AN ANALYSIS OF THE PARTICIPATION OF HOUSEHOLDS IN SUSTAINABLE DOMESTIC SOLID WASTE MANAGEMENT: THE CASE OF WARD 2, SAKUBVA.

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B1128098

A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE BACHELOR OF SCIENCE HONOURS DEGREE IN DEVELOPMENT STUDIES
MAY 2015
APPROVAL FORM

The undersigned certify that they have read this project and have approved its submission for marking after confirming that it conforms to the Geography department requirements.

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Supervisor (Mrs Chinyanganya)                                  Date
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Co-Supervisor                                                               Date
DECLARATION FORM
I, Chioneso Gambiza, declare that this thesis is a result of my research and sources of information other than my own have been acknowledged. This work has not been previously submitted to any other university except the Bindura University of Science Education for award of Bachelor of Science (Honors) Degree in Development Studies.

Signed ........................................ Date .................................
DEDICATION
This special dedication goes to my mother Chipo Annah Gambiza who has always been my pillar of strength because she never gave up on me. I also dedicate this piece of work to my husband Lesley Marisa, my baby Hannah Nokutenda and the rest of my family.
ACKNOWLEDGEMENTS
Firstly, I would like to thank the Lord Almighty for seeing me through this research work. If it was not for His favour, I would not be where I am today. I would like to extend my sincere gratitude to everyone who made this study possible, my lecturers, my aunt Jessica Magaisa and my sister Vimbai Gambiza. Special thanks go to my direct supervisor, Mrs Chinyanganya for her patience and assistance through my dissertation. It was a pleasure indeed to work with her. To all my friends thumbs up for the light moments we shared, the support and for providing a friendly studying environment throughout the four years of my university life. Most of all I would like to thank the Mutare municipality staff, especially the town clerk Mr Muzawazi and the senior hygiene officers, Mr Chirau and Mr Dukwa for granting me the permission and opportunity to do this research.
ABSTRACT

The study aimed at analysing the participation of households in sustainable domestic solid waste management in Ward 2, Sakubva. The research was motivated by the presence of illegal dumpsites composed of mixed solid waste which revealed that there is no sustainable domestic solid waste management being practiced in the area. Ten percent of the population which constituted 145 households was sampled and questionnaires were administered to them. Triangulation was employed with 6 municipal officers and 1 EMA officer being interviewed; an FDG and an observation guide being commensurate research instruments used. The research results revealed that most of the residential survey respondents were females whilst males constituted the minority of the total population. The results also revealed that biodegradable kitchen waste is the highest type of waste being produced and most households did not own bins hence resorted to the use of informal bags to store waste. Most households did not sort waste before disposing whilst only a meagre 12% did. The survey also revealed that municipality of Mutare was very unreliable and not collecting waste as they should; hence people used unsustainable alternative methods of waste disposal to ameliorate the situation. Statistical correlation (-0.104> r calculated>0.104) revealed that demographic characteristics which are gender, age and level of education, have a role to play in the choice of alternative waste disposal methods. Chi-square test of significance ((398.2); p=0.001<0.05) also showed that lack of space, lack of finance, lack information and lack of interest affected the alternative disposal methods by households in managing domestic solid waste. The research proved that households were not participating in sustainable domestic solid waste management (48% open dumping and 0% recycling). The following recommendations were made; the municipality to hold educational campaigns, provide skip bins, make communal composts and provide sound policies on domestic solid waste management. Households were recommended to re-use waste, sell paper and plastic or to make floor polish. Ward 2 counsellor was recommended to hold clean up campaigns.

Key Words: domestic solid waste, sustainability, household participation, waste management.
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<tr>
<td>DSWM</td>
<td>Domestic Solid Waste Management</td>
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<td>MDGs</td>
<td>Millennium Development Goals</td>
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<td>SDSWM</td>
<td>Sustainable Domestic Solid Waste Management</td>
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<tr>
<td>UNEP</td>
<td>United Nations Environment Program</td>
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<tr>
<td>UN-HABITAT</td>
<td>United Nations Human Settlements Program</td>
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<tr>
<td>EPA</td>
<td>Environmental Protection Agency</td>
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<td>ISWM</td>
<td>Integrated Solid Waste Management</td>
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<td>SWM</td>
<td>Solid Waste Management</td>
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<td>EMA</td>
<td>Environmental Management Agency</td>
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<tr>
<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
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<td>NIMBY</td>
<td>Not In My Backyard</td>
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<tr>
<td>ZIMSTAT</td>
<td>Zimbabwe National Statistical Agency</td>
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<tr>
<td>SDG</td>
<td>Sustainable Development Goal</td>
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<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
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<td>ZIMASSET</td>
<td>Zimbabwe Agenda for Sustainable Socio-Economic Transformation</td>
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CHAPTER 1

INTRODUCTION

1.1 Introduction

Rapid urbanization coupled with increased population levels is a developmental challenge for municipal authorities and Domestic Solid Waste Management (DSWM) has become one of the most serious challenges (Guerrero et al., 2013). According to Laurent et al. (2014) DSWM is of paramount importance since it is also an important contributor to many different environmental problems. These environmental problems range from climate change (from emissions of greenhouse gases (GHGs) from landfills), human health damages (from exposure to chemicals and particles during waste collection and treatment), ecosystem damages (from emissions of heavy metals to air, soil and surface water), and resource depletion (due to currently inexistent or inefficient recycling systems for certain key minerals or metals) (Laurent et al., 2014).

In order for municipalities to be effective it requires them to be able to embrace the concept of sustainability in solid waste management (Laurent et al., 2014). Sustainable DSWM is envisaged in the United Nations Millennium Development Goals (MDGs) and is connected to MDG seven (Medina, 2010). The seventh MDG indirectly advocates for Sustainable Domestic Solid Waste Management (SDSWM) by ensuring the inclusion of environmental sustainability into countries’ policies and programs and reverse negative environmental impacts (Medina, 2010). Studies pertaining to the management of domestic solid waste recommend waste reduction through recycling, reuse and repair which is the 3R principle (Parrot et al., 2009). This principle of sustainability, if correctly adopted does not only reduce waste but also increases the use of waste as a resource resulting in employment creation for the local people (Parrot et al., 2009). Such efforts will help cities to reduce the financial burden on city authorities for waste management, as well as reduce the pressure on landfill requirements (Laurent et al., 2014).

According to Ezeah and Roberts (2012) the world now is characterized by increasing scarcity where raw materials from natural resources are limited, financial resources are often insufficient, and securing land for final disposal is getting more difficult. The resource value of waste can act as an important driver in many developing countries (UN-HABITAT, 2010) since informal
recycling can provide a livelihood for the urban poor in many parts of the world (Wilson, 2007). Wilson (2007) underscores that developing countries can improve waste management systems by selling carbon credits to developed countries under the clean development mechanism as envisaged by the Kyoto protocol. This suggests that city authorities should set policy directions aiming for resource efficient, recycle-based societies if they are to provide a clean, healthy and pleasant living environment to its citizens for current and future generations (Ezeah and Roberts, 2012).

However, Guerrero et al. (2013) mention that the operational efficiency of SDSWM depends upon the active participation of both the municipal agency and the citizens, hence people should participate in decision making (Sharholy et al., 2008), community awareness and societal apathy for contributing in solutions to DSWM (Moghadam et al., 2009). SDSWM is the nexus between generating agents and managing agents (Henry et al., 2006). In order to accomplish and increase effectiveness of SDSWM it is crucial to take into account community participation and their attitudes (Yuan, 2012). Household waste reduction efforts at source by means of various techniques like recycling, reuse and composting (Choe and Fraser, 1999) determine the optimal sustainable waste management scheme. Khan (2006) reveals this concept as a comprehensive solid waste model that combines these elements with active stakeholder’s participation even at household level.

1.2 Background of the study

Studies pertaining to waste management in Zimbabwe show that; lack of capacity to manage solid waste is one of the most visible and pressing urban environmental problems (Masocha and Tevera, 2003). Therefore waste management has emerged as one of the greatest challenges facing local authorities throughout Zimbabwe (Makwara, 2011). Nhete (2006) argues that in Zimbabwe, waste collection has virtually collapsed triggering its chaotic and rampant illegal dumping. The waste is characterized by vegetative matter, tins, glass, cans, metals polythene, and wood among others (Nhete, 2006). If improperly handled and disposed of, it can cause substantial harm to human health, death of smaller animal and plant organisms and a general breakdown and loss to the immediate ecological systems (Makwara, 2011). Residents characteristically dispense of the waste they generate without regard for the environment since it is treated as common property (Nhete, 2006).
The municipalities which have the sole responsibility for waste management in the cities have the challenge to provide an effective and efficient system to the inhabitants (Guerrero et al., 2013). City of Mutare Department of Housing and Community Services is the one responsible for domestic solid waste management in Mutare and it has the sole responsibility of providing bins for storage of the waste, collection, transportation, processing, treatment and disposal of the waste. However, Sujauddin et al. (2008) reveal that these municipalities face problems beyond their ability to tackle mainly due to lack of organization, complexity and system multi dimensionality, financial resources and insufficient equipment such as collection trucks, (Burntley, 2007). According to Matimiti (2011), a municipal department of waste disposal in a city should have at least ten vehicles. In Mutare however, out of the seven trucks that are available, two trucks are on the road (City of Mutare, Department of Housing and Community Services, 2014). Regarding of waste management as a sole responsibility of local authorities by the citizens of Mutare has resulted in the public deeming it unnecessary for them to contribute to sustainable domestic solid waste management.

It is against this background that the researcher seeks to analyse the participation of households in sustainable domestic solid waste management in Ward 2, Mutare. The proposition of this study is to assess the methods that the households are using especially in the event of the municipality not collecting waste and to understand the barriers that deter them from using sustainable methods. This will help to propose feasible solutions. This is important in the observation that sustainable domestic solid waste management in the area of solid waste management is increasingly important from a global perspective of resource management.

