SUSTAINABLE HOUSEHOLD PRACTICES FOR ENVIRONMENTAL SUSTAINABILITY IN INFORMAL SETTLEMENTS: INSIGHTS FROM KANYAMA WARD 10, LUSAKA.

By

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Declaration

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Abstract

This study on sustainable household practices for transforming environmental concerns into environmental solutions in informal settlements was conducted in Kanyama Ward 10, Zones 98 and 100, Lusaka District. The study identified household practices among residents that could contribute to enhance household environmental sustainability and assessed the costs and resident's willingness to pay for household greening. Data was collected using structured interviews administered to 145 residents and interview guides for 11 key informants. Quantitative data was analysed using chi-square, two sample t-test and the Pearson Product Moment correlation, while qualitative data was analysed using thematic analysis. The results showed that the major environmental concerns in Zones 98 and 100 of Kanyama Ward 10, prioritised from the resident's point of view included waste management with 79 percent in Zone 100 and 82 percent in Zone 98, flooding 67 percent in Zone 100 and 80 percent in Zone 98 and poor drainage system 51percent in Zone 100 and 59 percent in Zone 98. Some of the household practices by residents capable of enhancing environmental sustainability were identified as maintaining sanitary home environment at 42 percent in Zone 98 and 61percent in Zone 100, disposing waste in bins 11 percent in Zone 98 and 15 percent in Zone 100 and planting trees/vegetables 7 percent in Zone 98 and 24 percent in Zone 100. Results show that more sustainable household practices in Zone 100 resulted in reduced environmental concerns. There was a significant positive correlation between household practice cost incurred for greening and average monthly income earned by respondents ($r \geq 0.5$; $p < 0.05$). This meant that households with higher monthly household incomes spent more on household greening. Furthermore, household income levels had an insignificant effect on the resident's willingness to pay for household greening ($X^2=0.781$, $p = 0.321$).

In conclusion resident's engagement in sustainable household practices and willingness to pay for greening in informal settlements was significantly influenced by their levels of household income as there was a relationship between level of income and cost of environmental sustainability. Residents' attitudes towards household greening and levels of income could prove to be either a hindrance or motivating factor in achieving environmental sustainability. As such, the study recommended sensitization, providing entrepreneurship skills and behavioural change campaigns in the area in order to instil the importance of household greening and improve their levels of income.

KEY WORDS: *Environmental solutions, greening, household practices, environmental concerns, willingness to pay*

Dedication

This work is dedicated to my late husband Dickson Tembo and my children; Joseph, Blessings, Angel and Charles Tembo who contributed to my well-being through love, respect, moral and financial support which enabled me to accomplish this level of education. I really appreciate, may Almighty God bless you.

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Acronyms

CBD	Central Business District
CBEs	Community Based Entrepreneurs
CSO	Central Statistics Office
EE	Environmental Education
EMA	Environmental Management Agency
EPA	Environmental Planning Authority
LCC	Lusaka City Council
LED	Local Economic Development
NDP	National Development plan
NGOs	Non-Government Organizations
SDGs	Sustainable Development Goals
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Education and Scientific Organization
WDC	Ward development committee
WHO	World Health Organization
ZEMA	Zambia Environmental Management Agency ZMW
Zambian Kwacha	

Chapter One

Introduction

1.1. **Background of the study**

Informal settlements are illegally developed residential areas that lack the consent of the concerned municipal authorities. They are usually established through self-help processes by people who illegally occupy premises or land and build their houses on such land [World Bank and United Nations Centre for Human Settlements (UNCHS), 2007]. Inhabitants of informal settlements live in a permanent state of illegal and social insecurity that lack legal recognition due to unlawful occupation and or unauthorised use of land and or illegal construction of houses upon the land (URP Act No. 3 of 2015 of Government of Zambia).

Srivinas (2003) in Olajide (2010) also defined informal settlements as being characterised by the illegal occupation of private or vacant land, unauthorised subdivision and construction of buildings and structures, reliance on low-cost and locally available scrap construction materials and the absence of restrictive regulations and standards. This often leads to overcrowding and deterioration of the environment, and insufficient basic needs such as water, sanitation and solid waste management, which often endangers residents' health and the environment. Informal settlers are also often characterised by poverty, which plays a major role in preventing them from acquiring service delivery to improve the environment they reside in (Lohern, 2011). According to the UNHabitat (2010), over 60 percent of the urban population in Africa is estimated to reside in informal settlements. Residents of informal settlements are regularly exposed to spatial and environmental marginalisation that comes with living in such settlements (Napier, 2000). Informal settlements are generally associated with environmental degradation. Urbanisation alters the environment in many ways, from causing habitat fragmentation and biodiversity losses to urban flooding and dramatic increases in severity of air and water pollution (Li et al, 2016). Bai and Dent (2009:150) stated, "Land or environmental degradation is a long-term loss in ecosystem function and productivity from which the land cannot recover unaided, requiring progressively greater inputs to repair the damage". The other major reason why there are a number of environmental problem of polluting, depleting, and storing of waste is that during the past 200 years, there has

been a shift from an agricultural way of life to an industrial way of life which releases numerous environmental impacts or pollutants.

Informal settlements have grown considerably in recent years in Zambia, and most have poor water supply and sanitation issues (Ministry of Local Government 2011). Several factors exacerbate environmental issues common in informal settlements. For instance, in Kanyama, water supply is highly fragmented with just very few households having access to piped water in their homes and yards, while the rest depend on communal kiosks and shallow wells (Mutesu, 2014). Further, many households go without water supply for several hours each day due to intermittent water supply which could compromise household sanitation and make residents susceptible to increased spending on health care which may deplete household savings (Moosav, 2011). Other environmental issues that affect households in informal settlements include indiscriminate solid waste disposal and uncollected waste around the houses (Gutberlet, 2016). The use of landfills is also a common health hazard in informal settlements as the disposed waste contaminates underground water.

The general failure to instil good practices by households in informal settlements through environmentally friendly household practices exacerbate impacts felt through environmental issues. Sustainable household practices entails households' lifestyle practices that are better for the environment and makes the planet a better place for our communities and generations to come. Environmentally sustainable household practices include sustainable water conservation practices, reduced generation of waste, reusing material rather than disposing, planting more trees and keeping green spaces, and separation of waste for possible recycling (Rinkesh, 2009). Proper sewage treatment is required to limit the amount of toxic substances that normally end up in water systems and underground water. Other sustainable household practices include proper management of septic tanks, planting trees to reduce the speed of surface water runoff and as such, lessens erosion and prevents toxic substances and chemicals from washing into water systems. Further, sustainable practice also involve household practices such as lessening the use of plastic water bottles, disposable plastic plates, and plastic bags which frequently end up in the drainage system contaminating natural habitats and destroying aquatic life and generally makes the environment unpleasant. Unsustainable household practices may include illegal dumping and burning of household solid waste which result in environmental problems such as land, water and air pollution

(Nkwachukwu et al., 2010). Indiscriminate solid waste disposal on roadsides and on any available open pit (Kaundal and Sharma, 2007) are also a common unsustainable household practice in informal settlements.

The greening concept is a concept that represents environmentally friendly practices that contribute to environmental sustainability as well as preservation of green spaces (Head, 2011). This study aims at assessing sustainable household practices among residents in informal settlements in Kanyama Ward 10 Zone 89 that could contribute to the transformation of environmental problems into environmental solutions.

1.2. Problem statement

Environmental concerns in informal settlements are usually a product of a lack of service provision from the local government (due to the unplanned nature of the settlements) and the residents' failure to develop environmentally friendly practices towards management of environmental challenges. These areas are marginalised and as long as they do not develop locally devised methods of handling their own environmental problems, they run the risk of enduring the challenges for extended periods of time. This is because these areas are usually not serviced by the local governments and as such, are not priority areas for the government. Hence solutions to their environmental challenges should be locally driven and should start with the residents' own attitudes towards environmental sanitation, which involves sustainable household practices. Commonly occurring challenges in informal settlements such as sanitation, unsustainable disposal of faecal matter, indiscriminate disposal of household solid waste and open burning of waste could be minimised in informal settlements by residents' change of attitude towards management of such challenges.

Like many other informal settlements, Kanyama Ward 10 suffers from the said environmental challenges involving unsustainable disposal of faecal matter, and indiscriminate disposal of household solid waste and open burning of waste. Waste burning in informal settlements does not take into consideration the nature and types of waste. Besides burning, indiscriminate disposal of waste is another challenge in informal settlements such as Kanyama Ward 10. Indiscriminate disposal of solid waste in dumpsites located within urban areas has proved to be a problem to nearby residents in most developing cities of the world, Kanyama Ward 10 is no exception**.** Some wastes are dumped in open undesignated areas where they are then burnt to reduce the volumes.

As indicated by Šmejkalova *et al*. (2003), such a practice has a negative impact on maintenance of biodiversity of an area. Furthermore, open dumps have environmental safeguards; they can pose major public health threats and environmental effects in urban cities**.** A lack of sustainably managed landfills and inadequate solid waste management in Kanyama Ward 10 is both a sanitary concern as well as an environmental concern. However environmentally friendly household practices can provide solution to such actions which begins by changing people's attitude and behaviour towards their environment and sanitation of their surroundings. This study therefore sought to identify specific household environmental practices in Kanyama Ward 10 that could contribute to the transformation of the area into an environmentally friendly one.

1.2. Aim

The study aimed at assessing sustainable household practices among informal settlement household dwellers in Kanyama Ward 10 Zones 98 and 100 that could contribute to the transformation of environmental concerns into environmental solution.

1.3. Objectives

i) To identify environmental issues in Kanyama settlement that constrain possible household environmental sustainability.

ii) To identify household practices that can enhance environmental sustainability in Kanyama Township

iii) To determine the cost of transforming selected household environmental issues into environmental solutions.

iv) To assess the willingness of the residents to pay for the transformation of their households into greener ones.

1.4. Research questions.

i) What are the environmental issues in Kanyama Township that hamper its possible household environmental sustainability?

ii) What household practices can enhance environmental sustainability in Kanyama Township?

i) What is the mean cost for transforming identified household environmental issues in Kanyama Ward 10 into environmental solution?

1.5 Hypothesis

H1: There is a positive linear relationship between the cost of transforming environmental issues into environmental solutions in Zone 100 and Zone 98 and the monthly income.

H2: There is no difference among residents of Zones 98 and 100 as regards their willingness to pay to transform their households' environmental issues into environmental solution.

1.6. Significance of the study

According to UN-Habitat (2001), informal settlements place great pressure on the environment and are often highly polluted. Unsustainable household practices in informal settlements such as poor solid waste management and disposal, use of untreated pit latrines, heavy reliance on dirty fuels would cause many environmental problems such as vector infestation, contaminating ground water, polluting the environment, and floods in rain season due to blocked drainages. This study will provide adequate information on sustainable household practices that can transform informal settlements into environmentally sustainable ones as a way of mitigating or minimising environmental problems. It will provide lessons to the targeted population of the study area and other informal settlements facing similar challenges. It is hoped that the findings of this study will also assist policy makers in generating policy that will be related to environmentally friendly practices.

Unsustainable household practices such as poor solid waste management and disposal, use of untreated pit latrines, cause many environmental problems in Kanyama Ward 10. It is important to have a sustainable household practices at the household level to avoid many problems such as vector control, contaminating ground water, polluting the environment and disease control. There are many major environmental problems associated with poor environmental household practices such as poor solid waste management which cause many diseases such as diarrheal diseases(cholera outbreak in the years 2017-2018), respiratory diseases, vector borne disease, road traffic injuries, unintentional poisonings etc. Some of major environmental problems are unsafe water and sanitation and poor hygiene, indoor and urban air pollution, climate change and so on. The waste from poor waste management block the drainage system which lead to floods in rain season. The

stockpile of household waste is turned into bacteria culture because it becomes rodents and insects food, which are diseases carriers and result in public health hazard. It aslo create annoyance due to poor odour, poor scenery, and untidiness.

