indiscriminate disposal of waste. South African National Waste Management Strategy revealed that lack of policy and governing systems which can effectively promote the management of waste and the absence of recycling infrastructure are also hindrances to the establishment of proper solid waste management systems.

Hardoy et al (2004) studied the hardships experienced in managing solid waste in Nigeria. They employed interviews, focus group discussions and observation and from the information they gathered they indicated that the type and quantity of waste generated in Lagos is influenced largely by population growth and income. They discovered that high income earners consume more packaged goods which lead to increased waste generation. . Imam et al (2008) also supported noting that in Nigeria there is a constant increase in waste volume and it is a result of population growth. Dauda and Osita (2003) highlighted that the rate of waste produced in Nigeria amounts to 0.49kg with households owing to 90% of urban waste. This places a heavy weight on the municipalities who fail to equate their services with the amount of waste being generated. Dauda and Osita (2003) note that due to this inadequacy the Nigerian populace continue to dump waste in open spaces and burning as ways of disposal

Henry (2006) notes that litter has become a notable feature along highways in Kenya. He indicated that regardless of the various clean up campaigns and anti-litter campaigns that have been introduced by different stakeholders, dirt and rubbish continue to flood Nairobi as people continue to carelessly dispose solid waste. In Nairobi Kenya Henry reports that solid waste management system is poor because of lack of sufficient infrastructure which undermines the proper movement of vehicles that collect waste. This together with financial constraints makes the whole process of solid waste management a vicious cycle.

Wieslander and Bergqvist (2006) having conducted a research in Mbale Uganda revealed that the challenge of poor solid waste disposal or management in Uganda started when the British colonies left the country. The two scholars indicated that Uganda having been a British colony it had the most efficient waste management system because the British authorities had the facilities and skills to properly manage solid waste. However the British departure adversely affected the income base and operational skills of the city council which up to now is unable to provide services to the urban residents. The circumstances as they note saw the standard of waste management falling off the wagon and below the accepted standards of waste collection in Uganda triggering the rampant disposal of waste thereby placing the health of residents at great risk.

The scholars and studies mentioned above gave an overview of waste management and focused more on the causes and factors leading to the problem of solid waste management and disposal in the African setting. This is essential in understanding the concept of solid waste management however the literature was silent on the impacts and consequences which might occur as a result of the indiscriminate dumping of solid waste. Thus this study goes an extra mile in examining the effects of the improper solid waste disposal in a bid to showcase the severity and how life threating the impacts of indiscriminate disposal can be.

Studies conducted on the impact of solid waste included McDougall et al (2001) who conducted a study in Nigeria Lagos and indicated that open dumps in Nigeria have facilitated poor living conditions for waste pickers thereby resulting in significant health risks not just for the present time but for the future as well hence proper waste treatment and disposal is very important to protect public health. The federation of Red Cross 2010 also reported that collection workers in developing countries have significantly direct contact with solid waste hence is at a greater risk of obtaining infections.

Henry (2006) conducted a research in Kenya and showed that waste is not separated at source but rather mixed in one plastic bag including harmful materials hence collection workers are exposed to toxic materials and infections from micro-organisms. Agunwamba et al (2003) observed that solid waste generation in Nairobi exceeds capacity resulting in 80% of waste not collected and as a result waste generates in open dumps providing harbourage for diseases causing organism and bacteria.

In assessing solid waste in Accra Ghana Kuitunene (2003) reported that many households store waste in plastic bags and baskets. However he discovered that before the bags are emptied they attract flies which have greater possibility of contaminating food and cooking items. He further indicated that the high levels of diarrhoea in children under six years in Accra are as a result of food contamination by flies. In Zimbabwe due to poor waste collection services many people were affected by cholera between 2008- 2009. The Zimbabwean (2010) noted that the cholera outbreak claimed the lives of 4200 people.

Sule (2011) conducted a research in Sierra Leon and revealed that indiscriminate solid waste disposal has resulted in the damaging of ecosystems. Sule (2011)) noted that when solid waste is dumped into streams and rivers it changes the aquatic habitats and destroys flora and fauna. He further notes that the high nutrient level found in organic waste can exhaust dissolved oxygen in rivers, lakes and streams denying oxygen to fish and other aquatic life form. He highlighted that dumps in ecosystem may damage or essentially damage these profitable natural resources and the services they provide.

Schuberler et al (1996) indicated that the decomposition of organic waste attract animals and vermin and flies particularly where waste comprises of diapers. UNEPA (2005) indicated that the impact of residing in an unhygienic and dirty environment may result in people becoming

demoralised and less motivated to change; also living conditions around waste leads to unhygienic behaviour as it become a place of public nuisance

Marcotullio (2003) in his survey in Ghana observed contamination of ground and surface water as a consequence which is as a result of indiscriminate disposal of solid waste, municipal solid waste stream can release toxic substances into the leachate of dumps which flows into water sources.

UN HABITAT data indicated a noticeable increase in cases of sickness among children living in households where refuse is dumped or burned in the yard. Other cases as indicated include diarrhoea and acute respiratory diseases. Uncollected waste blocks drains and causes flooding and transmission of water borne disease. UN HABITAT notes that in India 1994 drains were blocked by solid waste thereby resulting in flooding. In Egypt 89% of villagers residing downward off the burning dumpsite was suffering from respiratory diseases.

The studies above highlighted the impacts of indiscriminate disposal of solid waste on health and environment however they were focusing on different countries from the area under study. This study looks into the impacts of indiscriminate disposal of waste specifically in Harare, giving Harare residents opportunities to participate in issues affecting them because environments differs what happens in one country may not happen in another.

2.5 OVERVIEW OF SOLID WASTE MANAGEMENT IN ZIMBABWE

In Zimbabwe researches by Masocha and Tevera (2003), Mapira (2001) and Makwara (2011) highlighted that due to lack of economic and social capabilities solid waste has become one of the most noticeable and grave environmental challenge. This is upheld by Nhete (2005) who contends that Zimbabwe waste collection has practically crumpled and has brought forth the chaotic and uncontrolled illicit dumping leading to environmental degradation.

Chidavaenzi (2006) also supported noting that decades ago Zimbabwe urban communities were viewed as the epitome of cleanliness in the African continent and beyond.

The challenge of poor solid waste disposal or management in Zimbabwe as indicated by Makwara and Magudu (2013) date back to the 1990 when the economic structural adjustment programme was introduced, which restructured the economy in a catastrophic manner. In addition to this is the fast track land reform policy of 2000 which facilitated the unprecedented economic meltdown.

This adversely affected the financial base of the city council who at the present moment is failing to provide services to the urban communities. The standard of waste management dropped as a result of these circumstances. The local government in Zimbabwe as noted by Machivenyika (2012) was also affected by the withdrawal of donor support from 1998 owing to the political differences between donor countries and Zimbabwe. Musademba et al (2011) highlighted that owing to the down spiral of the economy during 2000-2010 many challenges militated against proper urban solid waste management.

Financial Challenges

Tsiko (2012) notes that in Zimbabwe where financial and material resources are scarce allocation of these resources is bounded and badly managed. UN Habitat indicated that insufficient funds restrict operational expenses which include salaries, maintenance and fuels. According to the reports in the daily newspaper 2015 local authorities in Harare are having a hard time in coming up with satisfactory solid waste management services due to financial constraints. Councils across the country depend on rate payers but due to the current economic status in Zimbabwe ratepayers have not been able to pay their bills. Newsday sept 2016 reported that rate payers owe an estimated 520 million US$ to the city council. Makwara (2013) notes that this results in poor service delivery, he indicated that up to 50%

of residents have poor collection services especially in high density suburbs. He goes on to say that there is limited room for the development of sustainable solid waste management systems as the government which the city council relies heavily upon is operating under tight budgets hence the proper collection of solid waste is overlooked.

Population Growth

Saungweme (2012) highlighted that increased population growth due to urbanisation has contributed immensely to the challenge of solid waste disposal and management in Zimbabwe. He goes on to say population growth has strained resources and puts pressure on basic infrastructure and amenities leading to poor service delivery in some areas. The city of Harare currently has to deal with a population of 2 million inhabitants. Regrettably city authorities in Zimbabwe provinces seem to be having a difficult time in keeping up with the increased population. Residents who no longer receive collection services resort to crude dumping of waste posing threats to the environment. Tevera et al (2003) argue that the increasing population have resulted in increased waste generation which today has become a global challenge. Saungweme (2012) agreed that waste generation is on the rise yet the levels of collection continue to drop. Chidavaenzi (2006) further notes that the reduction in the collection levels has resulted in chaotic disposal of waste on open sites and road sides. Mukuka (2002) notes that the problem of household waste is a product of very large population who behave as if the environment is elastic hence can receive and transform waste.

Poor Service Delivery

Conyers highlighted that the Harare city council introduced the contract system for collecting solid waste in 1997 however in 1998 the inefficiencies of the contract system led to its cancellation and the city council assumed the duties. The city council however has been a

huge let down. Waste collection levels have dropped and waste collection trucks are always out of service. Residents in Bulawayo have been reported to go for about a month without collection services and this has forced residents to dump their waste in open lands and highways Saungweme (2012).