### 1.3 Problem Statement

Ward 2, Sakubva has a general problem of indiscriminate waste dumping as the volume of waste generated continues to increase at a faster rate than the expansion of Sustainable Domestic Solid Waste Management (SDSWM) measures. These measures were formulated in order to establish ways of sustainably dealing with solid waste. Indiscriminate waste dumping is also exceeding the ability of the municipal authorities to improve on the financial and technical resources needed to parallel this growth. The problem is vividly indicating that households are not sustainably managing waste as revealed by the composition of waste at the illegal dumpsites and observed
bins. Households in ward 2 need to mobilize themselves in this world of limited resources to participate in SDSWM with the nature of waste they produce. Lack of participation is as a result of different barriers to participation that the study will also investigate because when households contribute to waste management, the ceiling of Sustainable Domestic Solid Waste Management can be reached.

1.4 Justification of the study
Low income suburbs are the most affected with the rising problem of poor domestic solid waste management, and this is vividly seen in Ward 2, Sakubva by the sprouting of illegal dumpsites. According to UNEP (2009) the concept of sustainable DSWM aims to continually improve the environment, provide direct health benefits, support economic productivity, and provide safe, dignified and secure employment. The study will benefit the local authorities, policy makers and other urban centres that face the problem of waste management. The study will provide baseline information for urban authorities who are adopting the idea of Sustainable Domestic Solid Waste Management in cities as well as to probe the citizens to mobilize themselves to sustainably manage waste. This study will also lead to the reduction of diseases associated with waste for example typhoid, plague and malaria. The research will provide a basis for further research in related areas.

1.5 Delimitation of Study
The study concentrated plainly on household participation in sustainable domestic solid waste management in Mutare, narrowing the focus to Ward 2, Sakubva. By mere observation, it is the area mostly affected by overflowing refuse bins and illegal dumping sites of waste. The study also reflected on the current methods of domestic solid waste management whether they are sustainable or not as well as the barriers to participation of households. Subjects drawn were specifically the 18 and older age group.

1.6 Main Objective
The study aims to assess the participation of households in sustainable domestic solid waste management.

1.7 Specific objectives
- To determine the nature of waste generated by households in Ward 2, Sakubva.
- To identify the methods of Domestic Solid Waste Management in Ward 2, Sakubva.
To establish the main barriers to participation of households in Sustainable Domestic Waste Management in Ward 2, Sakubva.

1.8 Research Hypotheses

1. There is a positive relationship between demographic characteristics of the population and alternative methods of domestic solid waste management.

2. There is a significant relationship between alternative methods of domestic solid waste management by households and the barriers to participation of household in sustainable domestic solid waste management.

1.9 Definition of Terms

**Solid Waste**: Any movable substance or material that is perceived to be of no further use and therefore should be discarded.

**Domestic Solid Waste**: Non-liquid material comprising of garbage and rubbish for example empty bottles, food scraps and yard trimmings, that is discarded from private homes or apartments because it has served its purpose and is no longer useful.

**Solid Waste Management**: Systematic control of generation, collection, storage, transport, source separation, processing, treatment, recovery and disposal of solid waste.

**Sustainable Solid Waste Management**: The employment of several waste control methods based on the waste hierarchy including avoidance, reduction, recycling, reuse, recovery, treatment and disposal, aimed at minimising the environmental impact of waste.

**Environment**: The surroundings or conditions in which a person, animal, or plant lives

**Household**: social unit comprised of people living in the same house, with a head, and pooling their incomes together for the management of their dwelling unit.
**Household Participation**: getting involved in, or taking part in an activity by individuals at household level

**Sustainability**: whether or not an activity continues to happen over time

### 1.10 Organization of the study
The study is presented in five chapters:

Chapter 1 introduced the general picture of the issue, the background, the study area, the statement of the problem and the objectives of the study. Chapter 2 explored related literature to the study, and also further defined the topic under study. Chapter 3 brought out the research design, the materials used for collecting the data, the methods of observation and how the data is going to be analysed and interpreted. After these explanations, chapter 4 then went on to show the results of the survey and data analysis as well as the discussion. The final part, which is chapter 5, then gave the summary, conclusion and the recommendations.

### 1.11 Summary
Chapter 1 highlighted the main aim of the study which is to assess the participation of households in sustainable domestic solid waste management (SDSWM). The study reveals an emerging issue of the proliferation of illegal dumpsites in Ward 2, Sakubva which needs to be addressed through the participation of households in SDSWM. The chapter also highlighted the objectives, delimitation as well as the hypotheses.
CHAPTER 2

LITERATURE REVIEW

2.1 Introduction
Literature review is an account of what has been published on a topic by accredited scholars and researchers. This chapter reviewed literature pertaining to participation of households in sustainable domestic solid waste management. Focus was on the methods of solid waste management, the barriers to participation of households in sustainable solid waste management as well as the concept of sustainable solid waste management.

2.2 Historical origins of solid waste management
Ezeah and Roberts (2012) unveils that mass production of solid waste by humans dates back to the days of the non-nomadic societies around 10,000 BC. According to Marshall and Farahbakhsh (2013) public health concerns, security, scarcity of resources and aesthetics acted as central drivers for waste management systems. This is corroborated by the fact that small communities managed to bury solid waste just outside their settlements (Wilson, 2007) or dispose of it in nearby rivers or water bodies, but as population densities increased, these practices no longer prevented the spread of foul odours or diseases (Seadon, 2006). As waste accumulated in these growing communities, people simply lived amongst the filth (Marshall and Farahbakhsh, 2013).

Several initiatives were implemented to clean up the streets, but all were short-lived because the poor focused on feeding themselves and the rich opposed on paying to clean up for the poor (Wilson, 2007). Seadon (2006) brings an early notion of recycling when he notes that the scarcity of resources ensured many items were repaired and reused and the waste stream was thoroughly scavenged. Marshall and Farahbakhsh (2013) then concluded that when solid waste management was finally started; public health, the environment, resource scarcity and the value of waste were the driving factors.
2.3 Demographic characteristics and domestic solid waste management

According to Trochinetz and Mehelcic (2009), gender and age affect how individuals dispose waste. In their study of Shekels, Trochinetz and Mehelcic (2009) revealed that 70% of the respondents were females because they were mostly available at home during the time of the questionnaire distribution. The authors concluded that women are largely responsible for the household chores; therefore waste management affects them more than men (Trochinetz and Mehelcic, 2009).

Gender has a role to play on the type of waste produced by communities (Momoh and Oladebeye, 2010). In Kenya, glass and can were mostly disposed by men, whilst kitchen waste was disposed by women (Henry et al., 2006). Of the 30% male respondents in Kenya, the majority of them responded to open dumping as an alternative disposal method when municipality does not collect domestic solid waste. Age as a demographic characteristic also affects domestic solid waste management (Masocha and Tevera, 2003). Responsible citizens in Palestine were found to be the elderly who regarded waste to be detrimental to the environment (Tchobanoglous et al., 1993). The elderly commented that people should compost or re-use waste rather than open dump because waste is the responsibility of both the residents and the municipality (Tchobanoglous et al., 1993).

Purcell and Magette (2010) state that; educational level strongly affects people’s beliefs about reducing the amount of waste to the landfill. A larger proportion of those who have never been at school reviewed the idea of reducing waste a not necessary in domestic solid waste management (Purcell and Magette, 2010). In their study of Dublin city Purcell and Magette (2010) revealed that 80% of those with a third level post graduate degree agreed to composting and recycling as the most important sustainable way of managing waste. Just 20% of the respondents with a leaving certificate agreed to the two as compared to the rest who were not interested in participating as household (Purcell and Magette, 2010).

However in Makelle, outcomes of the study shows that the demographic features are largely insignificant in their influences of choice among disposal options (Tadesse et al, 2008). Household size number, gender, age and educational status are found to have a statistically
insignificant impact on choice of waste disposal alternative (Tadesse et al, 2008). A possible explanation could be that some sort of awareness change rather than the number of years or education may affect waste disposal (Tadesse et al, 2008).

2.4 Methods of Domestic 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 generation, storage, collection, transportation, processing, treatment and disposal of waste (Booth and Lankester 2001). In developing as well as some developed countries, management of domestic solid waste is principally done by the municipality (Owusu et al, 2013).

2.4.1 Waste generation and nature of waste

Ogwueleka (2009) defined waste generation as all activities in which materials are identified as no longer of any value and are either thrown away or gathered for disposal. Solid waste is generated by any activity such as food preparation, sweeping, cleaning and burning fuel, gardening and recreation (Medina, 2010). The vital component of any waste management system is the amount of waste generated and the nature of that waste, this therefore renders it important for the characterization of waste to be done (Ogwueleka, 2009). This is also important since it highlights the environmental effects the waste may generate and helps in the commensurate disposal strategy being employed by both municipality and the residents (Friedrich and Trois, 2011). Waste generation has been correlated to population size, wealth and urbanization (Bogner et al., 2008), however according to Manyanhaire et al. (2009) the rate of increase in waste generation depicts that both developing and developed countries increased their waste generation per capita, though some countries have higher generation trends. Mazzanti and Zoboli (2008) state that European countries seem to have stabilized their waste generation rates whereas developing countries continue to show marked growth in the amounts of waste produced.