Due to inadequacy of prospective studies performed in this field the household practices to transform environmental issues into environmentally friendly ones in informal settlements have been difficult to be ascertained and to estimate the costs. The study aimed at assessing the sustainable household practices among informal settlement household dwellers in Kanyama ward 10 Zones 98 and 100 that could contribute to the transformation of environmental concerns into environmental solution.

Furthermore, the study assessed the cost for transforming environmental issues into environmental solutions. Knowledge in sustainable household practices may be used by stakeholders to be replicated to other areas in order to attain environmental sustainability for the entire city. Analysis of current environmental household practices will help to improve the sustainable household practices in the community and can make aware ness about inappropriate environmental household practice methods.

1.7 Structure of the dissertation

This dissertation has a composition of six chapters as follows; Chapter One includes the introduction, background to the study, statement of the problem, aim of the study, research objectives, research questions, and the significance of the study and the structure of the study. The second chapter contains literature review for supporting arguments based on previous researchers from global to local level. While the third chapter, describe the area of study. Chapter Four contains information on the study methods; variables, data collection and analysis. Chapter Five presents the findings of the research based on the research objectives. Finally, Chapter Six presents the discussion of the findings and chapter seven presents the conclusion and recommendations.

Chapter Two

Literature review

2.0. Introduction

This chapter contains a review of literature and looks at theoretical framework and conceptual perspectives related to the study, the greening concept, the strategies for addressing environmental issues, the economic costs for greening informal settlements and the concept of environmentally sustainable urban planning. The theoretical framework is built on theories of green growth and planned behaviour.

2.1. Theoretical framework

This section will discuss the theories surrounding sustainable households for transforming environmental issues into environmental solutions in order to enhance environmental sustainability in informal settlements.

2.1.1. Green growth

The term Green or greening is widely used by private and public organisations as a brand for sustainability and environmental solutions. According to Brilhante and Klaas (2018), the Green Concept is one of the latest responses to the diverse efforts and research conducted to address the problems caused by the dispersed model of city development and to help areas to become more environmentally sustainable (greener), less dispersed and more liveable. The concept of sustainable development has been on the world agenda for a number of years. The world is facing a number of challenges and environmental issues that are affecting the sustainability of the environment especially in informal settlements of developing countries. The Bruntland Commission published its report also known as “Our Common Future” in 1987 and it was presented at the United Nations General Assembly. The report focused on the need to link economic development and environmental sustainability. Sustainable Development was defined in the same report as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (The United Nations General Assembly, 1987:43). The overall goal of sustainable development is the long-term stability of the economy and environment and it can only be realised through the integration and acknowledgement of economic,

environmental, and social concerns throughout the decision making process (Emas, 2015) proving a structure for the incorporation of different environmental and economic policies. The above concept was designed to meet the requirement of both supporters of economic development as well as those concerned primarily with environmental conservation and sustainability at large. Today, it is recognised that social, economic and environment is completely interconnected, environmental sustainability in informal settlements and socioeconomic development are dependence variables (Mwamhanga, 2013). Therefore, sustainable human settlements and environmental sustainability are not a choice but a necessity.

Some strategies to achieve economic development without compromising the quality of the environment include concepts such as the green growth and green economy (Kasztelan, 2017). A green growth is defined as the principles of environmental, social and economic sustainability that, strives to use renewable resources, and tries to minimise the negative environmental impact of its environment (Cekanavicius, et al., 2014). According to Jacobs (2012), the core meaning of the concept of green growth can be defined as economic growth (growth of gross domestic product or GDP) which also achieves significant environmental protection that leads to environmentally sustainable households and settlements. UNEP's definition of a 'green economy' captures these ideas: it is one that "results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities" (UNEP, 2011:9). This is very important in informal settlements where environmental risks are very high and if not minimised or mitigated may lead to resource depression. While the term "sustainable development" in the 1980s had mainly environmental connotations, increasingly the international community, led by the United Nations Development Programme (UNDP), adopted a more comprehensive approach that stressed sustainable human development and emphasised the economic and social, as well as the purely environmental aspects of sustainability (UNDP, 1994; UNECLAC, 2003). By the early 21st century, sustainable human development aimed at good political and economic governance, poverty alleviation, reducing social marginalisation, raising general levels of well-being and advancing economic growth without depleting the resource base for future generations. Sustainable development rests on environmental sustainability to attain social and economic sustainability. This is because polluted environments may cause severe disease outbreaks which would hinder people's social lives and their economic activities (Thwink, 2018). The EBRD (2016), for example, defines

a green city as one that is characterised predominantly by its environmental performance, with the intention of maximising social and economic benefits

2.1.2. Theory of planned behaviour (TPB)

This theory centres on understanding, predicting and changing of human behaviour which is very much essential in transforming environmental issues in informal settlement into environmental solutions (Lange et al., 2012). The theory of planned behaviour was coined by Ajzen in 1991 and it elaborates that people should be able to act on their intentions to the extent that they have information, intelligence, skills, abilities and internal factors required to perform the behaviour and the extent that they can overcome any external obstacles that may interfere with behavioural performance. According to Lange et al. (2012), this theory was coined as an extension of theory of reasonable action which states that behavioural beliefs and outcome evaluations combine to produce an overall positive or negative trend towards the behaviour. The argument is that many factors, internal and external can impair or facilitate performance of a given behaviour the extent to which people possess. Environmental sustainability is environmental motivation and expectation for green building demand and investment. Environmental sustainability is therefore embedded in the environmental quest for protection of eco-system and bio-diversity, improvement of water and air quality, reduction of solid waste, conservation of natural resources, reduction of societal costs of landfill creation and maintenance, and enhanced energy efficiency (Onuoha et al., 2015). The application of this behavioural theory could induce pro-environmental habits, attitudes, and knowledge and arouse expectations and beneficial factors that could motivate clients and prospective users to go for green building or indulge in green practices and could also guide their environmental actions and activities in prospect of future benefits (ibid). If the behaviour is changed towards green growth, environmental sustainability is possible and the opposite is as well true. According to Scott (2009) shifting lifestyles towards an environmentally sustainable level of consumption at household level has become a central issue in environmental policy circles in recent years: "Lifestyle change is fast becoming a kind of 'holy grail' for environmental and social policy with questions like: How can we persuade people to behave in more environmentally and socially responsible ways? How can we shift people's transport modes, appliance choices, eating habits... holiday plans, lifestyle expectations (and so on) in such a way as to reduce the damaging impact on the environment and on other people? How can we encourage 'sustainable living' and discourage

environmentally unsustainable living? These questions lie at the heart of the emerging policy debate" (Jackson, 2006:7-8). Hence the focus of this research report.

According to Mueller (2017), it is assumed that the world certainly is headed towards a bad direction if people simply do not change the way that they behave which includes their day-today lives at their households. The author further observed that many underestimate the power of the individual, especially the power that many of them have when they agree on issues that are important to them. The residents are the only ones that have the power to truly change the world, even though it may not seem that way, basically residents control their environment to a higher degree. She further summarised the sustainable household practices for a greener home Box 2.1.

Making households green.

Way of Living:

- ✓ Do not litter, pick up litter on or around your property
- ✓ Open curtains for natural light instead of using electricity
- ✓ Buy a dishwasher (Energy Star 2016, cited 12.1.2017).
- ✓ Grey water recycling*
- ✓ Air dry laundry
- ✓ Limit showers to 5 minutes, install eco showerhead or turn off water when lathering
- ✓ Start a compost bin
- ✓ Start a home garden
- ✓ Buy low-flow toilets
- ✓ Replace non-stick pans with longer lasting cast iron pans
- ✓ Use reusable containers and bags
- ✓ Improve house insulation
- ✓ Check for leaky pipes

Box 2.1: Suggested practices on transformation into green homes

Source: Mueller (2017).

2.2. Environmental Issues in Informal Settlements

Due to rural-urban migration in developing countries, more of the world's population for the first time in history now live in cities than in the countryside giving rise to informal settlements (UN

Habitat, 1996). Definitions of informal settlement vary widely from country to country depending on a variety of parameters such as economic, social and environmental factors. An important issue in defining informal settlement is the distinction between formality and informality, the borderline between formality and informality when applied to economic, social and environmental activities, (Hoffman and Shirhan, 2006). UN Habitat (1996) defined informal settlements as the residential areas where a group of housing units have been constructed on land to which the occupants have no legal claim, or which they occupy illegally, and it is an area where housing is not complied with current planning and building regulations. According to Kombe (2005), the informal settlements refer to groups of housing in an area which are not complying with planning and building regulations. Informal settlements are settlements where "inhabitants have no security of tenure vis a vis the land or dwellings they inhabit, with modalities ranging from squatting to informal rental housing; the neighbourhoods usually lack, or are cut off from, basic services and city infrastructure; the housing may not comply with current planning and building regulations, and is often situated in geographically and environmentally hazardous areas" (United Nations Economic Commission for Europe, 2016, p. 21). Slum households are defined as those "in which the inhabitants suffer one or more of the following 'household deprivations': lack of access to improved water source, lack of access to improved sanitation facilities, lack of sufficient living area, lack of housing durability and lack of security of tenure" (UN-Habitat, 2016). However, terms such as informal settlement, slum, squatter settlement, and peri-urban area are often, but not always, used interchangeably (UN-Habitat, 2003). In this study, urban informal settlement and slum will be treated as synonyms.Omedo (2011) further asserts that the environmental concerns caused by informal settlements on the periphery of the city result in dangerous conditions or events that threaten or have the potential for causing damage to property on the land. Due to high poverty levels, settlers in peri urban informal settlements found themselves in disaster-prone areas and often live in crowded, makeshift houses which increase their vulnerability (Phiri 2016).General flooding due to heavy rainfall exacerbates the risks as there is no proper drainage system in place to remove water from the environment. Crowded shacks built on unstable land block the rain water, creating damp, saturated soil with great potential for landslides and thus environmental degradation (Schuster and Highland, 2007). This consequently damages the poorly constructed houses, and when landslides occur houses (and potentially human lives) are lost.

Globally UN's predictions claim that over 60 percent of people will live in cities by 2030, and the urban population will outstrip 75 percent of people by 2050 (UN-Habitat, 2009) with the majority living in informal settlements. The prodigious urban growth in global south megacities has been exceeding their capacity to provide adequate services and infrastructures to their citizens for the last decades, hence, the likely main engine of social and economic inequalities. The concentration of people and economic activities in towns and cities inevitably creates local pressure on the environment. This high concentration of people in a small proportion of land area generates some environmental problems/issues. Maione (2016) contends that, urban environmental issues have often been categorized as belonging to either the 'brown' or the 'green' agendas with 'brown' agenda prioritising environmental health, and addresses local issues related to inadequate water and sanitation, urban air quality and solid waste management – all of which are particularly relevant to poor urban dwellers in informal settlements. These phenomena are associated with a rapidly deteriorating quality of life, with particularly hostile impacts on the urban poor who have the poorest access to the existing facilities (African Development Bank, 2008). As a consequence, the size and the insatiable appetite for growth of cities strive for an overconsumption of resources and the proliferation of unplanned informal settlements that are home to over a third of urban population in developing countries. According to World Bank estimates by 2035, cities will become the predominant locations of poverty especially in informal settlements (GlobeScan, and Hazel, 2007). The following are some of the environmental issues associated with informal settlements that hinder environmental sustainability.