Poor Legislation

Solid waste management and disposal has been a huge challenge due to lack of law enforcement. Saungweme (2012) discovered that most residents in Zimbabwe are not aware of the regulations and policies of waste management. In Zimbabwe the solid waste management is guided by legislation, environmental laws, public health act and municipal by laws. These acts include EMA Act 2007, urban councils Act and Public health act. All these acts seek to promote and ensure a healthy environment however these acts are not strictly enforced hence people continue to dispose waste indiscriminately. Various policies have also been issued to ensure the proper management of solid waste, the draft national environmental policy, draft waste management strategy and environmental impact assessment. However Masocha (2005) observed that these policies have not been conveyed properly to the local authorities and this makes it difficult for them to effectively communicate the policies to the people and raise awareness. This disparity has ascribed to the crude dumping of solid waste and is posing major threats to the environment. This study shall go on to provide solutions on what can be done to promote solid waste management in Zimbabwe.

Currently people in Zimbabwe people have resorted to open dumping and burning of waste. Saungweme (2012) indicated that in most urban areas due to lack of adequate resources of properly managing solid waste, residents have resorted to illegal dumping and burning of waste. Manyanhaire et al (2009) characterises illicit dumping as the inappropriate or unlawful disposal of waste on land, in water bodies such as rivers and lakes and on any open space.

This as further indicated by Musademba et al (2011) has become an issue of concern in Zimbabwe because it's ruining the aesthetic value of the environment. According to Tsiko (2012) chemicals may leach out from solid waste materials into rivers and lakes and contaminate surface water. Wetlands are also being used as disposal sites resulting in the disruption of flora and fauna.

The Harare city council continues to dump waste at Pomona dumpsite without appropriate control measure to avoid leachate. Jerrie (2005) describes a dumpsite as the final place for all solid waste materials. These dumpsites as Jerrie (2005) notes have open burning which leads to the pollution of environment. The leachate from these dumpsites is harmful to human health and natural ecosystems. This study aims to provide suggestion on appropriate disposal methods that can be adopted in Harare.

2.6 PROPER SOLID WASTE MANAGEMENT

Zerbock (2003) characterises solid waste administration as a structure within which all exercises concerning solid waste are outlined. The real goal as he indicated is to come up with proper solid waste management systems and also alternatives within the framework of waste management. Anchakeng (2003) noted that this is done so as to minimise waste generation and develop ways to maximise on waste recycling in order to enhance environmental sustainability. Tevera (2003) argued that the administration of solid waste encompasses the policy and planning challenges of solid waste as well as promoting safe disposal and treatment.

Oladebeye (2010) regards recycling as a feasible method in minimizing solid waste that goes into dumpsites. Most researchers content for the utilisation of recycling in the solid waste management and assert that recycling is the most pro efficient and compelling strategy for solid waste administration. USEPA (1999) also acknowledges recycling as a standout measure of solid waste management in developing countries. USEPA (1999) Recycling

transforms waste material into valuable resources, helps in energy conservation and pollution reduction. Kreith (1994) also adds that recycling present many advantages including returning of raw materials back to the marketing by distinguishing usable items from solid waste.

Composting is also regarded as measure that can be used to dispose waste. Salvato (1982) pointed out that composting is the use of bacteria and fungi to decompose organic matter under controlled conditions and moist temperatures. Composting is a low technology approach and suited for developing countries since over 50% of solid waste in developing countries is organic material Zerbock (2003). Composting entails the burying of organic matter until it decays. Kitshoff (1986) highlighted that composting supports natural conservation and reduces environmental harm.

Nemerow (2009) perceives landfills in the simplest of ways highlighting that landfills are a type of solid waste management which no one wants but everybody requires. He indicated that landfill is the most appropriate method of waste disposal especially in developing countries. Landfilling is a system of trash and garbage disposal in which waste is buried between layers to build up low lying land. It has been qualified as an environmentally friendly and accepted global method World Bank (1999). It reduces air pollution and environmental harm.

Saungweme (2012) noted the importance of integrated approach to the management of waste after the realisation that solid waste systems are interrelated. It is a concept of proper management of solid waste which entails the inclusion of all stakeholders and key players with rights and responsibilities in decision making. Squires (2006) note that integrated approach is aimed at enhancing community participation and corporation in establishment of sound solid waste management systems.

The scholars assume that the use of the above methods will ensure sound waste management. It disregards the fact that they are limitations to the effective implementation of these strategies. This study focuses on highlighting some of the implementation challenges faced in Harare.

2.7 CHAPTER SUMMARY

In summary this chapter has reviewed various literatures available on solid waste management. The literature review focused on the nature of the challenges of solid waste management at global and regional level. In the views mentioned above the scholars seem to have a consensus on the fact that financial, economic social and political issues affect the proper management of solid waste. Inefficiencies of the city authorities have also been a major contributor to the indiscriminate disposal of solid waste in Zimbabwe. The chapter also examined scholarly views who looked at the impacts of indiscriminate disposal of waste which are largely health and environmental. A review of early suggestions of proper methods of solid waste disposal across the globe was also highlighted in this chapter.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter gives an overview of the various methods and techniques that were employed in order to accomplish the key objectives of this study. It seeks to give a full description on how the research was carried out. A carefully thought research design was used in this study which is qualitative as it helped the researcher in gaining fuller understanding of the nature of solid waste management in Harare. Denzin and Lincoln (2003) assert that it is the task of the researcher to use the best research design possible. This chapter also highlights the sampling techniques used, which in the study are purposive and random sampling. Data collection tools used and the population which the researcher targeted are fully illustrated in this chapter. Ethical issues related to this study are also outlined in this chapter.

3.2 RESEARCH DESIGN

According to William Zikmund research design is a road map with the conditions guiding the collection and analysis of data in such a way that all purposes and aims of the research will be revealed. Selltiz (1981) highlighted that research design can be defined as an appropriate and viable plan in which a research is carried out which enables the collection of information which effectively addresses the research questions. Overall it is a tool which the researcher utilises to incorporate the different aspects of the study in a logical manner thereby allowing one to effectively address the research problem. Having a specific research design is essential because it promotes the smooth operation of the research ensuring that the research is efficient.

In this study the researcher used qualitative approach which is a descriptive and non-numerical way to gather and analyse data. This research method was the most appropriate to the researcher as it enabled her to interact with the people and investigate how Harare urban

residents are reacting and managing the challenges of solid waste management. William (2007) notes that qualitative research method is essential mainly when there is need to understand the actions and ways of human beings hence this was the most appropriate for the researcher in this study as her focus was on understanding the ways and patterns of the residents and factors influencing their behaviour leading to the indiscriminate disposal of solid waste. Selltiz (1981) indicated that qualitative research is the avenue for examining and understanding the meaning human beings give to social problems.

This study focused on identifying and understanding the experiences and viewpoints of participants through various methods such as observations, questionnaires which were distributed on a face to face basis and also interviews which gave participants a voice on issues of solid waste disposal affecting them.

3.3 STUDY AREA

Harare previously known as Salisbury is the capital of Zimbabwe. It is located in the north eastern part of the country. Harare city has an estimated population of two million people ZIMSTATS (2012). It is located at an elevation of 1483 metres above sea level and Harare's climate is in the subtropical highland category Tsiko (2012)

Harare is the country's leading financial and commercial and communication centre. Many businesses are conducted in Harare as it is a trade centre for various produces which includes tobacco, maize, cotton and citrus fruits. It is also comprised of manufacturing industries which are involved in the production of textiles, steel and chemicals.

Harare has a pleasant subtropical highland climate. The average yearly temperature is 17.95 degrees Celsius which is rather low for the tropics however this is as a result of its high altitude position and the occurrence of a cool south easterly airflow. The yearly rainfall is

about 825mm. However these statistics are subject to change due to climate variability currently being experienced in Harare.

Harare is a home to 250 residential areas which are classified as low, medium and high density suburbs. This classification is based on economic and social status of the citizens in the various residential areas.

3.4 TARGET POPULATION

Target population can be understood as the total number of units from which data can be collected Castillo (2009). In this study the targeted population included council workers as they are responsible for the management and all processes relating to solid waste disposal. Environmental Management Agency officials were also a target of this research to provide information relating to the environment as it is the department responsible for the protection of the environment. This study also targeted urban residents both from low income areas and high income areas, they live in the environment and they are also the ones experiencing the challenges of solid waste and they understand the situation on the ground better.

3.5 SAMPLING

The procedure of selecting units (which in this context are residents and stakeholders) from a population of interest, so that they can be used as a representative of the whole population is known as sampling Trochim (2006). It is an approach or procedure the researcher employs in selecting a small group with matching characteristics and elements to represent the population of interest. According to Black (1999) sampling is aimed at obtaining reliable information about the research matter with minimum cost, energy and time. This study used stratified random technique and purposive sampling in order to ensure that all the target population was represented.

Sample Size

The researcher focused on five different locations. In each location ten people were selected at random to be part of the research giving a total of 50 residents. 30 council workers including HCC officials were also selected for the research. The research also included two EMA representatives giving an overall sample size of 82. However not every one of the 82 respondents managed to give the required information.