Manyanhaire et al. (2009) discovered that in Zambia, Chirundu and Marondera in Zimbabwe 15.62% to 72% of waste generated was vegetative components. It has been observed that with an increase in the living standards the composition of waste also changes (Troschinetz and Mihelcic, 2009). The biodegradable fraction is larger as it results from unprocessed foods decreasing and an increase in paper, plastic, glass, textile and rubber (Troschinetz and Mihelcic,
However the consequences of these changes in terms of greenhouse gas emissions depend on the disposal methods used for the waste (Friedrich and Trois, 2011). Rodic (2006) recommended that reduction of waste generation should be the responsibility of everyone, hence there is need to equip all waste generators with sound sustainable domestic solid waste management practices (Rodic, 2006). Seadon (2006) in his research of integrated solid waste management reveals that at a consumption level, reduction of domestic solid waste generation can include reuse of containers and bags, changing buying habits, reducing the use of disposable products, and packaging.

2.4.2 Waste handling and Separation

Domestic solid waste handling and separation are methods of domestic solid waste management that have received less attention from policy makers and academics (Medina, 2010). Solid waste handling and separation are concerned with management of waste until they are placed in storage containers for collection to the point of disposal (Zurbruegg, 2003). These two methods happen at three levels which are; at household, municipal transportation level and at the dumpsite (Zurbruegg, 2003). Medina (2010) indicates that waste handling is done to get rid of access to vectors, dogs and cats as well as the facilitation of safe, efficient, processing and disposal facilities and to encourage the separation and recycling of waste at the source. Source separation makes collection; recovery and reuse of domestic solid waste easy (Sharholy et al., 2008).

Henry et al. (2006) examined how waste was handled, separated in Kenya and observed that no sorting or grading of waste was done at household and industrial levels. This affected how households contributed to the motion of sustainable domestic solid waste management (Henry et al., 2006). According to Henry et al. (2006) residents of Kenya mix up the waste they generate in one receptacle, including hazardous wastes such as used batteries. In addition waste separation is considered as dirty work and time consuming, thus the Kenyans just dispose of their waste not separated.

2.4.3 Waste storage

Results from different studies carried out reveal that waste is handled in different ways that include wrapping the waste before placing in a separate receptacle for disposal (Matimiti, 2011). This is common with high income households. This group uses formal bins such as twenty litre
plastic bins and they highly participate in sustainable solid waste management. As was observed by Musademba et al. (2011), low income residents in some of the suburbs in Chinhoyi town use informal receptacles such as cardboard boxes. Musademba et al. (2011) noted that individual households provide their own informal bins, as a result of lack of financial resources to purchase the most suitable and recommended receptacles. Communities end up using receptacles which are not environmentally friendly such as the use of plastic bags as well as cardboard boxes which have low carrying capacity and are not durable (Musademba et al., 2011). Such a situation aggravates environmental health risks related to solid waste management.

Domestic solid waste in developing countries is left in an open carton or basket to be picked up by hand and this waste awaiting collection is readily available to random vectors, insects and scavenging animals (Khan, 2006). Matimiti (2011) also noted that the cost of storage containers, level of education in the communities, rate of waste generation and the type of waste as well as poor legislations are the main barriers to proper waste handling, separation and storage practices. This constrains solid waste management systems in urban areas (Khan, 2006). In his study, Matimi (2011) recommended backyard composting at source as the greatest panacea as it reduces the amount of waste to be collected.

2.4.4 Transportation of domestic solid waste

Domestic solid waste collection services at household level in developing as well as developed countries by municipalities is primarily done through door-to-door services by tractor trailers, box trucks and compactors and there are collection services using fixed point communal containers known as skips (De Feo and De Gisi, 2010). Collection of waste includes the gathering, picking and hauling of waste to places where the contents of hauling vehicles are emptied. Furthermore, Masocha and Tevera (2003) reveal that transfer and transportation of solid waste include two steps: the transfer of waste from smaller collection vehicles to bigger transportation equipment and final transportation of the waste over long distance to the final disposal site.

According to Hardoy et al. (2004) waste collection, transport and transfer have also presented a number of challenges in the third world cities. They range from lack of waste removal equipment, personnel, finance and above all, lack of commitment by management (Hardoy et al.,
2004). The collection system in most developing countries is grossly inadequate and local authorities are blamed for inefficient and unreliable domestic waste collection with 30-50% of domestic waste generated left uncollected (Owusu et al., 2013). De Feo and De Gisi (2010) further explain that there is a direct correlation between the inabilities of the municipalities to collect and transport waste, and the indiscriminate dumping of mixed waste by the community. If domestic solid waste is not collected by the responsible authorities, residents resort to illegal dumping in open space or in drains as alternative methods (Khan 2006). Most of the studies carried out in Zimbabwe’s urban areas seem to agree that collection and transportation of solid waste are a big problem (Marshall and Farahbakhsh, 2013). The inability of municipalities in developing countries to purchase multiple vehicles for collection of different waste for recycling and reuse, affects the way households discard their waste as they cannot practice separation at source (Conyers et al., 2002).

2.4.5 Waste disposal

In the traditional approach to solid waste management, the local authorities are responsible for disposal of domestic solid waste and it is the final stage in most solid waste management processes (Conyers et al., 2002). However, there is a growing tendency towards illegal disposal of waste by residents mainly due to the fact that local authorities are failing to execute their duty of waste collection. UNEP (2009) pointed out that between 20-80% of solid waste in African cities is disposed by dumping in open spaces, water bodies and surface drains as a result of inadequate infrastructure. Poor siting of the dumpsites has resulted in soil contamination, surface and ground water pollution and disease outbreak (UNEP, 2009).

The solid waste strategy after the Second World War was principally the landfills; however there was rapid consumption in the 1960s which increased the waste stream with higher plastic content (Sujaauddin et al., 2008). As has been the practice for the past years, almost all solid waste ends up in a landfill. Despite efforts to reduce waste by recycling and incineration, landfills continue to be the cornerstone of waste management (Rodic, 2006). Use of sanitary landfill includes the confining of waste through levelling, compacting and covering with soil (Puopiel, 2010). Thus the National Waste Report (2010) emphasized the fact that landfill standards in Australia have increased for the past 20 years. The shortage of landfill sites experienced by the Dutch
government resulted in the conceptualization of the waste hierarchy (Medina, 2010), however the idea was propelled forward primarily by the environmental movement (Marshall and Farahbakhsh, 2013). Thus, the availability of land and its value as a resource somewhat acted as a driver for the ‘move away from landfilling’, though land scarcity primarily led to new treatment options, such as incineration (Marshall and Farahbakhsh, 2013).

However, according to Tchobanoglous et al. (1993) the common alternative methods of solid waste disposal used in the early practices in solid waste management included, dumping on land, canyons and mining pits, dumping in water, ploughing waste into the soil, and feeding to hogs. In Puopiel (2010) viewed that some of these early alternative methods in solid waste disposal used in the 1950s still exist today for instance indiscriminate dumping of waste on open land and in gutters is still evident in many towns in developing countries. Momoh and Oladebeye (2010) opine that burning of waste is also common in towns in Africa including dumping of waste in gutters, drains, dumping of waste by the roadside, and on unauthorised dumping sites. Most of these cities turn to these methods which they think are cheap and easy to get rid of domestic solid waste. But Regassa et al. (2011) reported that these solid waste disposal methods need to be improved through use of burnable materials to produce either electricity or heating water for hospitals and schools.

2.5 Sustainable Domestic Solid Waste Management as a concept

According to EPA (2009) Sustainable Solid Waste Management is also referred to as Integrated Solid Waste Management (ISWM). The current ISWM paradigm has been widely accepted throughout the developed world (Choe and Fraiser, 1999). The concept emerged from the policy shift away from landfilling and to remove sore responsibility of waste management from the municipality (EPA, 2009). The concept of ISWM strives to strike a balance between three dimensions of waste management: environmental effectiveness, social acceptability, and economic affordability (McDougall et al., 2001). ISWM also focuses on the integration of the many inter-related processes and entities that make up a waste management system (McDougall et al., 2001). To reduce environmental impacts and drive costs down, the system should be integrated in waste materials, sources of waste, and treatment methods, market oriented because energy and materials have end uses and flexible in allowing for continual improvement (Choe
ISWM incorporates elements of the waste hierarchy in fig 2. by considering direct impacts like transportation, collection, treatment and disposal of waste and indirect impacts use of waste materials and energy outside the waste management system (Seadon, 2006). Waste is diverted for materials and resource recovery and substantial volumes of waste are reduced while recovered materials can be used to generate income that can fund solid waste management (UNEP, 2009).
Waste reduction and segregation is one such strategy based upon the waste hierarchy (Figure 2). By placing waste reduction and reuse at the top of the hierarchy, management strategies that prioritize conserving embedded energy and materials are shown to be favoured (Laurent et al., 2014). Friedrich and Trois (2011) explain segregation of waste at the household level as one of the measures for reducing amounts of discarded materials at the source.

The next tiers, recycling and composting, change the physical form of discarded materials but still preserve some of the embedded value (Mazzanti and Zoboli, 2008). Owusu et al. (2013) augment this by stating that better organization at community level for the collection of recyclables is another measure of waste reduction. Composting has been identified as one of the viable options in reducing the large volumes of waste generated from households in Ghana (Parrot et al., 2009). Composting can have many benefits, by transforming waste into a valuable resource, contributes to improved soil fertility and urban food security (Owusu et al., 2013). Decentralized composting, which could be performed at various locations in the city, such as places currently used as waste dumps, could significantly reduce the need for waste transport.
For high quality compost, properly sorted waste is necessary, and if the households do not separate waste at the source, compost producers must do so, which increases the cost of production (Sharholy et al., 2008).

Waste to energy and landfilling are at the bottom of the hierarchy because they are least conserving (Laurent et al., 2014). However, Mangundu et al. (2013) reveal that only increasing segregation does not provide the complete solution: the other “downstream” components of the waste management system (reliable collection of recyclables, recycling capacities) must also be in place and functional so that long-term incentives for households can be ensured.