2.2.1. Poor solid waste management

Solid waste is inevitable because by nature every human activity generates a certain amount of solid waste. The increase in population usually tends to cause an increase in the rate of solid waste generated (Hoornweg, et al, 2013). The rate at which solid-waste generation will rise depends on expected urban population and living standards growth and human responses (ibid). Poorly managed waste is contaminating the world's oceans, clogging drains and causing flooding, transmitting diseases, increasing respiratory problems, harming animals that consume waste unknowingly, and affecting economic development (Kaza et al, 2018). Unmanaged and improperly managed waste from decades of economic growth requires urgent action at all levels of society. Solid Waste Management (SWM) is a significant environmental health service, and included as

part of basic urban services. SWM has emerged as an essential, specialized sector for keeping cities healthy and fit for human habitation (Antwi, 2008). Solid Waste management encompasses programmes and activities in the waste hierarchy constituting recycling, reuse, composting, incineration and final disposal (Malinauskaite, 2017). Waste can further be classified as hazardous or non-hazardous. Urbanisation has contributed to increased waste generation in all major towns in Zambia. The increase in waste generation particularly municipal waste adds pressure to Local Authorities (LAs) who are charged with the responsibility of collection and disposal. According to CSO 2016 report, at national level, waste collection has slightly improved from 5.6 percent in 2010 to 6.3 percent in 2015. However, rural households had less than 0.2 percent of their waste collected compared to 14.4 percent in urban areas (CSO, 2016). Waste collection at provincial level has been at an average 0.2 to 24.8 percent. Lusaka Province had the highest collection rate at 24.8 percent followed by Copperbelt at 7.9 percent (ZEMA, 2017). In spite of existence of various efforts on solid waste collection, still the quantity of solid waste collected is small compared to the solid waste generated (ibid). The situation is even worse in informal settlements where, ineffective solid waste collection is contributed by haphazard solid waste disposal and hence resulting into environmental pollution. Therefore, having an effective and efficient solid waste management system is a major challenge in cities of developing countries, and thus more consulted efforts are needed. According to IDRC (2018), in most developing countries, solid waste management is a significant challenge, especially in urban slums and other informal settlements. Solid waste management is one of the typically neglected aspect of urban planning and in most instances, access to basic urban services such as solid waste collection and management is extremely limited. Gutberlet (2016) noted that in the informal settlement of Kisumu in Kenya most of the solid household waste generated in the city remains uncollected and is left along the main roads or in alleyways and empty lots, leading to appalling conditions not only in poor neighbourhoods but also in the city in general. This has heavily contributed to the impact of urban flooding by blocking drainage, increasing debris, and harbouring disease vectors. According to the findings by Kasala (2014) in the study carried out in Keko Machungwa informal settlement in Dar es Salaam, Tanzania, there are challenges facing solid waste management and that solid waste generated in Keko Machungwa was 16 tonnes per day, among those, only 4.56 (less than 50 percent) were collected. About 11.44 tonnes of uncollected waste are illegally dumped into a seasonal stream and in different vacant lots hence causing blockage of the seasonal stream. Keko Machungwa has

different groups engaged in solid waste collection but are deterred by many challenges which include: lack of cooperation among the existing solid waste collection organs, inaccessibility in some places, low public participation, financial constraints and unwillingness of local community to pay for solid waste collection fees.

Disposing of waste has huge environmental impacts and can cause serious problems. In the case of UK much solid waste is buried in landfill sites – holes in the ground, sometimes old quarries, sometimes specially dug where some waste eventually rot, but not all, and in the process it may smell, or generate methane gas, which is explosive and contributes to the greenhouse effect(Genske, 2003). Leachate produced as waste decomposes may cause pollution. Badly-managed landfill sites may attract vermin or cause litter (Chaudhary et al, 2020).When waste ends up at the landfill, chemicals in the trash can leech out into the soil, contaminating it. This will hurt plants, along with animals and even humans who come into contact with the soil (ibid). Incinerating waste also cause problems, because plastics tend to produce toxic substances, such as dioxins, when they are burnt. Gases from incineration may cause air pollution and contribute to acid rain, while the ash from incinerators may contain heavy metals and other toxins. Reducing waste therefore means less environmental impact, less resources and energy used and saves money (Bagozzi and Dabholkar, 1994). Improper waste disposal contributes to pollution by contaminating the soil, water and air. Additionally, other effects include increased expenditure on public health and water treatment and blockage of drainages resulting in damage to infrastructure such as roads. It also contributes to the outbreak of diseases such as cholera and dysentery, proliferation of pests and vermin, and the loss of aesthetic beauty. Improvements are required in the management of municipal waste. In addition, waste management covering aspects of minimisation of waste generation, collection, reuse, recycling, treatment and disposal need to be enhanced (ZEMA, 2017).

2.2.2. Poor water and Sanitation

Informal settlements are usually associated with poor provision of water and sanitation which is the healthy concern (Maiwanga, 2019). Due to intermittent water supply in informal settlements residents tend to use ground water supply.The World Health Organization report of 2010 estimates that 2.2 million people die annually from diarrhea diseases and that 10% of the population of the developing world are severely infected with intestinal worms related to improper waste and excreta management. Although the world's urban population has in the last 50 years increased fourfold, investment in water

and sanitation services infrastructure in low-income countries has not kept pace with this population growth and about 60 percent of urban population is not adequately served (Kayaga and Kadimba-Mwanamwambwa, 2006). In Kenya for instance, diarrheal diseases are among the major illnesses affecting children of the slum residents. Where ground water is used as a source of domestic water, use of pit latrines is not recommended because the two are incompatible unless the water table is extremely low and soil characteristics are not likely to contribute to contamination of ground water (Phiri, 2016). The United Nations has long been addressing the global crisis caused by insufficient water supply to satisfy basic human needs and growing demands on the world's water resources to meet human, commercial and agricultural needs especially in informal settlement. According to World Health Organization (2010) in Wasongo (2014), an estimated 2.6 billion people, comprising about 40 per cent of the world's population, live without adequate access to safe water and good sanitation of which the majority of the affected population are found in informal settlements of the developing countries where the practice of open defecation, poor sanitation services, and use of unsafe and unsustainable water persists due to bad attitude making people unable to practice basic hygiene. Addressing the water and sanitation needs of people living in urban informal settlements would be essential for delivering on the inclusive promise of the SDGs (Sinharoy et al, 2019).

The United Nations Water Conference (1977), the International Drinking Water Supply and Sanitation Decade (1981-1990), the International Conference on Water and the Environment (1992) and the Earth Summit (1992), are all focused on this vital resource. Contaminated water and lack of basic sanitation are undermining efforts to end extreme poverty and disease in informal settlements in the world's poorest countries. Currently, there are 2.3 billion people worldwide, who still do not have basic sanitation facilities such as toilets or latrines. According to the WHO/UNICEF (2019) Joint Monitoring Programme for Water Supply and Sanitation, at least 1.8 billion people world-wide are estimated to drink water that is not protected against contamination from faeces. An even greater number drink water, which is delivered through a system without adequate protection against sanitary hazards. (WHO, 2019)

2.2.3. Floods

According to Nchito (2007), flooding in unplanned settlements in Lusaka is expected, even in years of normal rainfall. Most of the households affected by flooding are poor and the flooding damages or destroys their homes and belongings, which might have taken years to accrue. Pelling (2011) added

that cities in developing countries are increasingly prone to flood risk, particularly in informal settlements which are socio-economically deprived areas. The study by Mwape (2009), showed that floods have an impact on people's socio-economic livelihoods and critical aspects such as agriculture, health, education, housing, water and sanitation, property and assets of the people in Sikaunzwe community in Kazungula District of Zambia which Grunfest (1995) in Mwape (2009) argues that, due to high poverty levels in informal settlements, people in Sikaunzwe community have become more vulnerable because they live in hazardous areas including flood plains and steep hills. People in informal settlements have fewer resources which makes them more susceptible to disasters. They are less likely to receive timely warnings. Furthermore, even if warnings were issued, they have fewer options for reducing losses in a timely manner. The poverty level affects the resilience and process of recovery from disasters (Mwape, 2009). According to Lind et al. (2008:143) in Mwape (2009), "the loss in case of flooding has many dimensions". In addition to economic loss and loss of life and injury, there may be irreversible loss of land, of historical for cultural valuables and loss of nature or ecological valuables causing land degrading which is an environmental issue. Borrows and De Bruin (2006:1) indicated that, "among natural catastrophes, flooding has claimed more lives than any other single natural hazard". In the decade 1986 to 1995, flooding accounted for 31 percent of the global economic loss from natural catastrophes and 55 percent of the casualties. The damaging effects of flooding are likely to become more frequent, more prevalent and more serious in the future if strategies to mitigate them are not identified at household levels.

2.2.4. Lack of green spaces

'Thou shalt not destroy the trees ... for the tree of the field is man's life. 'Deuteronomy 19:5"

Green spaces are a great benefit to our environment. Green space includes parks, community gardens, cemeteries, schoolyards, playgrounds, public seating areas, public plazas and vacant lot (EPA, 2006). Household green space can promote physical activity, mental health and well-being, and it can be a vital part of a household's infrastructure by helping improve water quality and reduce runoff (Rigolon et al., 2018) and as refreshment spaces. Wolf (2004) added that green spaces filter pollutants and dust from the air, they provide shade and lower temperatures in urban areas, they even reduce erosion of soil into our waterways and help in regulating air quality and climate, reducing energy consumption by countering the warming effects of paved surfaces, recharging

groundwater supplies and protecting lakes and streams from polluted runoff and provide proper landscaping, reduces nitrate leaching from the soil into the water supply and reduces surface water runoff, keeping phosphorus and other pollutants out of our waterways and preventing septic system overload. Trees in a parking lot can reduce on-site heat build-up, decrease runoff and enhance night time cool downs. Informal settlement lack this precious ecosystem that provides numerus advantages and natural healing to the environment. Despite the benefits that urban green offers to households, Rigolon (2018) also observes that urban green space might also bring some disservices to some households' water quality and access issues from water lines being damaged by tree roots.

2.3. Strategies for transforming identified environmental issues into environmental solutions

This section will discuss various strategies that can be employed in Kanyama Ward 10 to transform environmental concerns into environmental solutions.

2.3.1. Settlements upgrading

Informal settlements upgrading is one important strategy for transforming identified environmental issues into environmental solutions. Informal settlement upgrading refers to any sector based intervention on the settlements that result in quantifiable improvement in the quality of life of the residents affected (Abbott, 2008). This means that there is a range of potential interventions that will play a significant role in determining the success of upgrading projects that seek to transform an illegal and sub standards environment through capital intensive intervention.

2.3.2. Greening and co-production

Greening is one way of upgrading a settlement and is actually a relatively new phenomenon that would provide solutions to increased environmental concern with environmental issues in informal settlements and in general. In order to achieve greening of informal settlement, urban infrastructure provides an important means while taking advantage of urban densities that acts as the mode or as engine for transformation through their contribution through coproduction. Collaborative community-based initiatives and social micro-enterprises in waste management are important livelihood activities in many cities in the Global South and co-production in waste management by various stakeholders have been described for cities in Brazil (Gutberlet, 2016). Cities rely heavily on urban energy, transport, communications water and sanitation infrastructure, all of which require a significant level of public sector oversight, investment or provision and some level of coproduction by users is needed to achieve good service delivery, particularly where financial

resources are (ibid). This infrastructure is critical to urban economic productivity, and one of the economic challenges for economically ambitious low income cities is how to finance infrastructure improvements and its economic cost that raise productivity, attract investment and achieve environmentally sustainable development (Infrangalis, 2013). Infrastructure also mediates between households and their environments, helping to determine levels of resource use, pollution and the residents' contributions to long term sustainability. Green infrastructure relates to green goals; that is, natural and eco-friendly approaches in the delivery and operation of infrastructure and services such as energy, transport, sanitation, waste management (Foster et al., 2011). It thus means the greening of infrastructure with the intention of 'minimizing environmental damage while maximizing environmental benefits related to the use of material and energy during the construction and operation phases' (Giordano, 2014:482). John Abbott 2012 employed this normative use of the term green infrastructure to argue for a context sensitive ecological (green) infrastructural approach in African cities, from the position that the delivery and management of a full range of urban infrastructure and services can indeed be 'green' (Abbott, 2012). On the other hand, the term green infrastructure refers to 'green spaces and other environmental features' (Natural England, 2009:7) as well as productive natural landscapes (Bohn and Viljoen, 2011:150) that deliver a range of benefits to human beings.