Sampling Procedure

The classification of sampling techniques is divided into two parts that is probability sampling and non-probability sampling. Trochim (2006) indicated that for probability sampling method to be effective it is imperative to organise a structure which enables all the units in the population to have an equal chance of being selected. William (2007) on non-probability sampling notes that it is a sampling method which depends solely on the judgement of the researcher. The researcher in this study utilised both stratified random technique and non-probability sampling where the researcher purposively selected participants for the research. Questionnaires were distributed and interviews conducted using this procedure.

Stratified Random Sampling

This technique entails a process of dividing members of the population into sub groups called strata. It is within the strata that individuals are then selected at random to give everyone an equal opportunity of being included in the study since they are selected entirely by chance. Black (1999) defined stratified random sampling as the division of a population into sub groups or strata and the random samples are taken in proportion to the population from each stratum. The researcher came up with five stratus, that is the CBD, Kuwadzana, Mbare, Budiriro and Highlands to be a representation of Harare and then respondents were selected at random in each stratum.

Purposive sampling

Parahoo (1997) defined purposive sampling as a sampling technique whereby the researcher deliberately chooses who to include in the study based on their ability to provide key information relating to the study. The researcher selected key individuals of Environmental management agency and council workers based on their experience and expertise regarding the research subject. The rationale was that EMA being an entity responsible for the protection of environment would be able to provide information regarding the measures and efforts being put in place for the preservation of the environment. Council workers being responsible for conducting all processes relating to solid waste management would be able to give key information on solid waste management in Harare hence they were selected.

3.6 SOURCES OF DATA

Data sources are categorised into two classes' namely primary and secondary sources. This study gathered both primary and secondary data.

Primary Sources

Primary data entails raw data collected by the researcher which addresses and answers the research questions in this study. Wallen (1996) defined primary data as data collected specifically to address the current research problem. Primary source can be a person well informed or currently experiencing the subject under research. Primary data sources in this study included interviews, use of questionnaires and observation.

Secondary Sources

Secondary sources are additional sources with information relating to the study, usually studies carried out by other individuals and organisations. William (2007) indicated that secondary source is literature already in existence which helps the researcher come up with the historical background of the work being done. Secondary data for this study was gathered from the internet and library texts, the researcher only focused on secondary sources with

information relating to the impacts of indiscriminate solid waste disposal on environment. Pamphlets and articles published by EMA and city council were also used.

3.7 DATA COLLECTION TOOLS

Interviews

According to Trochim (2006) interviews are ways of collecting information through oral quiz using a set of questions. The researcher conducted interviews in five different locations on different dates and time. This was because the areas are located far away from each other hence the researcher could not visit all the areas at once. The researcher moved from household to household conducting interviews with respondents who were available; houses where only children were available were skipped. Selected community members were asked about disposal options available to them. The researcher also scheduled appointments for interviews with the council officers. Not all targeted members were interviewed but they managed to give necessary information about current trends in solid waste management and also challenges they are currently facing however they were selective of the information they were willing to give. The researcher's hope of conducting face to face interviews with EMA officials was shattered when she visited the offices and could not find anyone around. The researcher resorted to telephone interview where she managed to talk to office assistants on measures put in place to promote a healthy environment

All of the interviews conducted which were mentioned above were semi structured. In order to maintain consistency the researcher prepared a set of pre-planned core questions for guidance so that some specific questions are answered by every respondent, for instance the issue of disposal systems available to residents had to be answered by every interviewee. However as the interview progressed the researcher asked open ended questions which allowed the respondents to express themselves freely. The researcher had a note pad where

she would summarise all the responses. This technique was helpful as it allowed both the researcher and respondent to feel at ease at least the interviews were not strict or too focused.

The interviews conducted facilitated direct contact between the researchers and respondent. This was an essential aspect as it enabled the researcher to pay attention to non-verbal communication of the respondents. The researcher could tell whether the respondents were bored with the interview or being untruthful.

Interviews as a technique in this study were essential and productive as they gave room for clarification and also some of the respondents were using jargons known to them and their community which needed to be simplified and explained further so that the researcher could derive the exact meaning and not make assumptions. However setting up meetings for interviews with officials was stressful and also for the researcher the process of introducing herself to every interviewee became more redundant and overwhelming.

Questionnaires

Dawson (2002) indicated that questionnaires comprise of a set of questions presented to respondents for answers. Merrian –Webster dictionary defines questionnaire as a set of questions that are given to individuals in order to gather facts, ideas and opinions on a particular subject. In aspects and situations whereby the researcher could not use interviews, questionnaires were used. The researcher handed out questionnaires to EMA and some residents of low income areas.

The researcher used open ended questions and closed questions. Closed questions facilitated short responses the respondents were given an option to jus tick on the response. This was used in the demographic section. Open ended questions provided a platform for respondents to answer freely. Questionnaires distributed to council included questions regarding major challenges leading to poor solid waste management. Questionnaires distributed to residents

included issues regarding the frequency of waste collection. For a detailed structure see the appendix.

Questionnaires were used because they provided the researcher with validated information. This technique was essential in this study because every questionnaire contained the same set of questions which gave the researcher an opportunity to generalise results obtained in all different areas. This technique also yielded good results because those residents who are naturally shy to express themselves around people still had the chance to participate in this study. The researcher gave them questionnaires so that they could just fill in the necessary information. However the researcher had some challenges regarding this technique as some questionnaires were not returned. Other households claimed to have misplaced the questionnaire and others were not available on the agreed dates of collection. Also some questionnaires were not completed fully there were some questions which were not filled and this made it difficult to gather enough information and there was not much room for clarification.

Observation

The issue under study required the observer to go to the location to pay attention to the environment. According to Black (1999) observation as a technique provides a valuable display of the situation on the ground. This was supported by American philosopher Yogi Berra who cited that one can observe more by watching. The researcher visited the dumpsite at Pomona to pay a closer attention to the effects of solid waste on the environment. The researcher also noticed heaps of heaps of waste along highways and water sources contaminated by the solid waste as people of Harare have now resorted to dumping of waste in water bodies. The researcher during her walks around town noticed some individuals throwing away litter and plastic bottles in the streets without hesitation which made the researcher realise that the indiscriminate disposal of waste has become a common feature ,

people from what the researcher saw seem to have adopted a throw away culture. The researcher however could not finish observing all the targeted areas due to the hot temperatures and the long distances the researcher had to walk hence the researcher had to leave out some areas.

3.8 PILOT STUDY

The researcher before distributing the questionnaires to residents and other stakeholders conducted a preliminary -test to identify errors and check if there are any areas which needs clarification. The pilot study was conducted by distributing questionnaires to colleagues and check whether they are facing any difficulties in answering the questionnaire. This was done so as to alert the researcher ahead of time if they are verbs to be changed or issues to be clarified so that when the questionnaires are distributed to respondents they would be a lot simpler and clearer.

3.9 ETHICAL CONSIDERATIONS

Dodd (2003) indicated that it is imperative for a researcher to understand and knowing what embodies ethical research. The researcher during the course of the research had some ethical considerations to uphold including confidentiality, voluntariness and consent. The researcher in all processes introduced herself and sought the respondents consent. In other places such as the Harare city council she was required to produce a student identity card, cover letter from the school and research proposal which she did. The researcher ensured all the respondents that all information would remain confidential and is only to be used for academic purposes. The researcher also assured them that all information will be reported with no direct reference to respondent's identities. Those participants who were willing to participate were included neither force nor coercion was used. Permission to interview them was sought first. The researcher at the end of the interview would give the interviewee the note pad to browse through all her summaries and notes she was collecting during the interview. Residents were

generally happy to have someone cover issues affecting their day to day lives hence they were willing to participate.

3.10 DATA ANALYSIS AND PROCESSING

Data analysis is a process of bringing order, structure and meaning to the mass of collected data. Data was analysed qualitatively however with the aid of tabulations. Statistical data was presented on tables and graphs. Qualitative data was analysed using content analysis and was presented in a narrative form. The researcher gathered data from interviews, questionnaires and descriptive notes from observations and classified them into themes and subthemes. This categorisation process was done through identifying, examining carefully and checking similar patterns in the collected data. This process facilitated the simplification and reduction of data. Denzin and Lincoln (2003) indicated that content analysis requires the researcher to read and proof read again pieces of data paying attention to key words, ideas and themes which are to be signified by codes.

3.11 CHAPTER SUMMARY

This chapter has managed to give a detailed outline of the research methods that were used in carrying out this research. Research design, target population, sampling techniques, data collection tools and procedure was outlined in this chapter. The chapter also gives an overview of what sources were used, how they were used and why they were used. Ethical considerations which were upheld by the researcher were also included in this chapter.

CHAPTER 4

DATA PRESENTATION AND ANALYSIS

4.1 INTRODUCTION

This chapter is set on presenting and analysing data on the impacts of indiscriminate disposal of solid waste on environment in Harare. The key tools that were used in gathering data included questionnaires distributed to the target population which included council workers Harare residents and EMA officials and also interviews. Documented literature was also used to support the research. In this chapter data is presented and analysed using qualitative method and tabulations as an aid. Data is presented with the aim of addressing the objectives of the study. Tables, graphs and pie charts were used in the presentation of data and also narrations in order to give meaning to the presentations. The process of giving a full detailed presentation will start by presenting the response rate, demographic data followed by a detailed analysis of the results obtained that is challenges in the management of solid waste and impacts on environment.