Solid waste separation by households ensures various benefits to municipalities, recycling industries, farmers, compost producers and other stakeholders of waste management (Conyers et al., 2002). Such benefits include provision of a steady supply of materials to composting facilities and other recycling industries; reduced disposal costs; possibly reduced waste collection costs; reduced environmental impacts from the extraction of natural resources; reduction of leachate and landfill gas emissions by reducing organic material in landfills and the creation of compost to return humus and nutrients to the soil (Owusu et al., 2013).

2.6 Barriers to participation in sustainable domestic solid waste management

In waste management systems based on collection, transport and disposal of waste, households can be considered as passive producers of waste (Parrot et al., 2009). In contrast, households have a central role in waste management systems involving source-separation, as their work in separating waste forms the basis for all later steps in collection and recycling of waste (Musadamba et al., 2011). It is therefore necessary that municipalities and policy makers have an understanding the issues that deter participation of these households, so that services can be designed to fit the needs of households (Musadamba et al., 2011).

2.6.1 Space as a barrier to participation in sustainable domestic solid waste management

Coffey and Coad (2010) elaborate on how the housing status of the neighbourhood affects adoption of introduced strategies of solid waste management. Insufficient space to store recyclables both inside and outside the home as well as inadequate local facilities (Makwara,
2011) can be a barrier to participation of households. Type of accommodation acts as barriers to participation as well (Manyanhaire et al., 2009).

In a study of the city of Makelle, Tadesse et al. (2008) brought out that management and disposal alternatives of waste are determined by the type of accommodation one resides in. People burn, open dump and some go to the extent of recycling (Tadesse et al., 2008). Household may for example re-use or recycle glass materials and dispose or burn their covers (UNEP, 2009). However, Coffey and Coad (2010) state that, most people living in blocks or flats tend to find it difficult to practice alternatives such as backyard composting due to shortage of space, therefore they will end up open dumping the waste.

Purcelle and Magette (2010) also highlight that in the residential sector, socio-economic status and housing characteristics affect not only the amount of domestic solid waste generated, but also how they manage it. Depending on where one lives, “optimum” sustainable domestic solid waste management can be easy or difficult to practice (Purcelle and Magette, 2010). It may be difficult to implement such a system in apartments often inhabited by low income residents because they are too small and may have limitations on the amount of waste storage (Tadesse et al., 2008).

2.6.2 Attitude and behaviour as barriers to participation in sustainable domestic solid waste management

In order to maintain good waste management we need not only accurate data on waste generation but also information on the behaviour and attitude of people towards waste (Friedrich and Trois, 2011). This is because waste is a product of human behaviour (Friedrich and Trois, 2011). Household attitude like NIMBY, ‘Not In My Back Yard’ will affect success and acceptability in such waste management practices as the siting of landfills and waste containers (Manyanhaire et al., 2009).

Masocha and Tevera (2003) underscore that public participation is an important step for the integrated solutions developed for waste management. Public attitudes towards waste plays a pivotal role in solid waste management systems and this ranges from household storage to
separation, interest in waste reduction, recycling, demand for collection services, willingness to pay for SWM services (Henry et al., 2006). Coffey and Coad (2010) also allude to the attitude of householders and city officials alike that may have no interest in whether waste is dumped illegally or sent to a proper disposal facility, as long as it is removed from the urban zone. Owusu et al. (2013) highlight that since source separation of waste requires extra work from households, thus most people have no interest to participate in such activities.

According to Purcell and Magette (2010) the results of a chi-square test of independence revealed that there is a significant association between the payment of services for refuse collection and participation of households in sustainable domestic solid waste management. According to Sujauddin et al. (2008), developing cities have failed to manage the domestic solid waste of the growing populations because when the people pay for the services, they believe that they have no reason to participate in any issue that concerns waste.

In a study in Kenya, it was discovered that households believed they should be compensated for their contribution to improved waste management (Owusu, et al., 2013). This could be done through reduced collection fees, direct monetary compensation for delivery of source separated materials, or free provision of waste bins (Owusu et al, 2013). Without this agreement they would not participate (Owusu et al., 2013).

2.6.3 Financial constraints as barriers to Participation in sustainable domestic solid waste management

In developing countries, SWM is often under-funded due to a combination of inadequate resources from municipal tax revenues, insufficient user fees, and the mismanagement of funds (Coffey and Coad, 2010). This persistent lack of funds prevents capacity building and the improvement and expansion of SWM handling capacities (Henry et al., 2006). According to the World Bank (2013) and USAID (2014), it is therefore common for municipalities in developing countries to spend 20–50% of their available municipal budget on SWM, which often can only stretch to serve less than 50% of the population (Memon, 2010). In low-income countries, 80–90% of this budget is spent on collection while in high-income countries less than 10% is spent on collection services (Memon, 2010).
Due to lack of funds to purchase or service vehicles, residents nicodemously collect and transport solid waste and deposit them at different points not meant for this (Moghadam et al., 2009) and some of the solid wastes are just dropped by roadside.

Booth and Lankester (2001) state that, large discrepancies often exist between the job requirements and the actual qualification of the staff at the managerial and operational levels. Overstaffed local authorities find it difficult to meet the large wage payments of poorly trained workers (Henry et al., 2006). Such poorly trained workers do not even know sustainable waste management practices and are bound to act just as households do when waste is poorly managed (Henry et al., 2006).

Henry et al. (2006) notes that, the use of techniques from the sustainable domestic solid waste approach of industrialized countries results in mismanagement of funds. At times sophisticated vehicles and equipment for collection, treatment, and disposal are imported thus expensive and difficult to maintain and operate (Coffey and Coad, 2010; Zurbruegg, 2003). Frequently, the waste composition in developing countries is very different from the waste characteristics they are designed to handle, causing them to break down rapidly or be of little use in the first place (Memon, 2010; Zurbruegg, 2003). Managerial challenges are compounded by the fact that waste quantities are increasing rapidly in most cities due to increases in wealth and in quantities of waste produced per person (UN-HABITAT, 2010). The concept of SDSWM requires the purchase of a number of bins to store the different kinds of waste thus most municipalities lack funds to purchase these (Zurbruegg, 2003). This consequently affects participation of households in such systems (Zurbruegg, 2003).

2.6.4 Information as a barrier to participation in sustainable domestic solid waste management

Manyanhaire et al. (2009) identify an information barrier by stating that if people do not have the correct instructional information; it becomes impossible to correctly participate in the programme. Lack of environmental and sustainable solid waste management education to local communities was cited as a major barrier to participation of locals in sustainable solid waste management.
management (Henry et al., 2006). Mangundu et al. (2013) in their study of Integrated Solid Waste Management in Glenview 8 explain that education campaigns through road shows, distribution of information and communication materials and radio/television programs can be done to encourage residents to separate their waste at source. Campaigns should be done to promote the use of household composts to dispose of biodegradable waste like food and agricultural material (Mangundu et al., 2013). The educational campaigns should be followed by education on policies and its implications to those who violate the domestic solid waste by-laws (Tadesse et al., 2008). It is therefore imperative that the public be aware of the SDSWM program through extensive education program so that they will not have a negative attitude in acceptance (Khan, 2006).

In exploring the relationship between environmental knowledge and action, factors influencing environmental behaviour, and the ways to motivate environmental attitudes and behaviour, Bogner et al. (2008) learned that residents of China possess greater knowledge of environmental issues and are more willing to participate in activities like recycling than US citizens (Bogner et al., 2008).

2.7 Conclusion
The literature reviewed has shown that a lot on domestic solid waste management has been researched. The chapter unpacked demographic characteristics in relation to waste management, the current methods being practiced in domestic solid waste management as well as the nature of waste being produced. It showed that there is need for households to embark on sustainable solid waste management for the program to be effective. However, little has been researched on how households can embark on sustainable domestic solid waste management in the face of limited resources.
CHAPTER 3

METHODOLOGY

3.1 Introduction
This chapter deals with the methods and instruments that were employed in the study to collect primary and secondary data. The target population, sample size and sampling techniques are revealed, and the instruments used were questionnaires, interview guides, focus group discussions and field observations. Furthermore, there is an overview of the study area.

3.2 Research Design
The choice of an appropriate research design is derived from the aim and objectives of the research as well as cost and time constraints (Harden and Thomas, 2005). The researcher employed a case study approach because the researcher noted that this was the most appropriate approach to analyse the contribution of households in sustainable solid waste management in Ward 2, Sakubva. The questionnaire was employed as the main tool for data collection in this study. Both quantitative and qualitative research methods were used to collect data that was used to conduct the research on Ward 2, Sakubva. The quantitative approach sought to quantify data through statistical procedures since this design has well established statistical methods for analysing data which the researcher used. The qualitative approach dominated the study. It was used by the researcher in order to acquire the respondents’ perceptions, thoughts, attitudes and feelings about household contribution and the barriers to participation of households in sustainable domestic solid waste management.
Mutare occupies the fourth position in Zimbabwe’s settlement hierarchy (Makwara, 2011). The city is located within a range of mountains and hills and it lies in agro-ecological region two where intensive farming is practiced. The city is divided into 38 suburbs and around 35925 housing units in the low, medium, and high density suburbs. These suburbs exceed the capacity of domestic solid waste management services that Mutare city council can provide (City of Mutare Engineers Department, 2014). Sakubva was established in 1925 as the first black location of Mutare, originally designed for single men, but now the suburb is divided into 22 sections and it contains 6 398 housing units. The suburb which consists of low class citizens lies in ward 1 to 5 and the population is 36604 (ZIMSTATS, 2012). Municipality collection of domestic solid waste is not reliable in such suburbs as compared to high income suburbs (Tadesse et al., 2008).
According to Manyanhaire et al. (2009) Sakubva River passes through the city and is threatened by pollution due to poor waste management practices which becomes hazardous to downstream communities such as Dora. Ward 2, Sakubva is the target ward and it has different sections namely NHB, Mcgregor’s, Blockyard, Matida Flats, Part of Chineta and Tenderere. The municipal dumpsite is located at the industrial areas and this is where Munene River that flows into Mozambique passes through. The dumpsite contaminates the river which flows into Mozambique and, thus, poses potential health effects on the users of the water from the river (Manyanhaire et al., 2009).