2.3.3. Public Private Partnership

The role that the public sector plays in investing in urban infrastructure and/or setting up regulatory systems and developing public/ private partnerships, can put public agencies in a good position to support urban infrastructure that contributes to sustainable household practices or green economy. Public-private sector collaboration model in waste management in informal settlements in Lagos is used to deal with solid waste management (Opoko, 2016). The relevance of green infrastructure can clearly be seen in Copenhagen, where 'greener' local drainage of rainwater and diversion of storm water to reduce flooding is cheaper than traditional measures (such as expanding the sewage network), while simultaneously improving the quality of life for urban residents through increasing the number of parks, streams, and ponds (Infrangalis, 2013). Parks, gardens, forests, wetlands, riparian corridor and other forms of green spaces and ecological systems are critical components of urban green infrastructure (Adegun, 2017) and have a positive roles in human well-being and the supply of ecosystem services (Swilling, 2013).

Pieterse (2000) commented that municipalities can strengthen urban governance in co-operation with the private sector by fostering partnerships and local economic development (LED) strategies that combine local skills, resources and ideas to stimulate the local economy and environmental infrastructure provision. Partnering with the private sector could: extend services into poorer or informal communities, provide safer work places, promote adoption of non-discriminatory employment policies, help the poor access credit, and boost investment in low-cost housing. The private sector will also seek partnerships with residents of informal settlements, NGOs and municipal government. A report on optimizing urban infrastructure for the green economy (Robinson and Swilling, 2012) identified eco-efficiency and social inclusion of different actors and stakeholders as the overarching principles to fund sustainable projects to promote the minimisation, recovery, reuse or re-cycling of waste.

2.3.4. Awareness and sensitization of the residents

The other strategy towards achieving a more sustainable urban environment should concern the awareness and sensitization of the residents, with a focus of changing their behaviours on matters related to environmental sustainability. This would include re-teaching both at municipal and local scale on matters of solid waste management system. This would provide a sound collection service that addresses the waste segregation at its source, the minimisation of disposed garbage, the preservation of open and natural spaces through prevention of waste disposal in streets, the acceptability of living and working conditions of garbage pickers and workers employed in the collection system (Maione, 2016). Substantial international programs have contributed to a growing “green” awareness in towns and cities, although there is much more that can still be done (Dodman, 2013) at household levels. At the same time, urbanisation provides a range of opportunities for addressing social and environmental burdens. These ‘sustainability multipliers’ include lower costs per capita for providing services in densely populated areas, greater options for recycling, and better opportunities for the use of public transport. Cities can therefore contribute substantially to achieving higher levels of resource efficiency if they are well informed.

2.3.5 Sustainable urban planning

Following the discourse about sustainable development based on the Brundtland Commission's report and the processes in the UN Committee on Environment and Development, a sustainable urban development would require considerably more ambitious policies than today in order to limit

energy consumption, reduce pollution and protect natural areas and arable land. The United Nations Conference on Environment and Development (UNCED) held in Rio in June 1992 acknowledged the need for countries to strike a balance between the economic and social demands on the world's ecosystems and the need to conserve natural resources on which economic and social systems depend. The UNCED also highlighted gaps in the understanding of the earth's ecological processes that were hindering our ability to attain sustainable development. Planning has been seen as the activity which can solve many of the major problems of urban areas. While the forces impacting on the growth of cities have changed dramatically in many parts of the world, planning systems have changed very little and contribute to urban problems (UN-Habitant, 2009). Planning systems can be changed so that they are able to function as effective instruments of sustainable urban change, that is, capable of making cities more environmentally sound and safe, more economically productive and more socially inclusive (ibid). Cities can use a range of principles and practices to integrate the environmental sustainability in urban planning. Integrated development plans (IDPs) need to show how to integrate environmental concerns in long-term area visioning exercises including informal settlements. These development plans strengthen relationships between stakeholders, but need to take nationally mandated planning cycles into account. Environmental strategies for urban areas need to be supported by key underlying principles which should be elaborated in local area plans and must explain in detail how households need to practice in order to achieve environmental sustainability in the settlement.

Political support and commitment are equally vital, as is broad-based enthusiasm from urban residents. The strategies need to be underpinned with governance structures that facilitate integration of environmental concerns in the planning process. Other international programmes initiated in this period included the Sustainable Cities Programme (UNEP and UN-Habitat), Localizing Agenda 21 (UN-Habitat) several bilaterally funded programmes as well (ICLEI, 1996). Each had their particular features, but all attempted to include a concern for the environment and sustainability into urban planning, and to include civil society and the private sector in the planning process. There were also many cities and city networks that developed innovative environmental and planning programmes apart from these international programmes. In Latin America, cities such as Curitiba and Porto Alegre 20 in Brazil, and Manizales 21 in Colombia, gained international reputation for their innovative environmental planning, as did networks such as Peru's Cities for Life **(**Schwartz, 2004). Many of the principles and approaches promoted in these programmes,

along with their more or less explicit critique of more conventional urban planning, were still evident in UN-Habitat's (2009) Global Report on Human Settlements on Planning Sustainable Cities. However, within the international agencies, integrated approaches to environmental management lost momentum, in favour of more issue specific approaches such as water and sanitation. As countries urbanize, the issue of sustainable urbanization becomes crucial. Urban planning can play a vital role in ensuring sustainable urbanisation. Achieving sustainable cities and contributing to climate protection requires planned change to the way in which cities are spatially configured and serviced. Urban planning can help mainstream climate change considerations into urban development processes (ibid). In Zambia, the 7th National Development plan, running from 2017 to 2021, is focused on attaining the long-term goal of the Vision 2030; 'Becoming a prosperous middle-income country by 2030' and the theme "Accelerating development efforts towards the Vision 2030 without leaving anyone behind" lies under the 5-pillars which recognizes the aspects of sustainable development of the economy, social justice, and social equity but lacks the environmental sustainability and climate change aspects which are significant in national sustainable development.

The Environmental Management Agency Act No. 12 of 2011 of Zambia has the following roles with regard to environmental sustainability;

i) Provide for integrated environmental management and the protection and conservation of the environment and the sustainable management and use of natural resources

ii) Provide for the preparation of the State of the Environment Report, environmental management strategies and other plans for environmental management and sustainable development.

iii) Provide for the conduct of strategic environmental assessments of proposed policies, plans and programmes likely to have an impact on environmental management.

iv) Provide for the prevention and control of pollution and environmental degradation**.**

The stated roles provide the benchmark for household environmental sustainability.

Sustainable urban planning is the planning that aims at fulfilling the sustainable development goals starting form household level by advocating for sustainable household practices in order to combat environmental degradation. Rather than aiming at consensus including all stakeholder groups, planning for sustainability should facilitate alliance-building among those population groups who

can support the basic equity and environmental values of a sustainable development (Naess,, 2001). Processes of strategic planning for urban infrastructure are thus instrumental to materializing environmental sustainability visions.

2.4. Economical costs for greening informal settlements

Raising the revenue for city governments to invest in green infrastructure can be difficult, particularly in low-income settings like informal settlements or where national governments provide only minimal funding along with very tight restrictions on the rights of city government to raise revenue locally. This is partly because the true costs of traditional (i.e. non-green) development are rarely fully acknowledged, and also partly because the economic benefits of green infrastructure (largely as a result of increased energy efficiencies) are rarely fully appreciated. Environmentally sustainable household practices can enhance settlement greening. According to Domingo (2002), economic approach for managing environment come in many different forms, but generally, works by making people face the environmental costs they impose on society.

According to Simukali (2009) stakeholders need to come on board to ensure that all projects surrounding water and sanitation are participatory of the beneficiaries to ensure their success and relevance. There is palpable absence of proper services and amenities in informal settlement, including green spaces. NGOs, with available external donor funding, need also to provide green infrastructure through the communal water supply at kiosks and make individual connections to residential households at a fee.

Ombis (2018) state that, in Nairobi Low and middle-income areas, do not even have waste collection systems in place while in high income areas, private waste collection companies are booming and residents pay handsomely. According to Domingo (2002), economic approach for environmental sustainability come in by making people face the environmental costs they impose on society. Those who do not pay the cost face the environmental consequences in their households. Whereas Littlefair (1998) in India the higher income households with the greater levels of ability to pay were less willing to pay for the public water utility supply compared to those with less income and less ability to pay in Kerala and Akulam Village. This was because in India the high income households did not believe they were receiving a reliable service for the price charged by the public water utility. Furthermore, Wyatt (2009) reported that inefficient, planning and upgrading of environmental infrastructure in unplanned settlements were caused by scarce financial

resources and rapid growth of informality and it results into a costly premature and even Scomplete loss of infrastructure which increases the negative effects in managing the environmental resources which low income households are unable to pay for. Economic and moral motives tend to play important roles in influencing households' choice to undertake environmentally friendly activities (Söderholm, 2011). Therefore household environmental sustainability is highly influenced by ones monthly income and moral behaviour.

2.5 Research Gap

From the reviewed literature, it was found that, studies concerned with informal settlements and service provision in urban areas of developing countries focus much on the provision of public infrastructure such as roads water and supply. Survey on willingness to pay, for example, water supply and services (Raje et al., 2002), waste disposal services (Mbaye, 2008; Sarkhel and Barnerjee, 2010), sanitation services (Seraj, 2008) have taken place in some low-income urban settlements outside Zambia, but little on the household practices to transform informal settlements into environmentally friendly ones and supply of green open spaces. This research will help to address this knowledge gap

Chapter Three

Study Area

3.0. Introduction.

This chapter deals with the location and description of Zone 98 and Zone 100 in Kanyama Ward 10 in Lusaka, Zambia. The chapter is divided into various sections. Section 3.1 deals with the location and demographics for Kanyama Ward 10. Further on, section 3.2 provides the social economic characteristic of the residents in Kanyama. Section 3.3 outlines the physical characteristic of the study area and finally, section 3.4 provides the characteristics of the study sites-Zone 98 and Zone 100 of Kanyama Ward 10, in Lusaka, Zambia.

3.1. Location and Demographics for Kanyama Ward 10

Kanyama Ward 10 is in Kanyama Constituency of Lusaka district and lies between latitude $28^0$12E, $28^0$16E and longitude $15^0$23S, $15^0$27S. The settlement is a walking distance of 4.5 Kilometre to the Central Business District and within the proximity of the industrial areas (Mwape, 2007). It is conveniently placed for the residents who cannot afford the bus fare to and from work daily, as the majority of them are dependent on the CBD and industrial areas for their livelihoods. Furthermore, a good number of them have no permanent employment, so they have to trek into town and the industrial areas in search of jobs. Kanyama constituency has a mixture of houses, some good buildings in wall fences and others that are substandard, with hardly any space in between. It is not easy to tell where the boundaries for most plots in the locality are. Hence, making Kanyama to be a high density area covering a big portion west of Lusaka town.

Kanyama Ward 10 has a population of 169, 253 with 84,539 Females and 84,714 Males (CSO 2016) representing nine percent of the population of Lusaka and 46 percent of the population in Kanyama constituency. Although Kanyama compound qualifies as an upgraded area after it was legalised by the LCC in 1999 and declared it as an improvement area under the Housing Statutory and Improvement Areas Act of 1974 (now the Urban and Regional Planning Act number 3 of 2015), the area lacks the layout plan or the improvement plan from the Lusaka City Council (Yasini, 2007). As such, the area has inadequate utility municipal services from Lusaka City Council such as supply of domestic water, provision of sewerage systems and solid waste management for the households. The lack of such utility services in the township implies that, most residents depend

on pit latrines and septic tanks which have the potential to contaminate ground water as well as domestic water especially when they are placed close to shallow wells, which is a norm in Kanyama Township and it possess not only a health concern but also an environmental one.

The Seventh National Development Plan 2017-2021 also identified Old Kanyama in Kanyama Ward 10 as one of the areas in Zambia that currently lack adequate access to housing, energy, clean and safe drinking water, sanitation, transport services, quality health services, quality education and employment opportunities (MNDP, 2017) which is against the sustainable development goals.

Kanyama Ward 10 is divided into 19 Zones (Figure 3.1) and each Zone has a Zone leader who is a representative of the Ward Development Committee. This study focused on Zone 98 and Zone 100 of Kanyama Ward 10 based on the economical and physical status of the two Zone in Kanyama Ward 10 informal settlement and been recently upgraded .