4.2 QUESTIONNAIRE RESPONSE RATE

For the purpose of this study questionnaires were administered and distributed to the Harare city council management, council workers, EMA officials, 3 high density suburbs namely Kuwadzana, Budiriro and Mbare, and 1 low density suburb Highlands and the Central Business Districts. The response rate is clearly indicated in the diagrams below

Table 4.1: Questionnaire response rate for key stakeholders

Respondents	No of questionnaires distributed	No of questionnaires returned	Response rate
HCC officials	**2**	**1**	**50%**
Council workers	**20**	**15**	**75%**
EMA officials	**1**	**1**	**100%**
Total	**23**	**17**	**73%**

Source: Research Data 2017

As illustrated in the diagram 2 questionnaires were distributed to HCC officials and 1 was returned, 20 questionnaires were distributed to council workers and 15 were returned and lastly 1 questionnaires was handed out to EMA officials and was returned hence in total 17 questionnaires were returned which had data giving a response rate of 73%. This response rate is reasonable and dependable considering that this set of target population has busy and demanding schedules.

Table 4.2: Questionnaire response rate for residents

Respondents	No of questionnaires distributed	No of questionnaires returned	Response rate
Kuwadazana	**5**	**5**	**100%**
Budiriro	**7**	**6**	**85%**
Mbare	**6**	**5**	**83%**
Highlands	**7**	**4**	**57%**
CBD	**4**	**3**	**75%**
Total	**29**	**23**	**80%**

Source: Research Data 2017

The table above indicate response rate of questionnaires distributed to residents in five different locations. A total number of 29 questionnaires were distributed and 23 were returned giving a response rate of 80%. 5 were distributed in Kuwadzana and were all returned, 7 in Budiriro and 6 were returned, 6 in Mbare and 5 were returned, 7 in Highlands and 4 were returned and 4 in the Central business district and 3 were returned. The response shows that most of the residents were willing to take part in the research. Schafer (1997) note that a 50% response rate is average and a 75% response rate is reasonable and even qualifies the research to be reliable. Residents were generally happy to be included in issues affecting their everyday life. 6 questionnaires were not returned this is because some of the residents were not available on the day of collection and others claim to have misplaced the questionnaire.

4.3 INTERVIEW RESPONSE RATE

Table 4.3 : Interview response rates

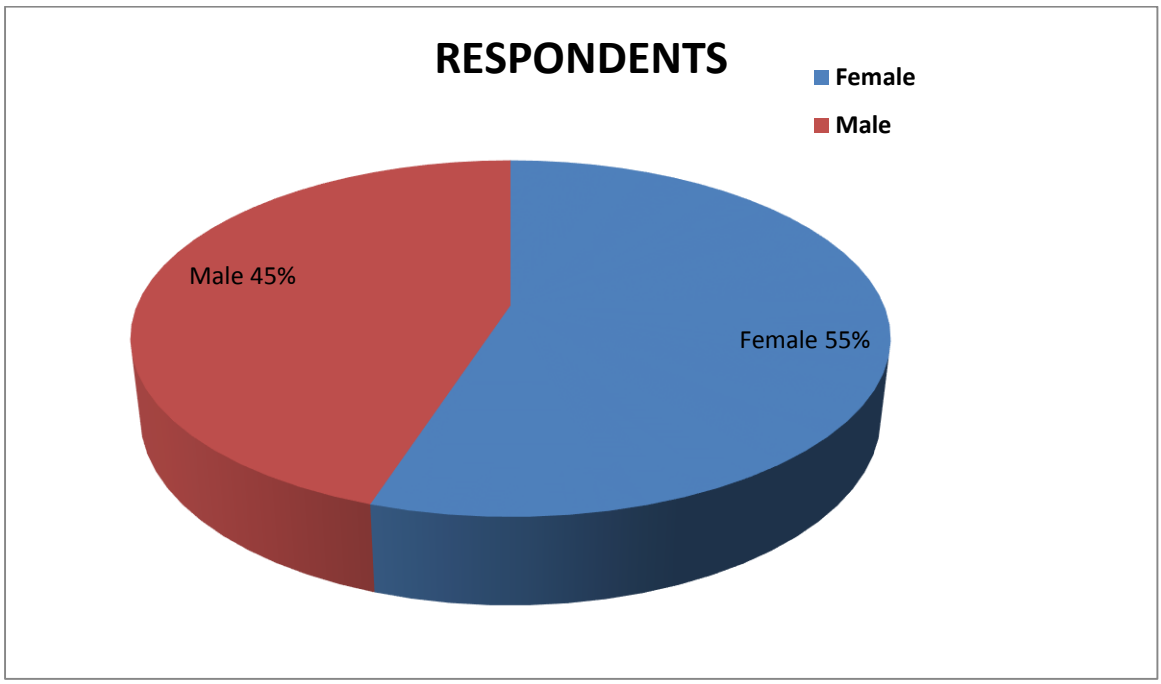
Respondents	No of interviewee	No of those interviewed	Response rate
HCC official	**3**	**1**	**33%**
EMA official	**1**	**1**	**100%**
CBD	**6**	**5**	**83%**
Budiriro	**3**	**2**	**66%**
Mbare	**4**	**3**	**75%**
Highlands	**3**	**2**	**66%**
Kuwadzana	**5**	**5**	**100%**
Council workers	**5**	**5**	**100%**
Total	**30**	**24**	**80%**

Source: Research Data 2017

The overall response rate of the interviews was 80%. The high response rate was due to the physical engagement of the researcher; she personally conducted the interviews and ensured that as many people participate. Most people were interested in interviews because they were instant.

4.4 DEMOGRAPHIC REPRESENTATION OF DATA

Fig 4.1 Distribution of respondents by gender

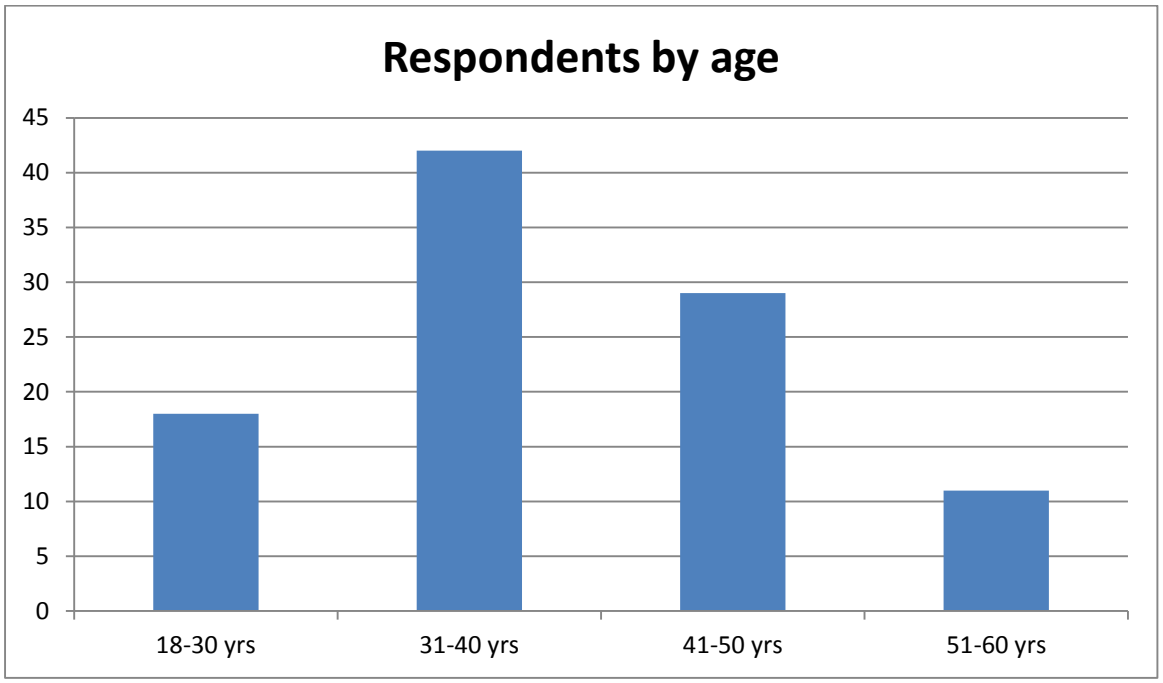


Source: Research Data 2017

The distribution chart above shows that they were more female representatives than their male counterparts. This was especially in the high density suburbs where most women are confined to the home taking care of the family, also majority of council workers responsible for cleaning the streets are women. Women also due to their reproductive role bear the brunt of household chores including managing household waste hence there were eager to participate because they are familiar with the subject matter. The percentage of males was slightly lower because majority were at work during the time the research was conducted.

Overall it can be said that there was a balanced representation of both males and females in the research.