3.4 Target Population
In this study the target groups were the households that constitute Ward 2, Sakubva, municipal officers from all departments of the municipality and EMA officer responsible for domestic solid waste. Neuman (2003) describes target population of a research study as all members of real hypothetical set of people to which research results are generalized. Sakubva Ward 2 has 1445 households according to the ZIMSTATS (2012). Subjects were derived from those of 18 years and above because this is the legal majority age where there is no need to answer questionnaires with parental consent.

3.5 Sample size and sampling procedures
A sample is a set of data collected and/or selected from selected statistical population by a defined procedure (Shamoe and Resnic, 2009). To reduce sampling error and improve representativeness of sample population, the systematic sampling technique was adopted (Leary, 2006). To achieve this, every tenth household was sampled and given a questionnaire. When the researcher could not find people at the tenth household, the researcher moved to the eleventh. Out of a population of 1445 households, the researcher used a sample of 145 households, which is 10% of the total population. A sample should comprise of 10% of the population in order to limit degrees of error (Leary, 2006). By using this sampling technique, the researcher distributed questionnaires to 96 Blocks, 9 rooms at Matida flats (residential stands without space) and 40 residential stands with space all of which are affected by adoption of sustainable domestic solid waste strategies.
3.6 Research instruments and methods
The research instruments were used to generate both primary and secondary data. Different instruments were used for triangulation purposes.

3.6.1 Questionnaire (Appendix 2)
Questionnaires were administered to selected households and 145 respondents filled them in. The respondents were from the six sections that constitute Ward 2. A direct door stepping questionnaire administration approach was used after the method adopted by Harden and Thomas (2005). An advantage of this strategy was to enhance the rate of return since the questionnaires were delivered directly by hand to the respondents and taken back immediately on completion (Shamoe and Resnic, 2009). The researcher subjected all the 145 respondents to the same questions to obtain valid and reliable data. Questions based on nature of wastes generated, who does the final disposal of solid waste and frequency of collection, alternative methods used and barriers to participation of households in SDSWM were asked. Questionnaire administration and collection took a period of seven days since the houses were in a clustered pattern. A questionnaire was relevant in this study because it provided a platform for obtaining confidential data by filling closed and open ended questions of interrelated questions. An important drawback of this approach was that it was laborious and time-consuming (Neuman, 2003).

3.6.2 Interview guide (Appendix 3 and 4)
According to Neuman (2003) interviews are planned and guided conversations which afford the researcher the privilege to read facial expressions and their body language. The main advantage of interview in this research was its flexibility and it also offered the chance for the researcher and interviewees to have a wide range of questions in the discussion than questionnaires would allow. A structured interview was designed for six target municipal authorities from the various departments of the municipality and another one interview for the Environmental Management Agency (EMA). The municipality departments were the health department, engineering department, finance department, chamber of secretaries, the housing department and the Town Clerk. All these directly or indirectly play a role in domestic solid waste management. The interview guides were aimed at obtaining information on the sustainable waste management practices, collection service availability, collection equipment and vehicles, collection fees, challenges faced by municipality in providing services to the people, final disposal methods and other relevant issues in line with the research objectives and aims. The interviews were done at
the municipality offices and lasted for five days because some interviewees needed appointments.

3.6.3 Focus Group Discussion (Appendix 5)
A Focus Group Discussion (FGD) was conducted to the refuse collectors who provide door-to-door services to the residents. According to Leary (2006) focus group discussion is a sort of group interview where a group discussion is done together in a smaller group of around five to ten participants. The focus group discussion was essential because the target group was too large, therefore a representative was picked from the different teams in order to note the different challenges they face in the different areas they operate in. Questions like the types of waste they find in the receptacles, whether the households sort the waste and the challenges faced in trying to incorporate the community in SDSWM were asked. This helped to answer the objectives and aim of the study, by understanding the current methods being carried out and the barriers to participation of households. FGD was suitable to use for the data collection because new ideas about how households can participate were introduced (Shamoe and Resnic, 2009). During the FGD, the interviewer lead like a moderator and everyone had a chance to speak.

3.6.4 Observation guide (Appendix 6)
Observation is visual data collection whereby direct information is observed in the form of transect walks (Leary, 2006). For transects, the researcher divided Ward 2 into two sections, residential stands with limited spaces (blocks and flats) and residential stands with space (200m² yards) in order to spot particular differences on how waste was being generated, collected and disposed, presence of bins as well as other methods like recycling reuse and repair if they were carried out. The main advantage of the observation was the fact that a direct contact with the area of study and personal opinion was derived. The visible illegal dumpsites and the mixed material disposed supported the reason for the study. The method was also independent of respondent’s opinions and willingness to respond and as such was relatively less demanding of active cooperation on the part of the respondents (Harden and Thomas, 2005).

3.6.5 Document analysis
Document analysis is a form of qualitative research in which documents are interpreted by the researcher to give voice and meaning around an assessment topic (Harden and Thomas, 2005). Analysing documents incorporates coding content into themes similar to how focus group or
interview transcripts are analysed. Document analysis was important because there is exploration of written documents and photographs on waste management which provide aid to the study (Neuman, 2003).

3.7 Data collection Procedure
Research instruments were first tested before actual distribution to the targeted groups. They were tested during a clean-up campaign that was held by a local Community Based Organization. This helped the researcher in developing interest from respondents and it also helped the researcher to determine whether to proceed with the research. After the pilot study, 145 questionnaires were then distributed to the targeted population. The researcher first distributed 96 questionnaires to the blocks, followed by 40 at the residential stands and finally 9 at the flats. Interviews were conducted next, with key informants who included the municipality officials and an EMA officer. The researcher took 5 days to complete the interviews. The third tool for primary data was the Focus Group Discussion. The FDG was done at the front office by the landfill site. The teams, co-ordinating officer advised the researcher to hold the FDG by the front of the office because the landfill produced bad odour and a lot of flies. The FDG was done in one day. An observation guide was also undertaken in the form of transect walks. The researcher also observed how the community was disposing their waste especially in the event of the waste not having been collected by the refuse collectors. The waste collection routine of the municipality was also observed and compared with the expected schedule which the researcher was given by the municipal authorities. Secondary data from related documents, pictures and records on other projects on waste reduction that were embarked on were also used. Previous photos on illegal waste dumps, other reports on projects in relation to sustainable waste management that have been embarked on in Mutare, as well as the success stories on such projects were used to help in the analysis.

3.8 Data analysis and presentation
The Statistical Package for Social Science (SPSS) version 21 and Microsoft Excel (2010) were used for analysing the data collected during the questionnaire survey. The respondents were given numbers for identification purposes and the household was also coded with a number to avoid confusion. The coded data was then entered in the SPSS computer program where frequencies, multiple responses, mean, and cross tabulations were computed during the analysis.
For hypotheses testing, data was entered into the SPSS and analysed through descriptive statistics and cross tabulation. Pearson correlation was used to obtain the significance level of demographic characteristics of respondents on the alternative methods of domestic solid waste management employed by the households.

The Chi-square crosstab statistics was used obtain the significance level of alternative methods of DSWM and barriers to participation. Information collected from the municipal officers and FGD was grouped together according to checklist questions and category of the respondents. The issues raised were summarized and interpreted as well.

3.9 Reliability and validity
Validity and reliability are key to good research designs (Shamoe and Resnic, 2009). A case study on ward 2, the involvement of significant numbers of respondents and the substantial time spent within the field of the study offered the prospect of a valid study. The researcher used both quantitative and qualitative methods. Leary (2006) stresses that; validity can be fulfilled by combining qualitative and quantitative approaches, which is triangulation. Triangulation aims to combine the advantages of all methods in one single framework and this was part and parcel of this research. Different instruments were used to collect data and finally peer consultation as well as document analysis was done in order to establish validity through pooled judgment.

3.10 Limitations of the study
In carrying out the survey there are other external factors that affected the flow of the project, which were beyond the control of the researcher. Factors like the attitude of the respondents and their level of understanding were beyond what the researcher could control but they affected the outcomes and results of the research. Some respondents were not willing to disclose important information and some municipal officers had biased responses in favour of the municipality. The researcher however, tried as much as possible to ask questions that required objective answers.

3.11 Conclusion
The researcher used triangulation in order to acquire valid and reliable information about the participation of households in domestic solid waste management from the target population of Ward 2, Sakubva. The raw data which are; demographic characteristics, nature of waste produced, method of DSWM and barriers to participation in SDSWM was then entered into the
computer and analysed by the use of SPSS as well as Microsoft Excel 2010, to obtain the required results that were to be used to formulate the recommendations needed for the research.
CHAPTER 4
DATA ANALYSIS, DISCUSSION AND RESULTS

4.1 Introduction
This chapter presented the results as well as the discussion of the research findings using various methods of data presentation such as tables, graphs and pie charts. The research findings were linked to the objectives of the study and the discussion was done in relation to other related literature. Pearson correlation was used to scientifically test the significance of demographic characteristics on alternative methods of domestic solid waste management. Hypothesis testing on the relationship between alternative methods of domestic solid waste management by households and barriers to participation was revealed as well. The drive is to ensure that households participate in sustainable domestic solid waste management.

4.2 Demographic Characteristics and domestic solid waste management
This section highlights the demographic characteristics of the respondents that were useful in determining the research outcomes.