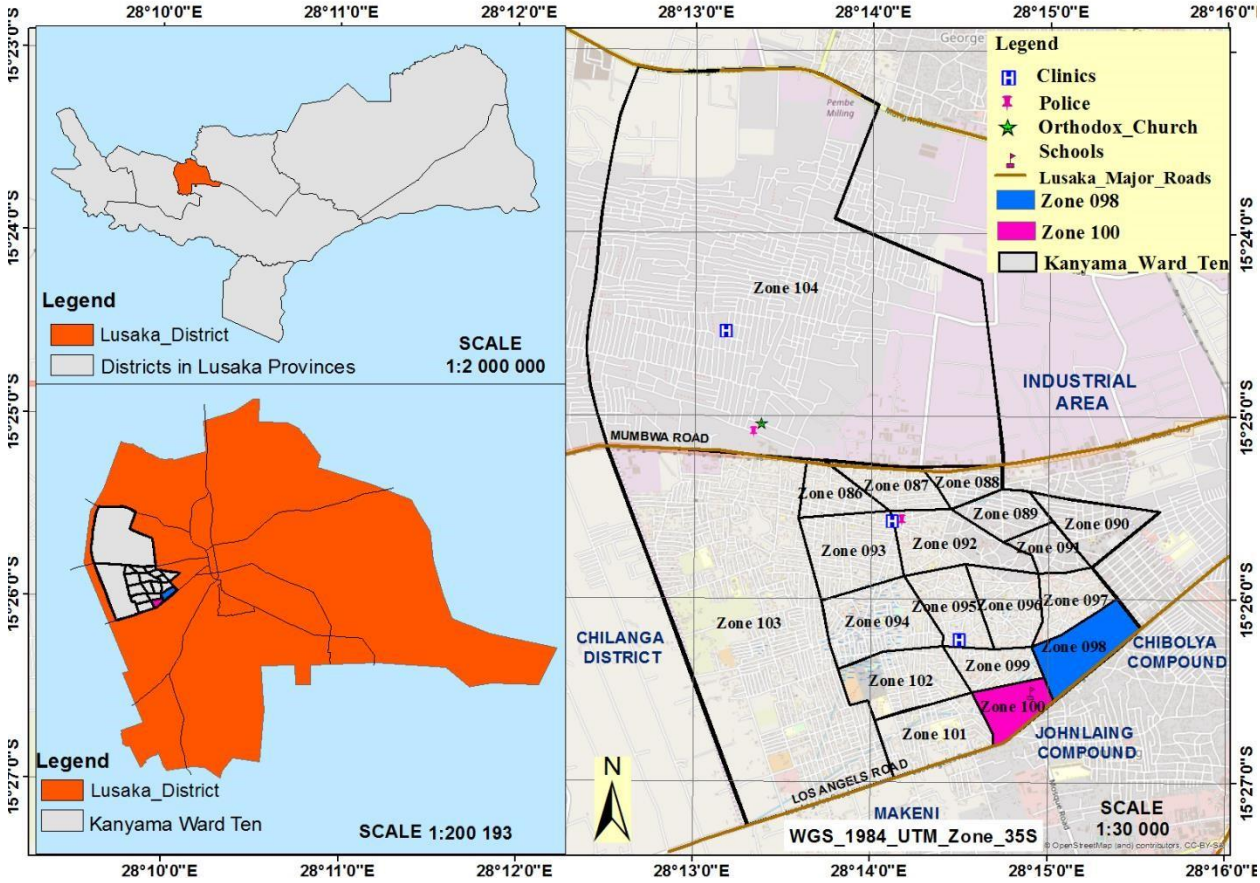


Figure 3.1: Location of Zone 98 and Zone 100 in Kanyama Ward 10 settlement in Lusaka, Zambia.

3.2. Social economic characteristics

Kanyama Ward 10 consists of people at opposite ends of the economic level spectrum. At the north border with Chilanga and in the Makeni Area are people with high income levels living in opulence whereas in the middle of the settlement are middle class and the far west or old Kanyama with the highest population are perhaps the most impoverished urban poor in Zambia. Poverty levels for Kanyama area stands at 67 percent (CSO, 2012). High poverty levels translate into increased poor health status, poor quality of environments, vice and crime and inhibits growth of economic activities due to inadequate capital bases. This induces a vicious cycle of p oor access to basic services due to low incomes and low literacy levels among others. The main economic activity of the residents in the ward is trading. Generally, old Kanyama has poor and inadequate municipal services such as piped water, government schools, tertiary institutions, proper sewerage and waste disposal systems, roads and drainages. For instance the area has only one primary school with no secondary and only one health centre against the population of 169, 253 (CSO,2012). This leads to

overcrowding at these institutions and generally, results into high-level of inefficiency when few centres of service provision are catering for high numbers of people beyond their capacities.

3.3. Physical characteristics

The geology of the area is predominately dolomitic marble. The outcrops of rocks make it difficult to construct drainage channels within the area as seen from the numerous attempts of digging drainage trenches throughout the area (Author, 2019). This contribute to the floods that are experienced annually as well as have economic implications as a lot of finances will be required to foster developmental projects such as drainage and lying of water and sewer lines in the area. The settlement has a flat land which consist of rocky and rubble, broken rocks with mainly skeletal soils and flatter areas with much surface rock or laterite crust (Author, 2019)

3.4 The study sites- Zone 98 and Zone 100

Kanyama Ward 10 was selected as a study area because of it being an informal settlement having both old unplanned houses and newly planned houses. Further, it was selected because no comprehensive study had been done in the Ward on the household practices that could enhance environmental sustainability despite facing numerous environmental concerns. Furthermore, due to limited resources, Kanyama Ward 10 was a better choice as it was less costly in terms of transport compared to other informal settlements which are located far away from the University of Zambia. Zone 98 in old Kanyama and Zone 100 in newly developed areas of Kanyama Ward 10 areas were selected from the 19 Zones of Kanyama Ward 10. The reasons for selection of the above mentioned Zones include their having different physical and economical characteristics. Poverty levels in Zone 98 are high as the residents depend on small informal businesses mostly done at their homes and informal employment such as maids, bricklaying, hairdressing, carpentry among others. Houses are old and close to each other with no access roads. The area is over populated with over 2500 households on 600,000square meters area land (that is, on average 15*15 each plot) which is below the low cost plot sizes (Google Earth, 2019). Most residents are low income tenants who pay as low as ZMW 70 (US$ 5) per month per one roomed house with no electricity. Water and sanitation is communal and shared among residents. Due to low levels of education in the settlements, residents are exposed to increased crime and social risks such as prostitution, theft as well as public nuisance through drunken stupors.

On the other hand, Zone 100 is a high residential area with big house plots with proper access roads. It is sparsely populated as compared to Zone 98 with about 500 households on the area of about 400,000 square meter (that is, on average 40*20 each plot) which is above the medium cost plot sizes requirement (Google Earth, 2019). Residents in Zone 100 are manly land owners who are engaged in formal employment and business with few in informal business. Hence their economic status and education levels are higher than those in Zone 98. Sanitation conditions are high in Zone 100 with residents utilising septic tanks and household boreholes for water supply, which is contrary to Zone 98 where most residents utilise pit latrines and shallow wells or communal taps and kiosks**.**

Chapter Four

Methodology

4.0. Introduction

Research methodology is a systematic way of resolving a research inquiry. It is a process through which researchers proceed with their work of explaining, predicting and describing events (Rajasekar*et al*., 2006:265). This chapter discusses the methodology that was used in this study.

4.1 Ontological and epistemological considerations

Epistemologies and ontologies are a basic set of beliefs that guide research action based on the researchers' discipline orientations. Ontology is a system of belief that reflects an interpretation by an individual about what constitutes a fact. Bryman (2001) says that Ontology is concerned with the nature of social entities. The positivistic studies indicates the researcher's outlook regarding methodical enquiry (quantitative in nature), rather than indicating the natural position. In this study quantitative analysis of the costs of transforming environmental concerns into environmental solution was done in order to get a general view of the cost of environmental sustainability. Furthermore correlation between monthly income and the cost for environmental sustainability was done to assess the difference in residents' attitude to engage in transforming their environments with respect to their income generation. The outcome would be generalized because it is asserted that social phenomena and their meanings have an existence that is independent of social actors. Therefore, within this context, positivism includes an outcome and adaptive oriented enquiry method (Johnson and Onwuegbuzie, 2004).

Constructionism on the contrary, perceives that social phenomena are created from the perceptions and consequent actions of those social actors concerned with their existence hence qualitative in nature. In this study constructionism was used by getting views from the residents in the study area concerning the environmental issues and sustainable household practices that they are engaged in in order to transform their households into environmentally sustainable ones. The other aspect of orientation is pragmatism. Pragmatism derives from the work of Pierce, James, Mead and Dewey (Holmes, 1992) and it applies to mixed methods research in that inquiries draws liberally from both quantitative and qualitative assumptions when they engage in their research.

On the other hand, epistemology deals with the relationship of the researcher and the subject been researched. Epistemology is how we know what we know. Interpretivist is an epistemological position that allows the researcher to grasp the subjective meaning of social action (Bryman, 2008). Interpretivist type of epistemology helped the research to get more information from the respondents on the nature of sustainable household practices they were engaged in and why they undertook such practices. This enabled the researcher to focus on social relationships, as well as the mechanisms and processes through which members in the study area navigate and create their social worlds. This position does not deny that there is a physical reality, but emphasises the socially significant meanings attached to the physical world (Bailey, 2007). Hence a semi-structured interview guide was employed in order to get the respondents' views through unstructured questions on the practices they were engaged in and an unstructured interview guide was used to collect data from the key informants.

4.2. Research Approach

Research approach is a plan and procedure that consists the steps of broad assumption to detailed method of data collection, analysis and interpretation (Chetty, 2016). There are mainly two types of research approaches and these are qualitative and quantitative approaches (Kothari, 2004). Mixed approach involves both qualitative and quantitative approach. Concurrent mixed approach design (triangulation) was used where both the qualitative and quantitative components were deployed simultaneously and their results were compared in order to improve the accuracy of the findings based from the two approaches. Hence, the findings complemented each other by using both words and numbers. The nature of the study required getting people's views on the sustainable and unsustainable household practices in informal settlement hence needed for qualitative type of approach and to assess the costs of transforming household environmental issues into environmental solutions ones requires quantitative approach.

4.3. Research design

Research design involves the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure (Kothari, 2004). Taylor (2000) defines research design as constructed plans and strategies that are developed to seek and discover answers to research questions. This study employed comparative

design because it engaged two contrasting Zones within Kanyama Ward 10 facing different settings (one in old Kanyama and the other one in newly developed areas of Kanyama Ward 10) and different housing unit layouts in order to understand sustainable and unsustainable household practices better from different cases. This contrasting design enabled the study to establish the relationship between residents in high residential areas and those in low residential areas in regard their sustainable household practices that could transform environmental concerns into environmental solutions.

4.4. Sampling

Sampling is the process of selecting a sample or what is popularly known as sample design. A sample design is a definite plan determined before any data are actually collected for obtaining a sample from a given population (Kothari, 2004). Kanyama Ward 10 has 19 Zones from which Zones 98 and 100 were sampled using stratified random sampling. Two stratus were made having two different economic and physical characteristics and a Zone was sampled from each strata using simple random sampling. A total sample of 145 respondents were selected from the two Zones within Kanyama Ward 10. Households for respondent interviews were sampled using simple random sampling in both Zones by giving equal chance of inclusion in the sample to all the households by assigning them random numbers then conduct a raffle (Kothari, 2004) . The sample size was determined through a prior analysis using the software G-power 3.2 (Erdfelder et al., 1996). The sample size of 145 provided a statistical power analysis of 0.98 for detecting moderate effect size at the two tailed with 0.05 level of significance. Eleven key informants were sampled purposively, where sample members were selected on the basis of their knowledge, relationships and expertise regarding environmental sustainability in the study area, (Freedman et al, 2007). These were Zambia Environmental Management Agency (ZEMA), officers from Lusaka City Council (LCC), five Ward Development Committee (WDC) members, an officer from Kanyama water trust, and Kanyama Ward 10 leaders.