Fig 4.2 Distribution of respondents by age

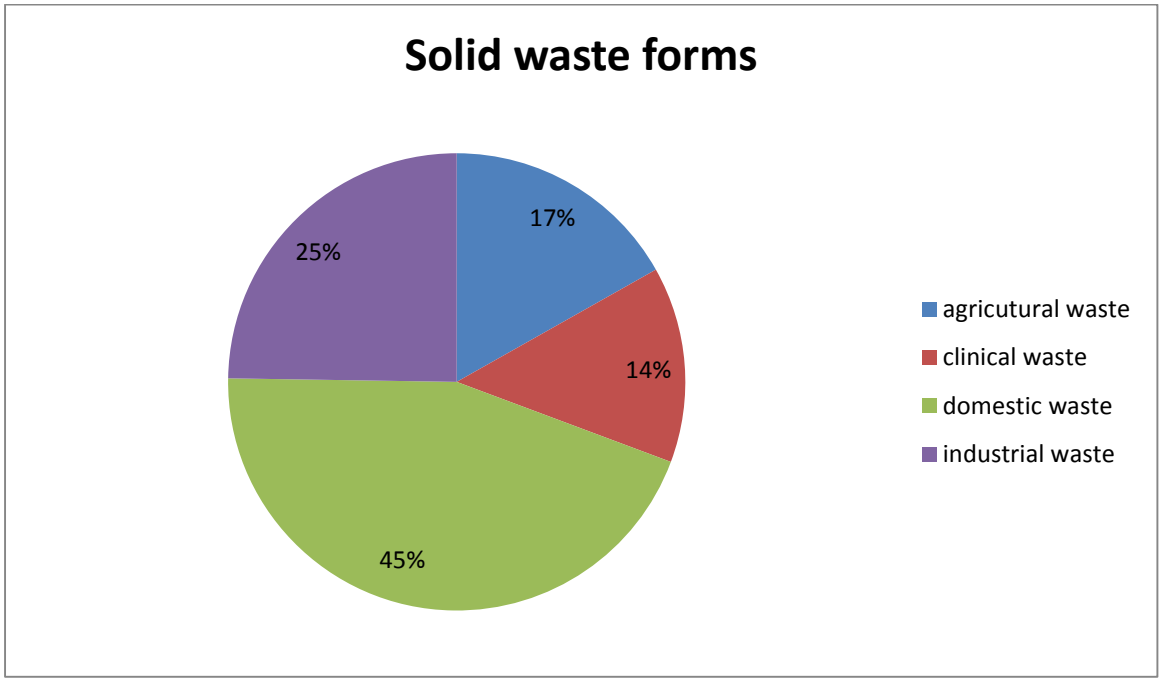


Source: Resource Data 2017

Results from the research show that 42% of the respondents were aged between 31-40yrs. This age group is very dominant and active consisting mostly respondents who are in the workforce and also most married females who were interviewed in high density fall within this age group. 29% were aged between 41-50yrs most were council workers, 18% were aged between 18-30yrs and 11% of the respondents were aged between 51-60yrs. This age group had the least respondents because some have retired and others have relocated to rural homes. All the ages from 18yrs to 60yrs were represented in this research. The age groups included had a better understanding of issues to do with solid waste management and how important it is to promote a sustainable environment.

4.5 TYPES OF SOLID WASTE PRODUCED IN HARARE

Fig 4.3 Types of solid waste



Source: Research Data 2017

Results from the study indicate that 45% of the waste generated in Harare is domestic waste which includes bio degradable and non-biodegradable waste like food, paper, organic matter, cardboard box and kitchen waste. The higher percentage in domestic waste is as a result of increased packaged goods and non-biodegradables. 24% of the waste generated is industrial waste which includes paper, glasses, wood and chemical solvents and paints. The current economic status has resulted in many entrepreneurial initiatives including furniture industries in areas like Budiriro. The production of furniture and other products have increased industrial waste in Harare. 17% is agricultural waste and this is as a result of increased urban farming. Many urban residents have resorted to farming for a source of living and for food supply. 14% is clinical waste comprising of syringes and needles and dressings and this is due to poor waste handling of waste in local clinics and poor collection services hence local

surgeries dump waste everywhere. Adam (1999) indicates that solid waste is largely comprised of clinical, domestic, agricultural and industrial waste.

4.6 WASTE STORAGE

The findings from the research indicated that residents generate a lot of waste in their households and areas and it was clear from the research that they handle and store waste differently. Residents from high density suburbs revealed that they store waste in their backyards in receptacles which they buy with their own money, mealie meal sacks and cardboard box. This is because they do not have proper storage facilities since the city council currently is unable to provide bins. This also makes it difficult for them to separate waste at source.

The inappropriate storage facilities however result in odours and attract houseflies. In low density suburbs the residents asked indicated that they store waste in plastic and metal bins offered by the city council and also they even have the capacity to buy their own storage facilities. The HCC official when asked of this disparity indicated that the population in the low residential areas is low as compared to the high residential areas hence they are not able to provide storage facilities to every household in high density suburbs due to the current economic hardships experienced in the country and also they do not have sufficient resources to keep up with the growing population

4.7 WASTE COLLECTION

The research findings indicated that 65% of the respondents revealed that the city council does not collect refuse regularly. The city council according to its policies decides regular intervals of when and how often refuse should be collected in jurisdiction areas. However the residents in Kuwadzana Budiriro and Mbare indicate that they are used to waste being collected on a weekly basis but nowadays they go for up to about a month without receiving

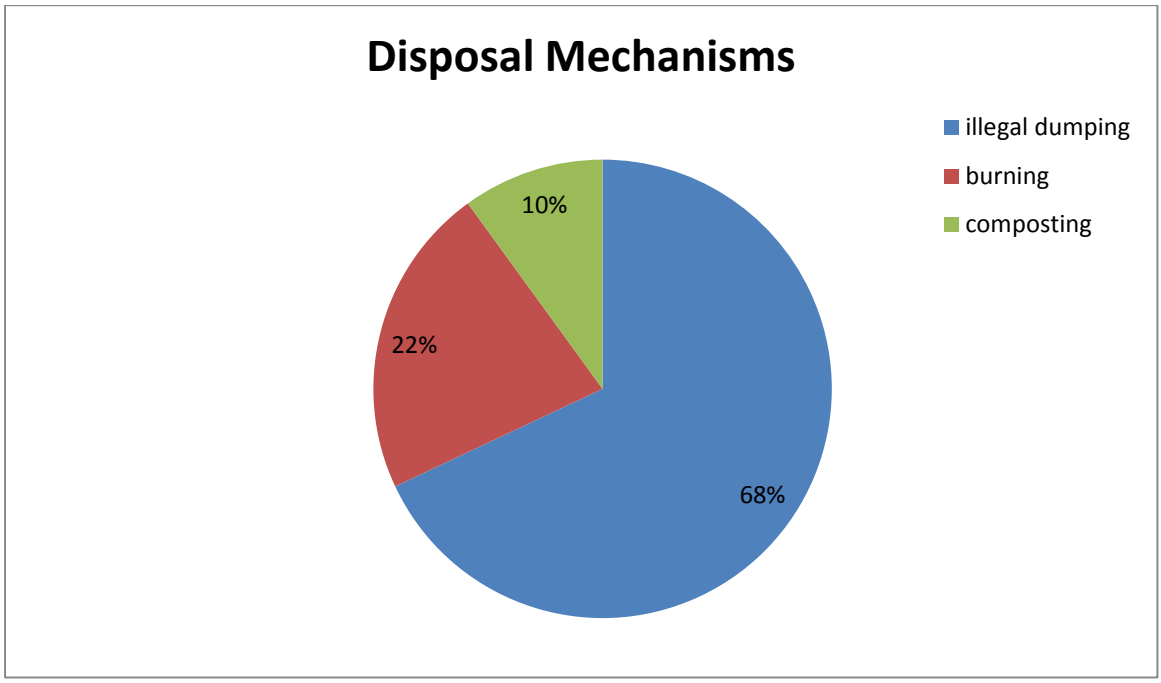
collection services which forces them to resort to illegal dumping of waste. When asked on waste collection routines this is what one of the respondents had to say

'....these days it's no longer certain sometimes they come weekly and sometimes we can go for about a month without collection services. So in the event that they don't come to collect waste we just dispose on our own because it becomes unhealthy to keep waste in our backyards....'

Waste collection has been indicated as the greatest challenges facing the city council. In highlands 25% indicated that waste is collected regularly that is on a weekly basis. This indicates a gap which exists between the high density and low density whereby the low income areas are not receiving services whilst the high income areas are provided adequate services. 10% in the CBD revealed that waste is collected regularly and the council workers clean the towns on a daily basis. The only problem seems to be that they can't keep up with the increased waste generation due to large numbers of people. In the CBD various stakeholders have taken initiatives in promoting the management of waste. Banks such as CBZ and other companies assist the council by providing bins to promote the proper disposal of waste.