4.2.1 Gender in domestic solid waste management

Figure 4.1 Distribution of respondents by gender (source: primary data).
Most of the residential survey respondents (76%) were females whilst male respondents constituted 24% of the total population. Females were mostly found at home during the time of the study and they are the ones who are mostly aware of the domestic solid waste issues around
the households (Purcell, 2010). Women are generally custodians of the environment at local level as they always interact with the environment through various household chores like cooking, cleaning the house and sweeping the yards. It therefore implies that gender plays an important role in sustainable domestic solid waste management issues (Henry et al., 2006) therefore educational campaigns on these issues need to be gender biased towards women. This can be done to foster the maximum participation of women who seem to be the dominant environmental managers (Henry et al., 2006).

4.2.2 Age and level of education in domestic solid waste management

Age and level of education as demographic characteristics of Ward 2 were investigated and the results revealed in the following table.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number of respondents (N)</th>
<th>Percentage of respondents %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 – 28</td>
<td>76</td>
<td>52</td>
</tr>
<tr>
<td>29 – 38</td>
<td>32</td>
<td>22</td>
</tr>
<tr>
<td>39 – 48</td>
<td>13</td>
<td>9</td>
</tr>
<tr>
<td>49 – 58</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>59+</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>145</td>
<td>100</td>
</tr>
<tr>
<td><strong>Level of Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>31</td>
<td>21</td>
</tr>
<tr>
<td>Secondary</td>
<td>93</td>
<td>65</td>
</tr>
<tr>
<td>Tertiary</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Never been at school</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>145</td>
<td>100</td>
</tr>
</tbody>
</table>

Age as a demographic factor affects domestic solid waste management (Masocha and Tevera, 2003). Table 4.1 shows that most of the respondents (74%) were from the combined categories of (18-38) years. They form the majority of Zimbabwe’s unemployed population whilst being the most economically active age range of any country (CSO, 2012). The results also show that most people reached secondary level (65%) as compared to tertiary (8%) as the highest form of education. The fact that most of the respondents reached secondary level shows that there is high literacy level in Ward 2, Sakubva. This makes communication easier during educational campaigns as most people are able to read and write.
4.3 Nature of waste produced

This section takes a close look at the nature of waste produced by the household in Ward 2. The nature of waste produced by households determines the sustainable waste management technique to adopt (Zurbruegg, 2003).

![Chart showing the nature of waste produced](image)

**Figure 4.2: Nature of Waste produced (Source: Primary data).**

Results on domestic solid waste generated revealed that composition of solid waste entering municipal waste stream from households have a very high proportion of organic waste. The bulk of the waste produced comprised of kitchen waste (55%), followed by paper and plastic (25%), cloth material (9%), glass and can (8%) and least of the waste comprises wood (3%) which is not usually discarded as it is used in lighting fires during power outages. Through interviews with the municipal officers in the health department, they also highlighted that most of the domestic solid waste content is kitchen waste and it can be managed at household level through composting.

Nature of waste is important since it highlights the environmental effects the waste may generate and helps in the commensurate disposal strategy being employed by both municipality and the residents (Friedrich and Trois, 2011). In the European Union, the average biodegradable waste generated from households is 49% (Ogwueleka, 2009). Mangundu et al. (2013) revealed that 42% of Glenview 8’s domestic solid waste is organic matter. Kitchen waste is mostly generated, therefore composting is the best alternative to adopt (Laurent et al., 2014). The process is a low-
technology approach of solid waste reduction and suited for developing countries since over 50% of solid waste in developing countries is organic material (Khan, 2006). The degraded content can be used as manure for vegetables and fruit trees.

Recycling is the next best alternative since paper and plastic are also mostly discarded. Results from interviews however show that recycling companies are few in Zimbabwe as a whole and Mutare does not have one. According to (Momoh and Oladebeye, 2010) recycling turns materials that would otherwise be discarded and considered as waste into valuable resources, environmental, financial and social yields and helps in energy conservation, pollution reduction and economic expansion and competitiveness. According to Mangundu et al. (2013) Recycling in Glenview 8 is done by individual households who separate plastic containers, bottles, and paper. They sell these to informal waste collectors, reuse or sell to occasional formal waste collectors like Delta Beverages (for reusable empty beverage bottles) or National Waste Paper Collection Company (Mangundu et al., 2013).

4.4 Methods of waste management
The respondents in this section revealed the methods of waste management being employed in ward 2, Sakubva.

4.4.1 Waste storage
The findings obtained from the questionnaires, interviews and observation guide revealed that different storage receptacles were used in ward 2, Sakubva. Availability of different formal waste receptacles encourages the participation of households in Sustainable domestic solid waste management (National Waste Report, 2010).
Figure 4.3: Types of receptacles used (Source: Primary data).

Figure 4.2 shows that most of the respondents (81%) use informal bags to store waste. Individual households provide their own informal bins, as a result of lack of financial resources to purchase the most suitable and recommended receptacles. Those who own plastic bins are few (14%) and those who have metal bins and skip bin constitute the least population 3% and 2% respectively. There is a huge gap between those owning informal receptacles and those who have formal receptacles combined. By mere observation, the researcher discovered that people living in blocks and flats do not own formal receptacles. From the FGD, the waste collectors revealed that they mostly collect informal bags full of waste and they highlighted that these bags result in the loss of aesthetic value of the environment.

The same trend was observed by Musademba et al. (2011) who stated that low income residents in some of the suburbs in Chinhoyi town use informal receptacles such as cardboard boxes. Households end up open dumping waste because they have no container to use.
Plate 4.1: Informal bags waiting for council collection (Source: Primary data)

When the municipality does not collect waste as expected, the community ends up having piles of uncollected refuse by their gates as observed by the researcher and shown in Plate 4.1.

4.4.2 Waste handling and separation

Most respondents had only one receptacle to store all types of waste and could not afford to buy a bin or more than one bin for the separation of waste.
Figure 4.4: Household waste sorting (Source: Primary data).

Information abstracted from questionnaires revealed that 88% of the respondents do not practice separation of waste (Figure 4.4). Results from the interview carried with the EMA official revealed that waste handling and separation was really a challenge to both residents of ward 2 and the municipality. Most people just mix all types of domestic solid waste in one bag because they do not have money to purchase one or two formal bins that enable waste segregation to be done (Matimiti, 2011). This then affects how people end up disposing waste. The results are also supported by a study in Kenya, where residents mix up the waste they generate in one receptacle, including hazardous wastes such as used batteries Henry et al. (2006). The door to door waste collectors also revealed that households dump all their waste in one receptacle.
From the FGD shown in Plate 4.2, the door-to-door waste collectors further explained that there is no source separation that is done and they end up being injured by waste such as broken glass. They also highlighted that they did not have enough protective clothing so they are affected by the mixed waste and the gases produced by the waste.

4.4.3 Waste Transportation and Disposal
From storage, domestic solid waste is transported and finally disposed. The following section revealed transportation and disposal of the waste. The respondents also rated the service provision.
Municipality has the sole responsibility of managing domestic solid waste in Ward 2 and provides door to door service when collecting waste (Table 4.2). The results were similar to those found in the city of Makelle where household waste collection and disposal is largely the responsibility of the municipality (Tadesse et al., 2008). However the majority (61%) of the respondents revealed that council is not collecting refuse as expected, or if they collect they mostly do so once a month (Table 4.2). Municipalities in most developing countries are having difficulties in providing refuse collection services (Friedrich and Trois, 2011). Basing from the collection schedule obtained at the municipality’s health department, municipality should collect waste at least once a week so that waste is not poorly discarded. Lack of vehicles is however a major challenge that is prohibiting the goal to be achieved. The department highlighted that there are only two vehicles available on the road, one box truck and one compactor which are being overburdened with collection. Through the ranking, most respondents (58%) revealed that the council is very unreliable in providing services to them. Because city council is not collecting waste, people are embarking on different alternatives to dispose waste.

Table 4.2: Collection of domestic solid waste (Source: Primary data)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number of respondents (N)</th>
<th>Percentage of respondents%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method of collection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Municipality collection</td>
<td>145</td>
<td>100</td>
</tr>
<tr>
<td>Own methods</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>145</td>
<td>100</td>
</tr>
<tr>
<td>Frequency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Once a week</td>
<td>20</td>
<td>14</td>
</tr>
<tr>
<td>Twice a week</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Once a month</td>
<td>33</td>
<td>23</td>
</tr>
<tr>
<td>Not collecting</td>
<td>89</td>
<td>61</td>
</tr>
<tr>
<td>Total</td>
<td>145</td>
<td>100</td>
</tr>
<tr>
<td>Reliability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very reliable</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Reliable</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Unreliable</td>
<td>45</td>
<td>31</td>
</tr>
<tr>
<td>Very unreliable</td>
<td>83</td>
<td>58</td>
</tr>
<tr>
<td>Total</td>
<td>145</td>
<td>100</td>
</tr>
</tbody>
</table>
When municipality collects waste they dispose at the landfill that is located along Park road. By merely observing the landfill (plate 4.3), it is composed of mixed solid wastes which revealed that sustainable solid waste management was not being done. At the landfill there is no sorting of waste that is done, however scavengers come and collect plastics and cardboard boxes for recycling companies in Harare as shown in plate 4.3.

Plate 4.3: Scavengers at the landfill (Source: Primary data)

The EMA official highlighted that the landfill is more than thirty years old now and is poorly sited as the river Munene that flows into Mozambique passes through. The impurities from the mixed wastes can infiltrate and pollute the water source (Manyanhaire et al., 2009).

4.4.4 Alternative methods of domestic solid waste management
Households use different alternatives to treat their waste because the supply of waste facilities is inadequate and domestic solid waste collection services are irregular. The alternatives include burning, open dumping, re-use and to some extent recycling (Khan, 2006).
Table 4.3: Alternative methods of DSWM in Ward 2, Sakubva (Source: Primary data).