4.5. Data Collection

The study used both primary. Primary data was obtained from the field through structured interviews with respondents, key informant interview guides and observations. Data on environmental concerns in the Zones under study was collected using semi-structured interviews of household and key-informant interviews. The tool was used so as to keep more of an open mind

about the contours of what needed to know about the environmental issues and the sustainable household practices in Kanyama Ward 10 so that concepts and theories can emerge out of the data. The same tools were used to collect data on possible strategies for transforming identified environmental issues into environmental solutions, as well as to provide recommended household practices that would rectify the environmental challenges observed in the Zones. Observations was used to ground truth the environmental challenges presented by the respondents and photos were taken.

4.5.1 Structured Interviews

Personal interview method requires a person known as the interviewer asking questions generally in a face-to-face contact to the other person. There are basically three types of interviews that is structured interviews, unstructured and semi-structured. A semi-structured interview is a hybrid, moderate and combination of the structured and unstructured interviews, which means that some questions are predetermined, while others arise spontaneously in a free-flowing conversation (Kothari 2004). This research used a semi-structured interview hence allowed the researcher to probe and follow up on issues. Interviews were also employed in gathering information from key informants such as Zone leaders from the Ward Development Committee, LCC officers. This method involved obtaining information through face to face conversation between the researcher and the above mentioned respondents.

4.5.2. Observation

Observation method is the method of data collection where the information is sought by way of investigator own direct observation without asking from respondents (Kothari 2004).This method is commonly used in studies relating to behavioural sciences (Kothari 2004) like this study. Non-participant observation was used throughout the field, hand in hand with taking photographs through the use of the camera. The method facilitated the availability of information which was not provided by other data collection methods or to validate the information gathered by other data collection methods that was employed in the field. The researcher observed the way the residents were dumping waste on open spaces and drainages and planting trees and vegetables.

4.6. Data analysis

Both qualitative and quantitative data analysis tools were employed in this research. The correlations involving mean annual household incomes for residents of Kanyama and the mean costs of handling environmental issues around residents' houses were done using the Pearson correlation coefficient. This is because it is the most widely method of measuring the degree of relationship between two variables (Kothari 2004). Two independent sample t-test was used to find the difference in the mean monthly income and mean monthly cost for greening for residents in Zones 98 and 100 in Kanyama Ward 10 as of 2019. Two sample Z-proportions test was used to compare the proportions of income dedicated to environmental solution for residents in Zone 100 and residents in Zone 98. Pearson correlation was used to find the correlation between residents' monthly income and the cost for greening. Chi-square test was used to find out if there was an association among residents of Zones 98 and 100 as regards their willingness to pay to transform their households' environmental issues into environmental solutions. Qualitative data was analysed using thematic analysis. According to (Moore and McCabe, 2005) thematic analysis involves categorising the data gathered in themes and subthemes so as to be able to be compatible. The themes were made according the objectives of the study by typing all qualitative data using Microsoft Word, then looked through all the responses, highlighted those that fit into each theme, then counted the frequencies. In this study qualitative data was analysed simultaneously with quantitative data hence strengthening each other. All statistical operations were conducted in SPSS 23 and Microsoft Excel 2013 at probability level, $p=0.05$.

4.7. Validity

Validity is the most critical criterion and indicates the degree to which an instrument measures what it is supposed to measure. According to Kothari (2004), validity refers to the extent by which a test measures what it actually wishes to measure. Two forms of validity include internal and external validity. External validity of research findings is their generalization to population, settings, treatment variables and measurement variables. The external validity might also refer to the enhancement or extension of the study results to wider context over the existing research environment (Remenyi, 1998). The method for sampling the respondents is key here. To ensure external validity stratified random sampling was used. Internal validity of a research design is its ability to measure what it aims to measure (Kothari 2004). In this research internal validity was

measured by assessing if the findings of the research from the collected data answers the research questions and the hypothesis by testing the interview guide on few respondents to see if the responses answer the intended research questions. Validity in this study was checked by how well the results corresponded to established theories and other measures of the same concepts in literature reviewed. Since the interview guide results in a reliable diagnosis when answered at different times and with different interviewers, this indicated that it had high validity as a measurement of data collection.

4.8. Reliability

Saunders et al. (2009: 156) defined reliability as "the extent to which analysis procedures or data collection techniques would yield consistent findings". Reliability refers to the measure that offers the same results on each repeated test or experiment. In this study reliability was checked by the consistency of results across time, across different observers, and across parts of the test itself. The same respondent was interviewed by different interviewers at different times to test if same results would be given to ensure its reliability. A measuring instrument is reliable if it provides consistent results. Recorded data was checked and re-checked to maintain a high level of reliability and validity. As per Collis and Hussey (2009) concluded, reliability ensures credibility of the research findings.

4.9 Ethical issues

Data collection, data analysis and data publication are the various features in research design that pose ethical concerns (Burton, 2000:297). All personal and organisational details of participants were kept anonymous in this study, and these details were not being used for any other purpose apart from research and academic purposes. Moreover, every participant was promised anonymity and only willing respondents were included in the study and their details were treated with complete confidentiality. Participants were fully informed regarding the objectives of the study, while they were assured that their answers will be treated as confidential and used only for academic purposes and only for the purpose of the particular research. Participants were not harmed or abused both physically and psychologically, during the conduction of the research.

4.10 Limitations of the study

Doing research involves dealing with a number of setbacks because reality often differs from what is planned. In this section, challenges and obstacles encountered during the research process are

identified. A major challenge faced in course of the data collection was meeting the targeted schedule of respondents due to their tight schedule. Collecting information from the LCC was not easy. This is because the researcher was made to pay a research fee. The introduction letter had to go through the administration before it was forwarded to the interviewees who then had to fix a date for an interview. The responsible officer was on leave hence making it difficult to get information, not until a senior officer intervened and gave the information. In addition, the interview process was often affected by phone calls and visitors, which sometimes disturbed the focus of the topic under discussion. Regarding the private waste companies, it was difficult to locate their offices since most of them have no regular office hours and premises.

Chapter Five

Results

5.0 Introduction

This chapter presents the findings on the basis of the established study objectives: i)To identify environmental issues in Kanyama compound that constrain possible household environmental sustainability, ii) To identify household practices capable of enhancing or hindering environmental sustainability in Kanyama Township..iii) To assess the cost of transforming selected household environmental issues into environmental solutions. iv) To assess the willingness of the residents to pay for the transformation of their households into greener ones. Section 5.1 outlined demographic characteristics of the respondents in terms of age, education levels, marital status and employment status. Section 5.2 outlined the environmental concerns in Zone 98 and Zone 100, Section 5.3 outlined the household practices that would either hinder or promote environmental sustainability. Section 5.4 outlines the mean monthly cost for greening and the correlation between monthly income and the cost for greening. It further explained the correlation between the cost for greening and the age and education status of the respondents. Lastly section 5.5 outlined the willingness of respondents to pay for greening.

5.1 Demographic Information

The study targeted household in Kanyama Ward 10 Zones 100 and 98 and of a total of 145 respondents interviewed, the majority 60 per cent were females and 40 per cent were males. As for employment status, the research found that the majority 67 per cent of the respondents were self-employed and 25.3 percent were employed. The other seven per cent of respondents were unemployed. Table 5.1 summarises the findings on demographic characteristics of respondents.

Table 5.1: Demographic characteristics of respondents in Zones 98 and 100 of Kanyama Ward 10, 2018.

Age	**Frequency**		**Percentage**	**Gender**	**Frequency**	**Percentage**
20-29	39		26.9	Male	**58**	40
30-39	51		35.3	Female	87	60
40-49	32		22	**Marital status**	**Frequency**	**Percentage**
50-59	19		13.1	Married	97	67
60-69	3		2	Single	48	33
70-79	1		0.7	**Sample site**	**Frequency**	**Percentage**
Education status	Frequency		**Percentage**	Zone 100	74	51
	Zone 100	Zone 98				
Primary	15	40	38	Zone 98	71	49
Secondary	38	19	39	**Employment status**	**Frequency**	**Percentage**
Tertiary	23	5	19	Employed	37	25.3
No formal schooling	2	3	3	Self employed	97	67
				Unemployed	11	7.5

5.2. Environmental Issues faced by respondents at household level in Kanyama

The researcher sought to identify the household practices of informal settlements that hinder environmental sustainability. The findings revealed significant environmental issues of informal settlements that have contributed negatively to environmental sustainability. Figure 5.1 gives a visual impression of the common environmental concerns in Zones 98 and 100 within Kanyama Ward 10.

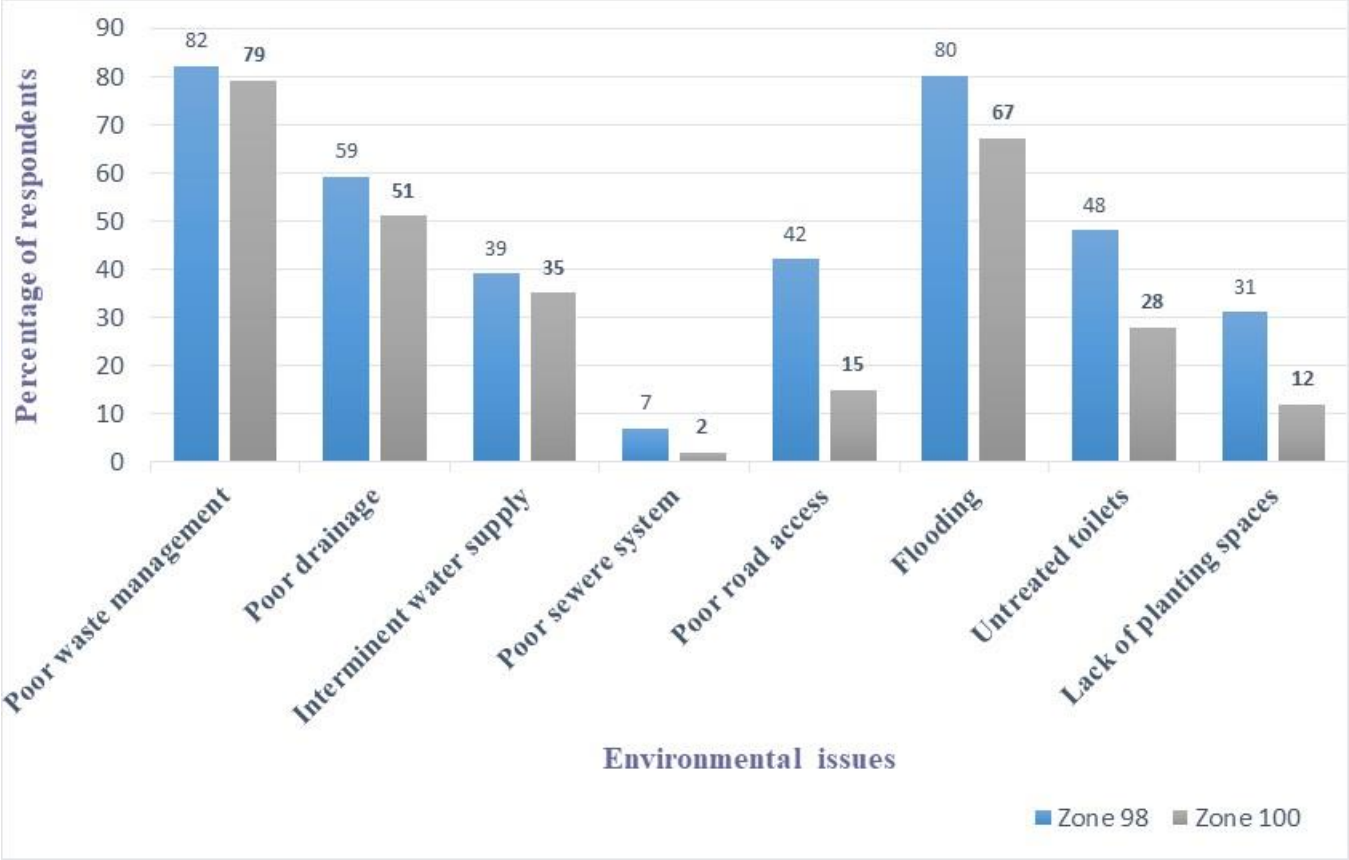


Figure 5.1: Environmental concerns affecting residents in Zones 98 and 100 of Kanyama Ward 10 as of 2018.