4.8 ALTERNATIVE DISPOSAL OPTIONS USED BY RESIDENTS

Fig 4.4 Mechanisms used for uncollected waste



Source: Research Data 2017

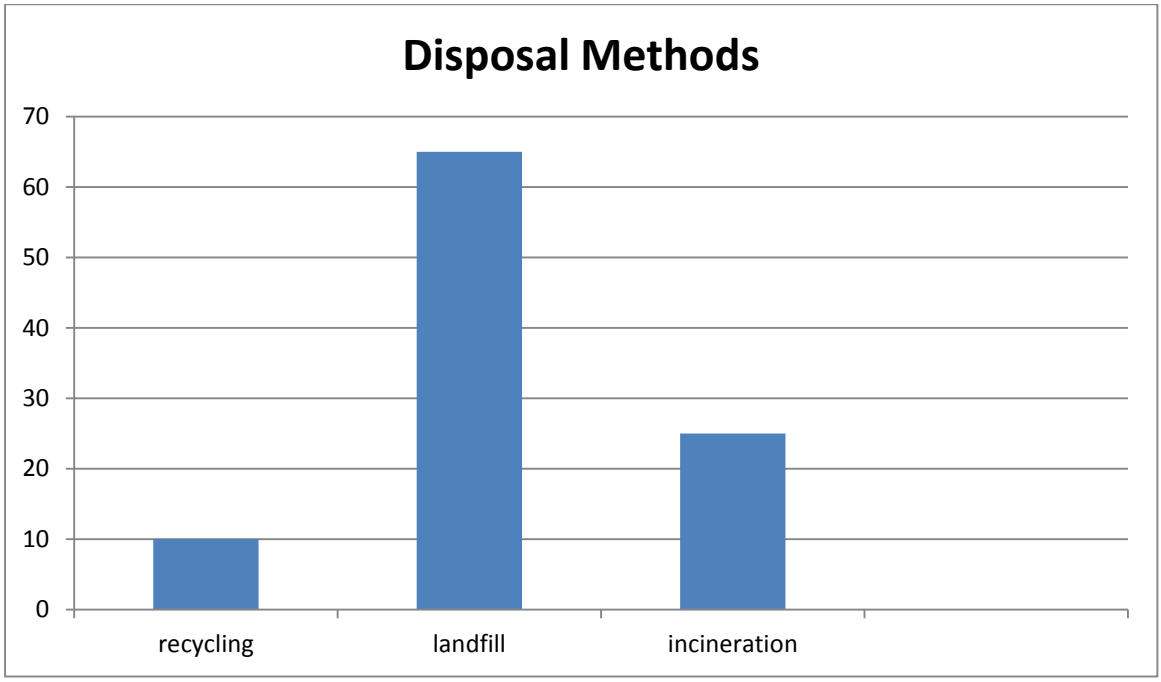
Solid waste collection in Harare is currently inconsistent and this is due to internal problems currently being experienced by the city council such as shortage of equipment and lack of finances to fuel and repair machinery. This however does not stop the generation of waste, heaps and heaps of waste continues to mount. Residents in the study revealed that poor service collection has triggered them to use other alternatives which include open illegal dumping, burning and composting. Mungai (1998) notes that in areas like Zambia people have resorted to illegal dumping. Figure 4.4 above show alternative methods used by residents when disposing uncollected waste. 72% resort to illegal dumping of waste in the event that the waste is not collected by city council. This is the remark made by one of the respondents

'……to be honest currently we just dump our waste everywhere where everyone else is dumping. Its harmful we know but we don't have much options that's why we end up dumping waste on open spaces……'

Waste is indiscriminately disposed in open spaces, along highways and in the streets reducing the appearance of the city. 18% resort to burning the waste if not collected. Burning however release toxic gases which cause air pollution. EME representative spoken to during the interviews highlighted that burning is unacceptable and can attract a fine. 10% revealed that they resort to composting to make manure they will use in their backyard garden.

4.9 SOLID WASTE MANAGEMENT AND DISPOSAL IN HARARE

Fig 4.5 Final solid waste disposal methods used by city council



Source: Research Data 2017

The chart illustrates the final disposal methods used by city council to dispose waste. Having collected waste from different areas the city council dispose waste at Pomona dumpsite. 10% of the materials is selected and then separated before being disposed of, this is done to allow various stakeholders to come and collect recyclables. Recycling is however done at a smaller rate. This as council workers say is due to the fact that mixed waste is difficult to separate and is time consuming. They indicated that it would be much easier if residents could

separate waste at source. The city council also use landfills as a disposal method. The process includes burying waste between layers and then levelling it. The study revealed that 65% of the solid waste is disposed at the landfill. However this method is still a challenge because it poses threats to the environment. The Pomona dumpsite has problems, according to the Herald Newspaper November 2016 due to immense pressure from the large amount of waste dumped there on a daily basis, the dumpsite caught fires after the gases from the decaying matter relented to the heat generated below the surface. Zimbabwe currently does not have sanitary landfills. The last method of waste disposal used is incineration. 25% of waste is incinerated. This is done by burning waste materials at high temperatures and converting it to ashes or gas. This method is mainly used when disposing clinical waste.

4.10 CHALLENGES FACED BY CITY COUNCIL IN SOLID WASTE MANAGEMENT

The results from the study revealed various factors affecting the proper management of solid waste in Harare. Solid waste has deteriorated and is posing many challenges to residents and environment. The major challenge that the city council is facing is funding.

'……currently the economic situation is very difficult but we are trying our best to ensure that we are able to provide adequate collection services with the available resources…'

The shortages of funding have made the management of waste difficulty as the process has become costly for the city council. The council is failing to improve their utilities and infrastructure due to shortages of money. Waste collection has deteriorated with some high density residents having to receive services after a month. The collection trucks are lying idle because the council does not have sufficient funds to fuel and repair the machinery. It can be noted that the council relies heavily for funding from the government through the mother ministry of the local government however the current economic challenges being experienced in the country makes it difficult for the government to provide funding to council with its reported dry coffers. Council also relies on rates paid by the residents for funding however

residents are failing to pay their bills due to economic hardships and also due to the fact that there are no strict measures being exercised on people who do not pay their waste collection fee hence they become reluctant. Inability of residents to pay their rates is a great challenge for the city council.

The other challenge in the management of solid waste is lack of education and awareness. People are indisposed when it comes to partaking in pro environmental activities such as recycling used materials. Many residents particularly Budiriro, Kuwadzana and Mbare have not embraced waste management practises due to their limited knowledge on the concept of solid waste management. This is what one of the respondents had to say

'…no campaigns or awareness programmes have been conducted in our area to educate us on waste matters that's why most people continue to dump waste carelessly however they are some people who just do it knowing very well the harm it causes to the environment…'

The lack of interest in environmental management breeds a culture of non-involvement of communities in decision making process and issues regarding the protection of environment. It can be noted that due to this Harare has now become a community of residents who lack sense of responsibility when it comes to the proper handling of solid waste. This lack of knowledge has resulted in a community which is narrow minded as people continue to dispose waste indiscriminately without paying attention to the harm it can cause to the environment. However EMA commented that they are trying the best they can however this has more to do with peoples attitude as they seem not to care at all.

The issue of inadequate disposal systems has also become an obstacle to the proper management of solid waste. It can be noted that there is lack of proper disposal sites in Zimbabwe. The city of Harare relies on the Pomona landfill for the final disposition of collected waste. The landfill has challenges in November 2016 it caught fire as the gases

from the decaying matter relented to the heat generated below the surface due to immense pressure from huge garbage disposed there daily. The Harare city council official when asked during the interview however revealed that

'……yes the issue of the disposal sites has been an issue of concern but we have since forwarded our prospect to EMA for a new landfill site in mount Hampden and we are at advanced stage on working plans to establish landfills which will be safe and easier to manage and the situation will definitely improve….'

Residents currently are dumping waste in the streets and illegal open and unprotected sites which poses threat to human wellbeing and environmental health. The lack of sanitary landfills has been a huge contribution to the problem of indiscriminate disposal of solid waste.

4.11 IMPACTS OF INDISCRIMINATE DISPOSAL OF SOLID WASTE ON ENVIRONMENT

The indiscriminate dumping of waste has resulted in environmental degradation and has affected water and air quality. From the observations made by the researcher at the Pomona dumpsite it was noted that the dumpsite is not compacted and does not have lining at the base. The dumpsite is characterised by leachate ponds. The dumpsite is a major health and environmental hazard this is because it has been subject to wild fires. The dumpsite also is not covered. The current condition at the dumpsite promotes the growth of disease vectors such as houseflies. The leachate from the dumpsite has also been polluting underground water.

Air Pollution

The heaps of waste on open spaces produce an unpleasant smell which affects both human and animals. The bad odours have undermined air quality. Some of the respondents noted that

'….we no longer pass through that place at the end of this street because that is where most people in this area (mbare) dump their waste and it smells horribly and it has become a place of public nuisance….'

Residents in Harare have resorted to burning of waste and this undermines air quality. Burning of solid waste produces gases which are toxic such as carbon monoxide. Children below the age of 6 have been reported to have been affected by respiratory diseases due to inhaling the smoke from the burning waste. EMA revealed that burning of waste is very challenging as some of the solid waste is flammable and can lead to veld fires which affect the environment. Burning of waste also leads to the formation of acid rain. The acidic rain has affected aquatic life and streams in Harare.