<table>
<thead>
<tr>
<th>Disposal method</th>
<th>Number of respondents</th>
<th>Percentage of respondents (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compost</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>Burning</td>
<td>30</td>
<td>21</td>
</tr>
<tr>
<td>Re-use</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Bury</td>
<td>20</td>
<td>14</td>
</tr>
<tr>
<td>Reduce</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Open Dump</td>
<td>70</td>
<td>48</td>
</tr>
<tr>
<td>Recycling</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>145</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

The current situation in Ward 2 is that municipality is not collecting domestic solid waste as it should; therefore the citizens are resorting to other alternatives as their alternative disposal methods. As depicted by table 4.3 most people (48%) are open dumping (Plate 4.4) their waste, which is not a sustainable method of domestic solid waste management.

Plate 4.4: Illegal dumpsite composed of mixed domestic solid waste (source: Primary data)

According to the waste hierarchy; reduce, re-use and composting, recycling and recovery (EPA, 2009) are the sustainable ways of managing domestic solid waste. Landfilling is the least option
to adopt in this system. However, none of the respondents recycle (0%) and reduce (0%), (7%) re-use, whilst (10%) compost (Table 4.3). This is different from what was observed by Ogwueleka (2009) in Nigeria, people agreed to the fact that reducing the amount of waste was the best alternative method being employed. Apart from open dumping, most of the respondents burn (21%) and bury (14%) which are solid waste management methods that are not part of the waste hierarchy. From an interview with the EMA officer, the aspect of burning is discouraged due to emission of smoke as it contains gases which affect the ozone layer.

4.5 Analysis of the adoption of alternative waste disposal methods in relation to demographic characteristics (Pearson correlation).

The data on demographic characteristics which are age, gender, level of education and alternative methods employed were statistically tested using 2-tailed bivariate Pearson correlation.

H₀: There is no significant relationship between demographic characteristics and alternative methods of domestic solid waste management.

H₁: There is a significant relationship between the demographic characteristics and alternative methods of domestic solid waste management.

For the three variables (age, gender and level of education), r calculated did not lie within the range of r critical (un-shaded part), therefore the variables were all statistically significant (appendix 1).

![Figure 4.5 Relationship of demographic characteristics and alternative methods](Source: Primary data)
The results revealed that there is a positive relationship \(-0.104 > r \text{ calculated} > 0.104\) between a person’s age, level of education and gender and the alternative methods of domestic solid waste management. Therefore we reject the null hypothesis. The results are similar with Purcell and Magette (2010) who stated that educational level strongly affects people’s beliefs about composting recycling and re-use. However in Makelle, outcomes of the study show that the demographic features are largely insignificant in their influences of choice among disposal options (Tadesse et al., 2008).

4.6 Barriers to participation of households in Sustainable Domestic Solid Waste Management

This section reveals the factors that deter households from participating in sustainable domestic solid waste management. There are three variables (educational campaigns, payment of services and type of housing) which were found to be important as they affect the adoption of sustainable domestic waste management practices.

The research findings show that lack of space is a major barrier that is militating against adoption of sustainable domestic solid waste management practices. This was revealed by majority of the
population (44%). The type of housing shows the amount of space that is available for each household (Parrot et al., 2009). According to the questionnaires, blocks are the dominant type of housing found in the area under study as stated by 66% the respondents whilst 6% live in flats. People who live in houses with space are very few (28%). The seven key informants who included all departments from the city council and a representative from EMA agreed with the information obtained from the questionnaires that shortage of space was a stumbling block in sound sustainable domestic solid waste management.

24% of the total population state that lack of information deters them from participating in sustainable domestic solid waste management. A larger proportion of the respondents (85%) stated that there are no educational campaigns on sustainable domestic solid waste management done in Ward 2, Sakubva. During interviews with the health department, they highlighted that due to lack of finance, they cannot hold enough campaigns for the people. Mangundu et al. (2013) also revealed that in Glenview 8, residents could not participate in domestic solid waste management because they lacked information about the concept.

18% of the population showed that they cannot participate in sustainable domestic solid waste management due to financial constraints of both the households and the municipality. Coffey and Coad (2010) also support this result by emphasizing that the municipality lacks funds to purchase a number of bins to separate waste for storage which consequently affects participation of households in sustainable domestic solid waste management. The other 3% of the respondents said they have no interest in issues pertaining to sustainable domestic solid waste management, so they do not participate. This shows that most people are interested in issues pertaining to domestic solid waste management because they affect them. This is contrary to Owusu et al. (2013) who highlight that since source separation of waste requires extra work from households, thus most people have no interest to participate in such activities.

Everyone pays for the refuse collection services therefore people expect the city council to execute its duties. Some of the respondents (11%) stated that they cannot participate in sustainable domestic solid waste management because they pay for the services. However, according to the city council finance department, people are not paying for the services. There is
a deficit of US$2,490,811.98 for refuse collection from accumulated debts in ward 2 only. According to Purcell and Magette (2010) the results of a chi-square test of independence (χ²(3) =29.921, p<0.001) revealed that there is a significant association between the payment of services for refuse collection and participation of households in sustainable domestic solid waste management.

4.7 Alternative methods of domestic solid waste management and barriers to participation (hypothesis testing)

The Chi-square test was performed to find the degree of association between alternative methods employed by households and barriers to participation of households in sustainable domestic solid waste management.

\(H_0:\) There is no significant relationship between the alternative methods of domestic solid waste management by households and the barriers to participation.

\(H_1:\) There is a significant relationship between alternative methods of domestic solid waste management by the households and the barriers to participation.

<table>
<thead>
<tr>
<th>Value</th>
<th>Degrees of freedom</th>
<th>Assumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>398.253</td>
<td>16</td>
<td>0.001</td>
</tr>
</tbody>
</table>

There is a significant relationship (p=0.001<0.05) between alternative methods of domestic solid waste management and barriers to participation of household in sustainable domestic solid waste management (Table 4:4). Therefore the null hypothesis (\(H_0\)) is rejected.

From the research hypothesis it can be vividly seen that households are not being able to adopt sustainable domestic solid waste management because of various constraints. Most of the respondents (44%) have a shortage of space because they live in blocks or flats which are owned by the city council and there is no space. In a study of the city of Makelle, Tadesse et al. (2008) brought out that management and disposal alternatives of waste are determined by the type of accommodation one resides in. From the results of a chi-square test of independence by Purcell
and Magette (2010) there is a significant association between respondents who practice back yard composting and the type of dwelling in which they reside ($x^2(3)=63.03$, $p<0.001$). Almost everyone residing apartments or flats does not practice composting, a predictable response given the physical characteristics of the houses. The apartment and flat dwellers stated that the facilities or dwelling situation deters them from composting at home. Some are not equipped with information on the sustainable practices as there are no educational campaigns being done in the community. This affects the way they adopt such practices. Of the total sample population, 11% stated that they pay for the refuse collection services so city council should execute its duties. The remaining percentage stated that they lack interest (3%) and are financially constrained (18%). There is need to address such issues of concern so that sustainable domestic solid waste management can be fully employed by the households.

It can be seen that households in ward 2, Sakubva cannot embark on sustainable domestic solid waste management measures like composting, recycling, reduce, re-use and recovery because they have a shortage of space, lack finances, lack interest, they pay for services and they are not aware of the sustainable measures.

### 4.8 Conclusion
The findings show that the proliferation of illegal dumpsites which have a composition of mixed waste is a result of households not participating in sustainable domestic solid waste management. Households tend to open dump, burn or bury waste when city council does not collect, instead of embarking on sustainable measures such as composting, recycling, reduce, re-use and recovery. Such unsustainable alternatives are as a result of the fact that people pay for services so they are not involved in DSWM and they lack the information, space, interest and finances to do so as shown by the hypothesis test. Level of education, gender and age also affect the alternative DSWM method employed also. Households need to embark on initiatives to sustainably manage waste in the face of such factors that deter them from doing so.
CHAPTER 5
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction
This chapter outlines the summary of the responses from the Ward 2 citizens towards domestic solid waste management issues. The conclusions and recommendations drawn from the study are brought out in the chapter as well. These will help various organizations, as well as households on how to ensure that there is sustainable management of domestic solid waste.

5.2 Summary of research findings
The findings of the study revealed that households in Ward 2 are not participating in sustainable domestic solid waste management. The study also revealed that much of the waste produced is kitchen waste which is biodegradable and the people are not sorting their waste for easy disposal. People are using informal bags to store waste since the municipality is not providing them the formals bins. Municipality is not collecting waste as expected thus the households are using alternative methods to ameliorate the situation. Most of the households are dumping waste in the drains and on the streets instead of composting, recycling or re-using. Age, gender and level of education have a role to play in determining these alternative methods of DSWM that are employed. The research findings indicated that the households are not able to pursue sustainable methods of managing domestic solid waste because they lack information, they do not have the space, finances and some are not interested. Some stated that since they pay for the services they do not have to look for any alternative methods of managing domestic solid waste.

5.3 Conclusions
Drawing from the research findings, the researcher concludes that the proliferation of illegal dumpsites composed of mixed solid waste in Ward 2 are as a result of lack of participation of households in SDSWM. Households are affected by issues like lack of finances, interest, space and lack of information. Perceptions towards adoption of sustainable domestic solid waste practices are issues that can be controlled by the households themselves. People who lack interest should be reminded that the environment is theirs and they should have a sense of ownership so that they can practice sustainable measures of waste management. However, the
researcher also discovered that most of the issues that affect the majority of the households are those that are beyond their control. The types of housing they live in are owned by the municipality therefore they have no role to play in decision making pertaining to activities that should be carried out in their community. The households are also affected by information asymmetry because there is no implementation of educational campaigns on sustainable domestic solid waste management. Demographic characteristics also have a role to play in SDSWM and this was statistically proven. Therefore, the researcher concluded that when there is implementation of new systems, they should be gender sensitive. The government should also ensure that it provides equitable and inclusive quality education and life-long learning opportunities for all which is the fourth SDG. This will directly enhance the understanding and adoption of SDSWM. New concepts and systems introduced like SDSWM should begin from grassroots level such as households so that optimal operation and achievement of these systems can be achieved.