Majority of respondents in Zones 100, and Zone 98, felt that waste management (79 percent and 82 percent), flooding (67 percent and 80 percent)and poor drainage systems (51 percent and 59 percent), respectively, were the major environmental concerns at household level. On the other hand, poor sewer system (two percent in Zone 100 and seven percent in Zone 98) were the least environmental concern (Figure 5.1). While most of the environmental concerns are similar in the two Zones, the problems of poor toilets sanitation, lack of planting spaces and poor road access were significantly more in Zone 98 than Zone 100.

5.3 Household practices and environmental sustainability in Zones 98 and 100 of Kanyama Ward 10, Lusaka

Household practices that would hinder environmental sustainability were identified and displayed in Figure 5.2. Unsustainable household practices hindering environmental sustainability were common in the two Zones under study.

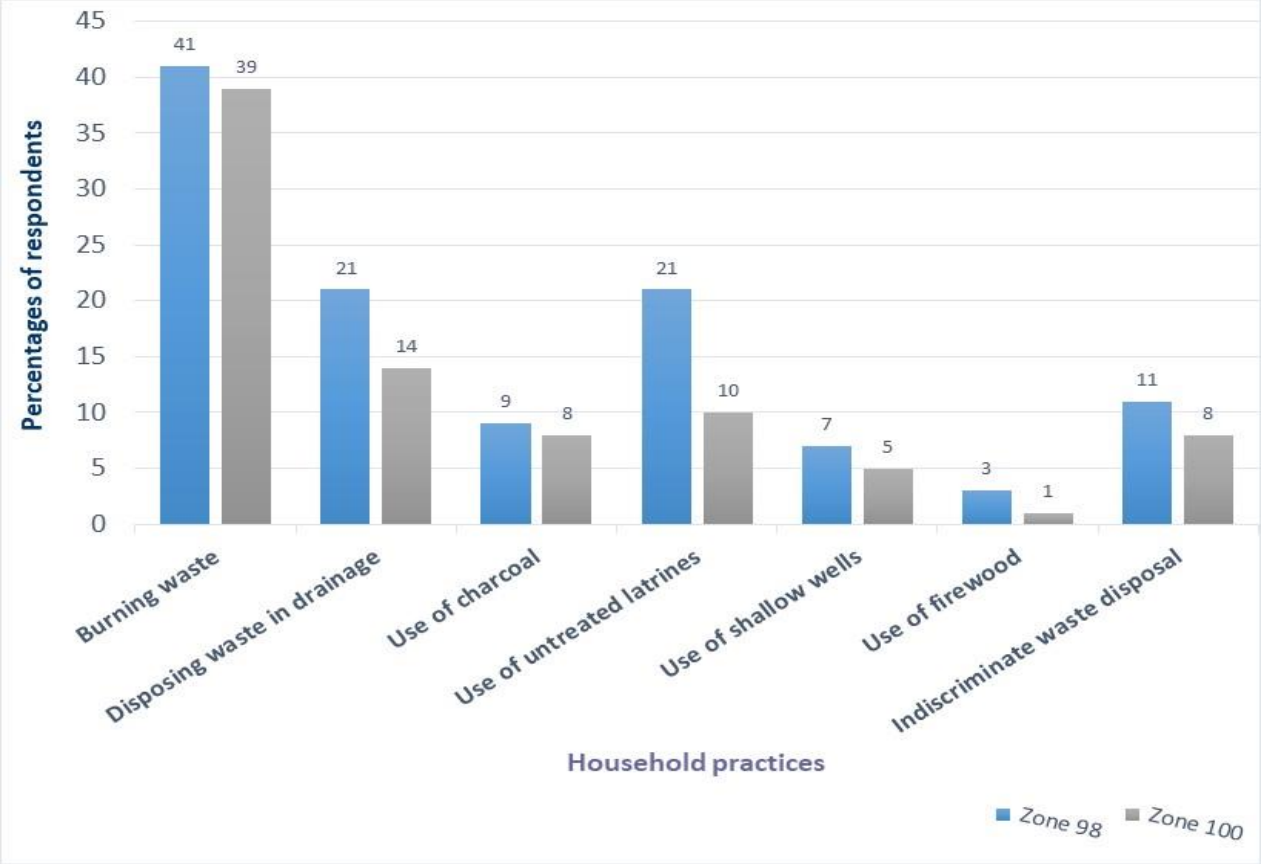


Figure 5.2: Unsustainable household practices hindering environmental sustainability in Kanyama Ward 10, Lusaka as of 2018.

Key informant interviews with the area councillor and the Ward Development Committee (WDC) representative revealed reasons as to residents' failure to maintain environmental sustainability. Among the reasons forwarded included the lack of transport for waste disposal from households to the dump site which is quiet very far. The available two tractors were said to be unable to go around the entire Ward due to its extensive coverage. The Ward leaders and an Environmental Planner at Lusaka City Council in charge of the area stated that they engaged eight community based

entrepreneurs (CBEs) who also facilitated in waste collection at a monthly fee of ZMW 60 per household. Even this was still not adequate for the entire ward as some households could not be reached due to inaccessible roads and the very high population they said.

A key informant from the study area said:

"There is only one solid waste collection company that was engaged to collect waste in the entire Ward which collects waste once a week".

Another key informant from the study area said:

"A lot of residents refuse to pay the monthly charge for waste disposal and resort to disposing waste indiscriminately and in drainages which results in blockages of the drainage system"

Observations around the area proved what the key informants said about indiscriminate waste disposal, burning of waste, and blockages of drainages in the area (Plate 5.1).

Plate 5.1: (a) Burning /indiscriminate waste disposal and b) Waste disposal in the drainage resulting in blockage of the drainage in Zone 98 of Kanyama Ward 10, Lusaka, 2018.

And the key informant from Lusaka Water Trust said that;

"*The Ward lack private sector involvement in the provision of adequate water and sanitation, hence residents depends on water from shallow wells and individually drilled boreholes and use pit latrines which are not environmentally sustainable*"

When asked on why they were still using wells as a source of water despite the government issuing a statement to have them closed, residents said that they did not see anything wrong with that, since they had been using them for a long time. Wells provided solution to the scarce water supply in the area they said.

A male respondent aged 58 said this

"Uyu mugodi wanga wanitandiza maninji pa zaka zambili. Nimasebenzesa manzi aya kumwa, kupikila na kuchapa. Siningaleke kusebenzesa aya manzi" meaning "my well has been of help to me for many years. It has been helping me with water to drink, clean my cloths and cooking. I cannot stop using this well"

Plate 5.2: Showing shallow wells for water supply for residents in Zone 98.

5.3.2 Household practices that promote environmental sustainability in Zone 98 and Zone 100 of Kanyama Ward 10 Township, Lusaka, 2008

This section outlines the sustainable household practices that promote household transformation into environmental solutions in Zone 100 and Zone 98.

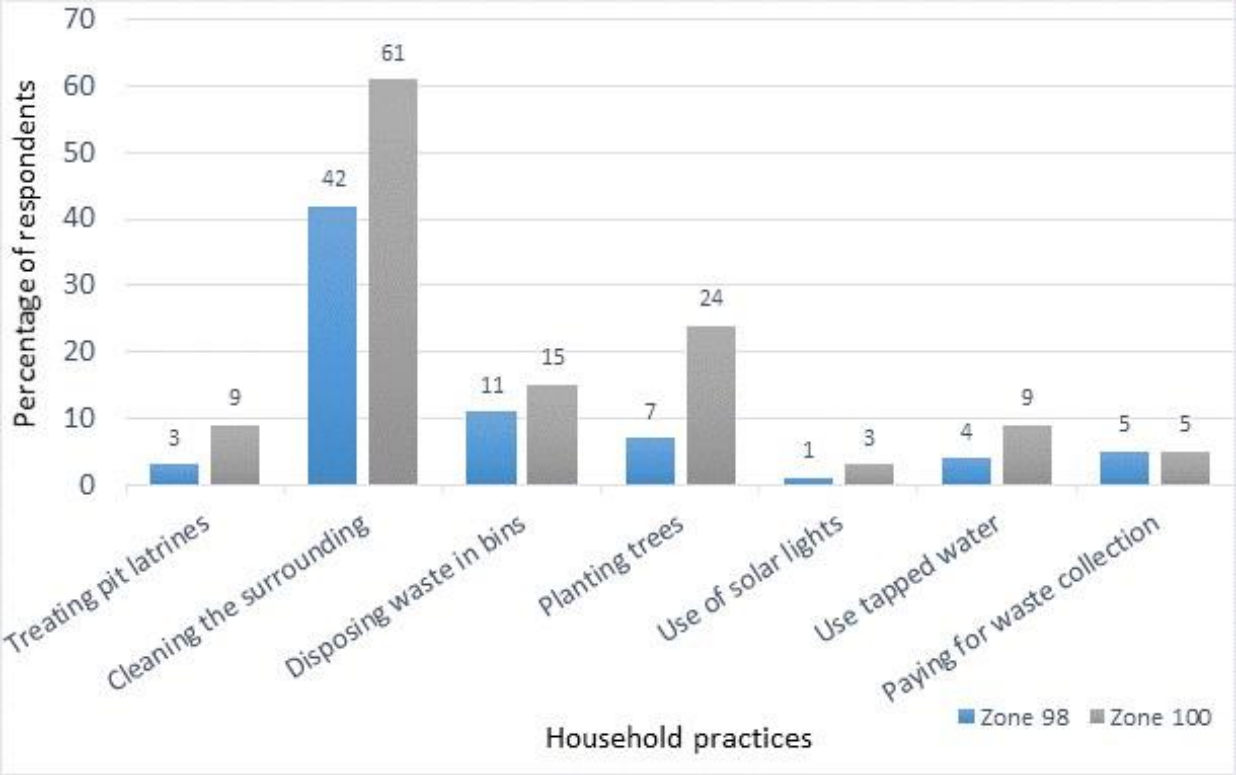


Figure 5.3: Sustainable household practices that would transform environmental concerns into environmental solution in Zones 98 and 100 of Kanyama Ward 10, Lusaka in 2018.

Cleaning of the surrounding (42 percent in Zone 98; 61 percent in Zone 100) was the commonest sustainable household practice in Zones 98and Zone 100 of Kanyama Ward 10 promoting environmental sustainability while use of solar lights was the least common household practice (one percent in Zone 98; three percent in Zone 100) (Figure 5.3).More residents in Zone 100 were engaged in environmentally sustainable household practices than in Zone 98.

5.4. Cost of transforming selected household environmental issues into environmental solutions

The mean monthly incomes for residents in Zone 100 was significantly higher than that of the residents in Zone 98 ($t = 6.46$; $p = 0.0001$) using one tailed two-sample t-test. Residents in Zone 100 (mean= ZMW 2877; Range = K8000) earned significantly more than the residents of Zone 98 (mean = ZMW 1095; Range = K2000) (Figure 5.4). The difference in monthly income shows that the economic status of the residents in the Zone 100 was greater than the economic status of

residents in Zone 98 hence the difference in environmental issues and sustainable household practices.

Table 5.2: Two-Sample T-Test for monthly incomes for residents in Zone 100, Zone 98 of Kanyama Ward 10.