Water Pollution

Water pollution in Harare is also largely due to the indiscriminate disposal of waste in water sources that is rivers and streams. The waste carried through runoff into the streams has undermined water quality. Some of the residents noted that they dump waste in nearby rivers and this has resulted in eutrophication as water bodies have become enriched in dissolved nutrients that stimulate the growth of aquatic plants. In the rivers that the researcher observed there are aquatic plants which are growing thereby affecting the flow of water. Polluted water also become unsafe for drinking and this poses a challenge to residents who relies on these rivers as alternative water sources since water in Harare is a challenge. In Budiriro residents revealed that the 2008-2010 cholera outbreaks were as a result of improper management of waste and also dirty water.

Land Pollution

The litter that is being disposed everywhere is affecting the appearance of the city. The land is being affected by the litter which is thrown everywhere. Most of the roads in Harare are covered in litter as people have adopted a throw away culture of plastics and also fast foods eaten on the run. The site is not pleasing to see at all.

Spread of Diseases

Storing waste in the backyards for long periods of time provides a breeding place for houseflies which cause diseases such as diarrhoea. Some of the flies enter the houses and affect food quality in households. Chingwenya noted that organic domestic waste threaten the health of people as they decay thereby creating necessary conditions for the growth of pathogens which causes cholera and diarrhoea. Waste collectors are also at huge risk of diseases. Direct handling of waste can cause infection and also injuries especially when dealing with clinical waste.

4.12 SOLUTIONS FOR IMPROVING SOLID WASTE MANAGEMENT

During the interviews respondents were asked to provide suggestions on how best solid waste can be managed and solution to the challenges posed by the improper management of waste. Various suggestions were brought forward which might help improve the management of solid waste both at local and national level

Payment ofBills

The city council indicated that residents should pay their rates on time so that the council will be able to repair and maintain equipment that is used in the process of waste management. Council worker noted that

'.....the situation can also be improved by the residents, we encourage the residents to pay their rates and cover their debts….'

Many residents also are still in debt owing the city council hundreds of US dollars thus the city council advised that the situation can be helped if the residents pay their bills and cover their debts.

Integrated Approach to Solid Waste Management

Respondents during the research advised that the effectiveness of solid waste management system relies upon the meaningful participation of various stakeholders including NGOs, private sector, institutions and individuals. Makwara (2013) advocated for an integrated approach to waste management. Partnership with the private sector is essential because they can play a complimentary role and provide financial resources and technical expertise which the city council is lacking. Respondents viewed that incorporating all stakeholders will definitely improve the situation.

Increase Bins

Respondents particularly vendors asked from the streets indicated that the bins must be increased in most vending sites and the central business district noting that it is difficult for someone to walk a longer distance holding waste until they reach the bin. Therefore bins should be at all points and street corners. Efforts are being made to promote a clean environment however there can never be too many bins especially in the CBD with the increased population and economic activities conducted there. Residents also feel that the city council should be able to provide proper bins so that they will stop using mealie meal sacks and cardboard boxes.

Recycling

The city council authorities advised that it would be really helpful if residents could recycle solid waste material and that it would be easier for them if residents also separate waste

within the household. There are objects and materials which can be transformed into useful products or they can be given away to other people.

Clean up Campaigns

Some residents recommended for the participation of stakeholders even youth involvement in clean up campaigns. Respondents highlighted that there is increased waste generation in Harare due to population growth hence the city council alone cannot keep up with the increased solid waste. Respondents noted that it would be helpful if organisations and churches conduct clean up campaigns to keep the city clean and raise awareness on how imperative it is to promote a clean environment**.**

4.13 Chapter summary

This chapter focused on the presentation and analysis of data which was gathered during the research. Data used was from questionnaires, interviews and observations made by the researcher. The data was presented in form of tables, graph and narrative form. The chapter managed to present the response rate and demographic data. The chapter looked into the waste management process and providing resident's experiences in relation to waste handling and storage, waste collection and disposal. Challenges faced in solid waste management including lack of funding and resources were highlighted. The aim of the research was to investigate the impacts of the indiscriminate disposal of solid waste on environment and in this chapter most of the impacts noted during the research. Possible solutions and suggestions on how to improve waste management given by respondents were highlighted.

CHAPTER 5

SUMMARY, CONCLUSSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

The aim of this chapter is to give a summary of the whole research, conclusions and recommendations. All the chapters in the study will be highlighted briefly in this chapter. Drawing from the findings made from the research this chapter will highlight the conclusions and recommendations which are directed to the Harare city council and the residents of Harare.

5.2 SUMMARY

This study was aimed at investigating the impacts of indiscriminate disposal of solid waste on environment a case of Harare. Harare city is characterised by heaps of waste along highways and litter in the streets. People have resorted to careless dumping of waste. Thus the research as part of the objectives sought to identify factors affecting the proper management of solid waste, to investigate the impacts of the indiscriminate disposal of solid waste on environment and lastly to highlight possible solutions that can be adopted in order to improve solid waste management in Harare. It can be noted that the current condition of Harare is not pleasing; people continue to dispose waste indiscriminately. The situation is largely due to increased population and urbanisation which leads to increased waste generation. The city council are failing to keep up with the growing population. Lack of resources has resulted in low waste collection leaving residents with little options if none at all.

The background of the study provided the knowledge that solid waste is a global challenge having begun in Europe with the coming in of the industrial revolution. The situation in Europe was however managed by the establishment of effective disposal systems. In countries like Japan and USA they focused on promoting Zero waste and sustainable waste management systems. The situation however is not the same in the developing countries.

Solid waste management is a major issue of concern in Africa with challenges ranging from financial constraints and lack of technical expertise to lack of sanitary landfills. In Zimbabwe the challenge began after the adoption of ESAP which impacted negatively on the economy and also the infamous land invasion. This negatively affected the council which largely depended on the government and donor funding. The de colonisation of Zimbabwe also promoted the free movement of people from rural areas to the city which increased population in the city. To the urban poor waste management has become a nightmare and they have since resorted to the illegal of solid waste. Poor service delivery has since resulted in the careless disposal of waste in highways and in the streets.

Chapter 2 revealed existing literature on solid waste management. The aim of literature review was to identify gaps in knowledge. The literature indicated that solid waste has been defined in so many varied ways. The scholar seem to have an agreement on the view that solid waste is any unwanted material discarded as useless and having no future value. This study however discovered that not all waste should be discarded as some can be transformed into useful products. Information from other scholars reviewed in this study indicated that waste generated in urban areas across the world could reach up to 27 billion tonnes by 2050. This chapter also highlighted the nature of solid waste management in countries like Nigeria, Kenya, Zambia and South Africa among others and all the studies conducted in those areas revealed that there are having problems in the management of waste due to inadequate financial resources, population growth and attitude of residents who continue to carelessly dispose waste. Inadequate disposal systems in Africa have increased the rampant burning of waste which has negative impacts on the environment. Literature reviewed from other studies showed that solid waste leads to the contamination of water sources, air pollution from burning of waste and it also destroys habitat and alters aquatic life. Human health has also been affected by improper handling of waste. Diseases such as cholera, diarrhoea and

respiratory diseases have also been noticed in Zimbabwe and other parts of the world. Existing literature on strategies that can be put in place to promote the sound management of waste were also highlighted in chapter 2. Other works indicated that it is imperative that residents adopt a culture of recycling, practise composting waste and building sanitary landfills.

Chapter 3 in this chapter the research methods used were highlighted. The researcher used both qualitative and quantitative design. The research was however qualitative with quantitative employed as an aid. Qualitative method was used because it facilitated the interaction with respondents and provided an understanding of their experiences and reactions to the challenges of solid waste management. The research targeted population included EMA officials and HCC officials, council workers, CBD and residents from four different locations namely Kuwadzana, Budiriro, Mbare and Highlands. The different locations selected provided experiences from both the high density suburbs and low density suburbs. The research used stratified random sampling which facilitated the easy classification of people. Purposive sampling was also used to target key stakeholders with relevant information related to the topic under study. The research used both primary and secondary sources and data collection tools used were questionnaires, interviews, observations and library text and sources from the internet. In order to check for errors the research conducted a pilot study. The research used tabulations and content analysis in data processing and analysis. This helped in the simplification of data. Transport cost, time and cooperation of the people were some of the challenges encountered during the research.

Chapter 4 focused on the presentation and analysis of data. Data that was used was obtained from both primary and secondary sources. Data was presented in the form of pie charts, graphs and tables. The response rate of residents from the questionnaires was 80%. The response rate from the interviews was 80%. Majority of the respondents were women with a

total percentage of 55% this is because many women were interested because they were familiar with the subject matter. Most respondents were aged between 31-40years. The research revealed that waste produced in Harare included domestic, agricultural, industrial, and clinical waste. Residents generate a lot of waste and from the findings of the research they do not have proper storage facilities. Those in the high density highlighted that they use mealie meal sacks and cardboard boxes for storing their waste. Waste collection has deteriorated with high density residents having to receive waste collection after two weeks or a month. This situation has triggered the illegal dumping of waste in Harare highways and streets. However there exists a gap between low and high density areas. Those in the low density noted that they receive collection services regularly. The HCC revealed that this is due to the low population in low density suburbs.