5.4 Recommendations
From the research findings, the following recommendations were made:

5.4.1 Municipality
- Municipality should carry out educational campaigns that teach the households about sustainable methods of domestic solid waste management like source separation and reusing of waste. The campaigns should be done in schools so that when children are educated about these issues and given enough information, they can in turn teach their parents at home.
- Due to the shortage of space in Ward 2, the municipality should locate designated places where households can dig composts to put organic waste. These composts can be communally owned and people can obtain manure which they can sell to people with gardens and urban farms, and they can obtain an income.
- Instead of providing door to door formal receptacles, municipality can build skip bins which are secure in ward 2 to reduce collection cost. They can place more than one skip bin for the different types of waste and households throw waste in them.
- Sound policies on domestic solid waste management should be established and efficient law enforcement for example polluter pays should be done
5.4.2 Community leaders

- Community leaders in Ward 2 like the councillors should encourage people to have clean up campaigns and they should be involved as well so that people clean up their home and streets.

5.4.3 Households

- Households should re-use waste for other businesses around their homes so that they reduce the amount of waste that is finally discarded. Re-use of waste does not need financial support, for example using empty water bottles to make flower beds and to use old cloth materials to make door mats.

- Households should also make use of waste as a source of income, for example to sell old tires to people who make shoes, old plastics to vegetable vendors and scrap metals to scrap metal dealers who reuse metal waste from abandoned cars and other objects made of metal and produce various arti-facts.

- Plastic and paper can also be used to make floor polishes by the households instead of disposing at the landfills.

- In this era of shortage of electricity, organic waste can be used to produce bio gas for cooking.

- Households do not need to be mobilized to participate in SDSWM. They should understand the value of their environment and the health hazards posed by poor waste management thus mobilize themselves into cleaning up their environment.

5.4.4 Future Research

- Further research must be done to find other ways in which optimum sustainable management of domestic solid waste can be reached

- Future research should also establish ways in which domestic solid waste can be used as resource that generates income for the nation thus aiding the implementation of ZIMASSET
REFERENCES


Zurbruegg, C. (2003). *Solid Waste Management in Developing Countries: A Sourcebook for Policy Makers and Practitioners*: EAWAG/SANDEC.
## APPENDIX 1: PEARSON CORRELATION TABLES

### Correlations

<table>
<thead>
<tr>
<th></th>
<th>Sex</th>
<th>alternative method</th>
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</tr>
<tr>
<td></td>
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</tr>
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</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
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</tr>
<tr>
<td></td>
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<td>145</td>
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</table>

### Correlations

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<th>alternative method</th>
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<td>Sig. (2-tailed)</td>
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<tr>
<td></td>
<td>N</td>
<td>145</td>
</tr>
<tr>
<td></td>
<td>Pearson Correlation</td>
<td>-.169</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.104</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>145</td>
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</tbody>
</table>

### Correlations

<table>
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<th></th>
<th>alternative method</th>
<th>Level of Education</th>
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<tbody>
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<td><strong>alternative method</strong></td>
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<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>-.171</td>
</tr>
<tr>
<td></td>
<td>N</td>
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</tr>
<tr>
<td></td>
<td>Pearson Correlation</td>
<td>-.171</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.104</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>145</td>
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</tbody>
</table>
APPENDIX 2: QUESTIONNAIRE

BINDURA UNIVERSITY
OF
SCIENCE EDUCATION
GEOGRAPHY DEPARTMENT

QUESTIONNAIRE FOR WARD 2, SAKUBVA RESIDENTS

My name is Chioneso Gambiza a student at Bindura University of Science Education. I am carrying out a research on an analysis of the participation of households in Sustainable Domestic Solid Waste Management in Ward 2, Sakubva as part of the requirements of my degree program. I am requesting for your participation in this survey by answering the following scheduled questions. All information that shall be provided will be treated with strict confidentiality and will only be used for academic purposes. I appreciate the completing and returning of the questionnaire as early as possible.

You are required to indicate your response with a tick in the appropriate box after preferred answer(s). If extra information is required, specify where necessary.

A: DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

<table>
<thead>
<tr>
<th>1. Sex</th>
<th>2. Age</th>
<th>3. Level of education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>18-30 years</td>
<td>Primary</td>
</tr>
<tr>
<td>Female</td>
<td>31-40 years</td>
<td>Secondary</td>
</tr>
<tr>
<td></td>
<td>41-50 years</td>
<td>Tertiary</td>
</tr>
<tr>
<td></td>
<td>50+ years</td>
<td>No education</td>
</tr>
</tbody>
</table>

B: NATURE OF WASTE PRODUCED

4. What type of solid waste do you generate?
C: METHODS OF DOMESTIC SOLID WASTE MANAGEMENT

5. What kind of receptacle do you use to store waste?
   Metal bins ☐ Plastic bins ☐
   Skip bins ☐ Informal bags ☐

3. Who provides bins for household waste collection?
   Municipality ☐ Self purchase ☐

4. Do you sort waste and store in separate containers before disposing?
   Yes ☐ No ☐

5. Who does final disposal of waste in your area?
   Municipality ☐ Own methods ☐

6. If council, how do they provide waste collection services?
   Door to door service ☐ Fixed point communal skips ☐

7. How frequent is the waste collected by the municipality?

<table>
<thead>
<tr>
<th>Frequently</th>
<th>Twice a week</th>
<th>Once a month</th>
<th>Not collecting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. Are they reliable?

<table>
<thead>
<tr>
<th>Very reliable</th>
<th>Reliable</th>
<th>Unreliable</th>
<th>Not very reliable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. When waste is not collected within allocated days what do you do with the waste?
   Compost ☐ Burn ☐ Re-use ☐
   Bury ☐ Reduce ☐ Open dump ☐
   Recycle ☐

C: BARRIERS TO PARTICIPATION OF HOUSEHOLDS IN DOMESTIC SOLID WASTE MANAGEMENT
10. Do you pay for refuse collection services?
Yes  [ ]  No  [ ]

11. Who do you think is responsible for domestic solid waste management?
Municipality  [ ]  Residents  [ ]  Both  [ ]

12. Which type of housing do you live in?
Blocks  [ ]  Flats  [ ]  Residential stand  [ ]

13. Are there any educational campaigns on sustainable domestic solid waste management being done in the community?
Yes  [ ]  No  [ ]

14. As an individual household, what deters you from participating in sustainable domestic solid waste management?

<table>
<thead>
<tr>
<th>Lack of information</th>
<th>Lack of interest</th>
<th>Lack of space</th>
<th>Lack of finances</th>
<th>Payment of services</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Thank you, Tatenda, Siyabonga!
APPENDIX 3: INTERVIEW GUIDE

Interview guide for municipal officers

Self-introduction and assurance of confidentiality

1. What is the nature of waste generated by the community of ward 2, Sakubva?
2. Which type of waste is generated the most?
3. Regarding to waste receptacles do you provide bins or they purchase on their own?
4. Do the people sort waste before disposal?
5. Do you have a domestic solid waste collection schedule?
6. If yes, is it currently consistent?
7. What challenges are you facing in providing services to the community?
8. Are these challenges affecting the participation of households in sustainable domestic solid waste management?
9. How are you trying to curb these challenges?
10. Do people pay for the refuse collection services?
11. Are there any educational campaigns on sustainable domestic solid waste management being carried out in Ward 2, Sakubva?
12. What is prohibiting people from participating in sustainable domestic solid waste management?
APPENDIX 4: INTERVIEW GUIDE

Interview guide for EMA officer

Self-introduction and assurance of confidentiality

1. What is the nature of waste generated by the community of ward 2, Sakubva?
2. What challenges are the municipality facing in providing services to the community?
3. What alternatives are people using in managing domestic solid waste?
4. What alternatives do you as EMA advise people to use?
5. How is EMA helping the municipality as well as the community in ward 2 to sustainably manage domestic solid waste?
6. What challenges are the people facing in adopting the concept of sustainable domestic solid waste management?
APPENDIX 5: FOCUS GROUP DISCUSSION

Self-introduction and assurance of confidentiality

1. How many people are you in your team?
2. Do you have enough manpower?
3. How do you collect waste?
4. How many vehicles do you have?
5. What is done at the landfill?
6. What challenges are you facing in collection of waste?
7. What can be done to deal with the challenges?
8. What are the sustainable domestic solid waste management practices that you know?
9. Is the community involved in sustainable domestic solid waste management?
10. Do they corporate by placing bins by the roadside?
11. Do they sort waste before disposing or they mix everything?
12. What do you think makes the residence unwilling to participate in SDSWM?
13. What do you think must be done for residents to participate?
## APPENDIX 6: OBSERVATION GUIDE

### TRANSECT......

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>SITUATION ON SITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visible littering on streets, drains</td>
<td></td>
</tr>
<tr>
<td>Presence of Mixed waste on illegal dumpsites</td>
<td></td>
</tr>
<tr>
<td>Presence of formal bins</td>
<td></td>
</tr>
<tr>
<td>Emptied waste receptacles</td>
<td></td>
</tr>
<tr>
<td>Receptacles not emptied</td>
<td></td>
</tr>
<tr>
<td>Composts</td>
<td></td>
</tr>
<tr>
<td>Recycling</td>
<td></td>
</tr>
<tr>
<td>Reuse of waste</td>
<td></td>
</tr>
<tr>
<td><strong>Other:</strong></td>
<td></td>
</tr>
</tbody>
</table>