Residents revealed that when waste is not collected they burn or dispose indiscriminately on open spaces. Very few practice composting and this poses major challenges to the environment. The city council having collected waste they indicate that they separate waste and call stakeholders to come and collect recyclable materials. Recycling is however done at a small scale. The council largely relies on dumping waste on Pomona dumpsite. Some of the waste is incinerated particularly clinical waste. This chapter also presented the challenges faced in the promotion of sound solid waste management in Harare. Some of the challenges indicated by respondents included lack of funding, lack of technical expertise, lack of education and awareness and inadequate sanitary landfills. The aim of this study was to find out the impacts of indiscriminate disposal of solid waste on environment in Harare. The results showed that dumping of solid waste carelessly has resulted in the contamination of water sources, air pollution from burned waste. Human health has also been undermined with the increase of the spread of diseases such as cholera and diarrhoea being facilitated by the improper management of waste. Respondents also highlighted possible solutions that can be

adopted to promote sustainable solid waste management systems. The suggestion highlighted included recycling, conducting clean up campaigns, the council advised that the residents should pay the rates and cover their debts.

5.3 CONCLUSION

Based on the research findings it can be concluded that the problem of poor solid waste management in Harare is a resultant of many factors. Major factors contributing to this challenge include lack of adequate resources and also the mismanagement of these few resources. Lack of funding, irregular waste collection services have become huge impediments to sustainable development. The issue of the management of waste however is not solely the responsibility of the city of Harare management; residents also should work together with the council. It can be noted however that the attitude of residents toward solid waste management has been a huge challenge. Residents continue to indiscriminately dispose without considering the harm it causes to the environment. This has been a huge set back to the city councils quest to ensure a clean environment.

The aim of solid waste management is to promote a healthy and friendly environment from dirt and pollution and also safeguarding public health. However results from the research have shown that people are carelessly dumping waste. Residents of Harare due to low waste collection have resorted to dumping of waste in water bodies and open spaces such as streets and highways. This has negatively affected the environment. Surface water for example rivers have been contaminated as people dump waste in rivers. Underground water has been contaminated through leachate from the dumps. The air quality is also undermined as the heap of waste produces an unpleasant smell. Spread of diseases such as cholera and diarrhoea has also been transmitted as dumps become breeding sites for pathogens which cause these diseases.

Based on the research finding, it can be concluded that through commitment and dedication strategies can be put in place to improve solid waste management in the city of Harare. These strategies include all stakeholder participation, awareness and clean up campaigns, recycling, and building of sanitary landfills and the enforcement of existing legal framework.

5.4 RECOMMENDATIONS

Having conducted the research and gathered information which is in line with the research objectives the researcher has noted some gaps in solid waste management hence wishes to make recommendations to key stakeholders.

Community Participation

Community members should be heavily involved in solid waste management. Households and the public should take responsibility for their own health and welfare by promoting a safe and clean environment. Community members can be major drivers of sustainable development if only they take interest in issues of solid waste management. They should also be given a platform to take a stand in issues affecting their daily lives.

Law Enforcement

Laws and policies have been put in place by EMA and the city of Harare to ensure a health environment. However the implementation and adoption of these policies by the public have been a major challenge. There should be an effective national policy on solid waste management which governs both local authorities and the community. Stricter measures in law enforcement should be adopted and also there should be a clear outline of the practical steps and procedures that can be taken to ensure that the by-laws are upheld.

Reduction, Reuse and Recycling (3Rs)

It is imperative that the public become familiarised with the concept of the 3Rs which entails reduction of solid waste, re use of products and recycling of solid waste materials. Solid waste management involves reduction whereby people should try as much as possible to minimise the volume of waste they generate in their households or industries. This will ensure reduced waste for collection and disposal. The public should practice re use of products for example containers and cardboard boxes can be used more than once for different purposes. Recycling is also essential in reducing the amount of waste generated. Materials can be transformed into useful products or be given away to other people who are in need of them.

All Stakeholder Participation

Various stakeholders should be incorporated in solid waste management. Institutions, NGOs, private sector and churches should be involved and complement the efforts of city councils. It can be noted that these stakeholders have the financial resources and expertise needed to ensure the management of waste. Solid waste management needs a holistic approach it is not solely the responsibility of city of Harare. Currently in Harare companies are providing city council with bins and there is need for more partnership with the council to ensure a healthy environment.

Sanitary Landfills

There is need for the establishment of sanitary landfills in Harare. It is equally important to build carefully engineered landfill which serves as the final disposal of solid waste. The landfill must be compacted to avoid contamination of the environment. This should be authorised by EMA so that the city of Harare would be able to adhere to the standard that would have been set by EMA. Landfills require a lot of money but if they are properly set up it is worthwhile in the long run.

Solid waste management should be given top priority because not only is it catastrophic but a set back towards development. The processes of waste management should be specifically budgeted for to promote efficiency. In Zimbabwe solid waste management is overlooked it is high time that it's given priority. Sufficient funds should be channelled to this area.

5.5 CONCLUSION

This chapter provided an overview of the whole research, highlighting the major findings which have been presented and analyzed in the chapters. This chapter also provided possible recommendations to deal with the problem of indiscriminate disposal of solid waste in the study area. All was done to promote a healthy environment and promote sustainable development.

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APPENDIX 1

INTERVIEW GUIDE FOR THE ENVIRONMENTAL MANAGEMENT AGENCY (EMA) ON THE IMPACTS OF THE INDISCRIMINATE DISPOSAL OF SOLID WASTE ON ENVIRONMENT

Good day to you Sir/ Madam. My name is Blessing Sikangela a final year student of development studies at Midlands State University. I am conducting a research on the impacts of the indiscriminate disposal of solid waste on environment. It is my pleasure to meet you. I hope you are going to assist in the best way you can. Please be assured that the information you are going to give will be used for academic purposes only and will be treated with confidentiality. Feel free to express yourself. Your cooperation is highly appreciated.

SECTION A

Job Title .....

Date .....

SECTION B

1. What is your relationship with the Harare city council?
2. What is your comment on the current waste management systems in Harare?
3. What factors do you consider with regards to the location of the dumpsite?
4. What are some of the challenges solid waste poses on environment?
5. What are some of the challenges EMA is facing with regards to the protection of environment?
6. As EMA what are some of the policies that you have put in place to ensure proper management of solid waste?
7. Wat suggestions and recommendations would you give to city authorities and urban residents to improve solid waste management?

Thank you!

APPENDIX 2

INTERVIEW GUIDE FOR THE HARARE CITY COUNCIL (HCC) ENVIRONMENTAL IMPACTS OF THE INDISCRIMINATE DISPOSAL OF SOLID WASTE

Good day to you Sir/ Madam. My name is Blessing Sikangela a final year student of development studies at the Midlands State University. I am conducting a research on the impacts of the indiscriminate disposal of solid waste on environment. It is my pleasure to meet you. I hope you are going to assist in the best way you can. Please be assured that the information you are going to give will be used for academic purposes only and will be treated with confidentiality. Feel free to express yourself. Your cooperation is highly appreciated.

SECTION A

Job Title .....

Date .....

SECTION B

1. How long have you been working for the city council?
2. What is the current status of solid waste management in Harare?
3. How often is solid waste collected in communities?
4. Which residents generate a lot of waste, high density or low density?
5. What are some of the challenges the council is facing in solid waste management?
6. What is your relationship with EMA?
7. What are some of the disposal options that are being used by residents in communities and their impact on environment?
8. What recommendations would you give to promote efficiency in solid waste management

Thank you!

APPENDIX 3

QUESTIONAIRRE FOR RESIDENTS

My name is Blessing Sikangela lam a final year student at the Midlands State University studying Development Studies. I am conducting a research on the impacts of the indiscriminate disposal of solid waste on environment. The purpose of this questionnaire is to gather information relating to the study and your assistance is highly appreciated. Kindly note that all information you give would be used solely for academic purposes therefore confidentiality is guaranteed.

SECTION A **(*tick where appropriate*)**

Gender

Male ☐ Female ☐

Age

20-30 ☐ 31-40 ☐ 41-50 ☐ 51-60 ☐

Level of education

ZJC or below ☐ 'O' Level ☐

'A' Level ☐ Certificate or better ☐

SECTON B

1) How long have you been staying in Harare?

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2) How often do you receive waste collection service in your area?

Weekly ☐ Fortnightly ☐ Monthly ☐

3) How would you rate the city councils performance in your area?

☐ ☐ ☐

Best Good Poor

4) How do you dispose your household waste? (*tick the appropriate answer*)
   a) Use city council facilities ☐
   b) Dumping in nearby bushes ☐
   c) Backyard pit ☐
   Other …….

5) How do you handle uncollected waste? (*tick the appropriate answer*)
   a) Dump the waste ☐
   b) Burn waste ☐
   c) Burry waste ☐
   Other: .....

SECTION C

6) What do you think are some of the factors affecting solid waste management in your area?
   .....
   .....
   .....
   .....

7) What environmental challenges are being faced in your area as a result of poor solid waste management?

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8) What measures do you think can be put in place to address the challenges of solid waste management both at local and national level?

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…….

Thank you so much for sparing your time to complete this questionnaire!