Sample	N	Mean	StDev	SE Mean	T-Value	DF	p-value
Zone 100	74	2877	2264	263	6.46	86	0.0001
Zone 98	71	1095	704	82			

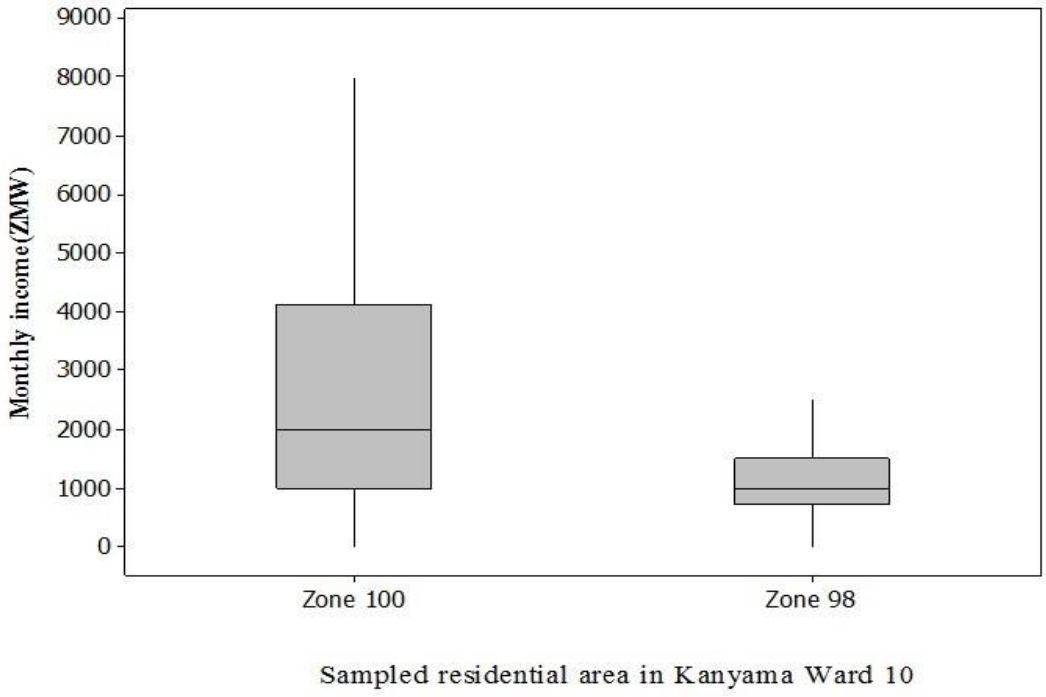


Figure 5.4: Showing the difference in mean monthly income for residents in Zones 98 and 100 in Kanyama Ward 10 as of 2019.

5.4.2. Cost of transforming environmental concerns

Just like the monthly income for residents in Zone 100 was greater than that of the residents in Zone 98 (Figure 5.4), the cost for transforming environmental concerns into environmental solutions was also greater for residents in Zone 100 than residents in Zone 98 ($t = 4.89$; $p = 0.0001$) (Table 5.3).

Table 5.3: Two-Sample T-Test for cost for transforming environmental concerns in Zone 100, Zone 98

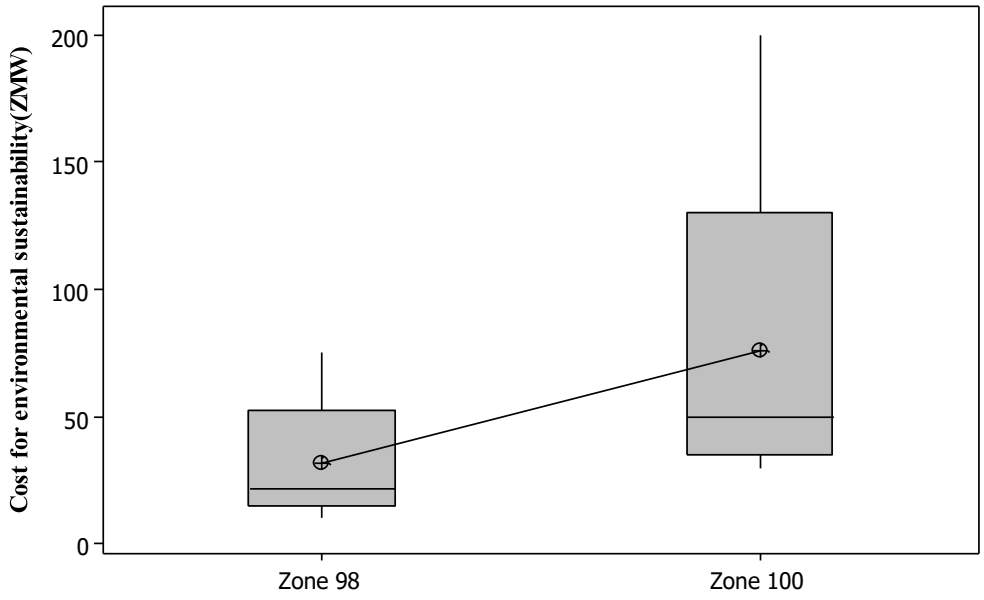
Sample	N	Mean	StDev	SE Mean	T-value	DF	P-Value
Zone 100	45	63.0	37.5	7.5	4.89	27	0.0001
Zone 98	15	25.12	9.66	1.9			

This implies that residents in high income residential areas pay more for their environmental sustainability than those from low income residential areas. When asked on how much residents paid to transform their households into environmentally sustainable ones, residents in Zone 100 where found to pay more (mean =ZMW 63) than residents in Zone 98 (mean = ZMW 25.12) (Table 5.3). Costs for waste collection and treating toilets were paid monthly because they were done monthly. However, costs for waste bins, planting tree /vegetables and solar lights were paid for periodically as need arose by residents but monthly estimates where done in this study.

Table 5.4: Mean amounts apportioned towards environmental solutions in Zone 98 and Zone 100 of Kanyama Ward 10, Lusaka as of 2018**.**

Household practice	**Mean monthly amounts apportioned towards environmental sustainability (ZMW)**					
	Zone 98			Zone 100		
	Mean	StDev	N	Mean	StDev	N
Treating latrines	10	3.8	25	50	20	30
Planting trees/vegetables	20	5.2	20	30	7.2	25
Waste collection	30	6.1	10	40	18	50

Use of dust bins	22	4.2	08	60	30	25
Use of solar lights	75	20.5	03	200	95	15



Residential area in Kanyama Ward 10

Figure 5.5: Mean monthly costs for greening in Zone 98 and Zone 100 0f Kanyama Ward 10 as of 2018.

There was a statistically significant difference between the mean cost for waste bins (t = -4.62; p = 0.001), planting trees / vegetables (t = -6.83; p = 0.001) and treating toilets (t = -2.29; p = 0.035) in Zone 98 and Zone 100. Residents in Zone 100 utilised expensive waste bins and paid for formal

waste collection, while those in Zone 98 utilised relatively smaller and cheaper waste bins and commonly utilised informal waste collectors for their waste collection. The prevalent use of informal waste collectors in Zone 98 could have contributed to the indiscriminate waste disposal common in the area. This problem was not as prevalent in Zone 100. There was a difference in the monthly cost for solar lights ranging from ZMW 175 to ZMW 275 in Zone 100 while in Zone 98, the range was from ZMW 70 to ZMW 90 per month (Figure 5.6c). This was because many residents in Zone 98 utilised relatively smaller and cheaper solar lights compared to the ones utilised in Zone 100. However, only a few households in both Zones (1% in Zone 98 and 3% in Zone 100) had any real interest in using solar lights which was a more environmentally sustainable energy source.

A female 38 year old respondent in Zone 98 said:

"I use charcoal and firewood for cooking and candles for lighting instead of solar energy because they are cheaper and manageable. I don't even know how solar energy can be used for cooking and lighting".

Treating toilets in Zone 100 costed an average of ZMW 50 and ZMW 10 in Zone 98 (Figure 5.6d). This was because residents in Zone 100 indicated that they were using chemicals from formal traders to treat their toilets than residents in Zone 98 who said that they bought chlorine and chemicals from street vendors. The cost for planting trees was also slightly higher in Zone 100 (mean=ZMW 30) than Zone 98 (mean= ZMW 20) (Figure 5.6e), because the researcher observed that residents of Zone 100 commonly bought different species of trees and plants, many of which were exotic, while residents of Zone 98 mainly planted vegetables and very few were observed to have planted trees.

Plate 5.3: (a) trees and (b) vegetables observed in Zone 100 of Kanyama Ward 10, Lusaka, 2019

Further, most residents in Zone 98 where tenants and felt they were not responsible for planting trees which they would leave when they shift.

The feelings of these respondents were summarised by one respondent who said:

> "*sininga shange mitengo panyumba yamene si anga, nikakuka nikasiyile benango*"

(Translated as "I cannot plant trees on a rented house of which when I leave, someone else would come and benefit").

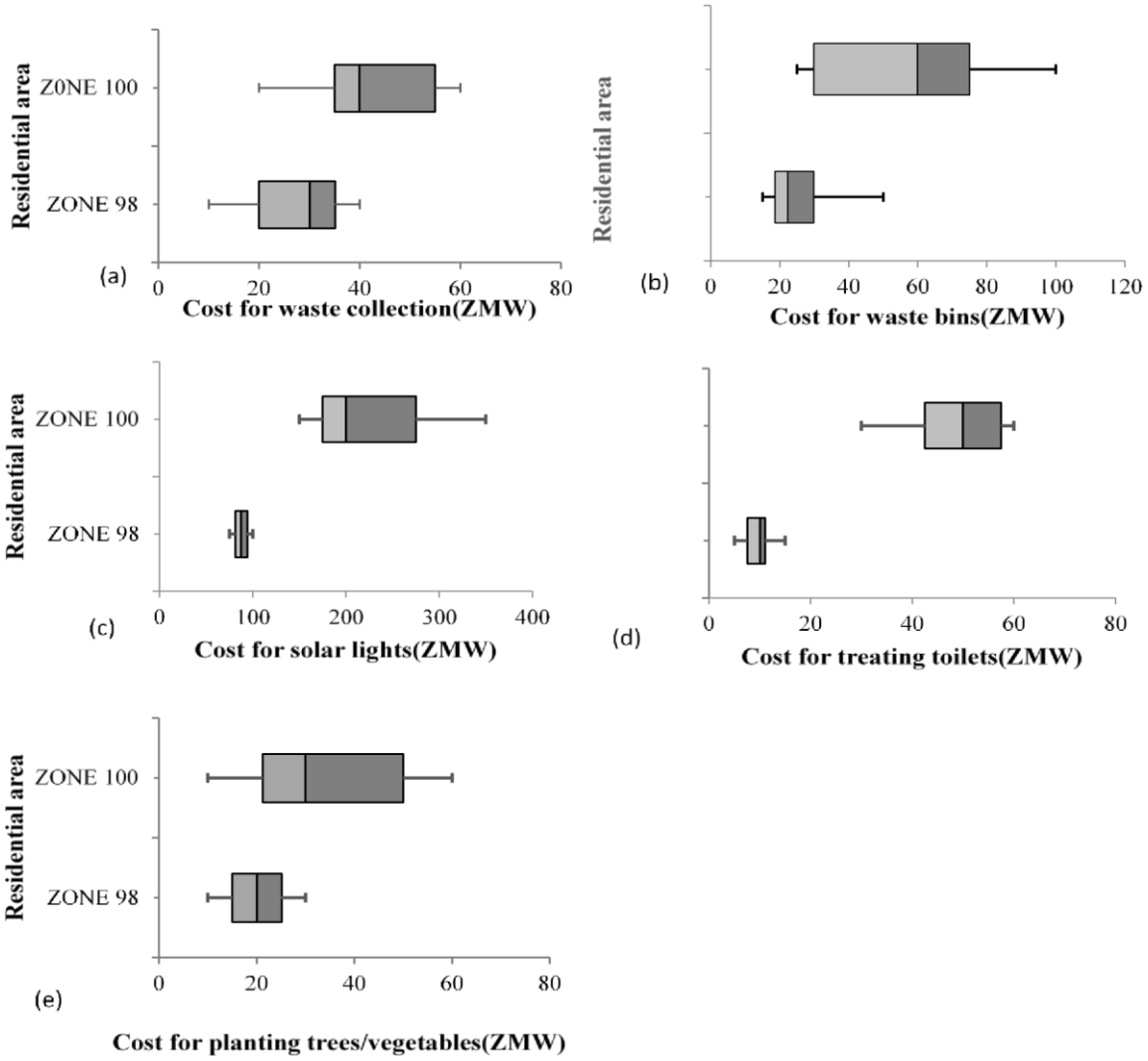


Figure 5.6: Mean monthly costs for a) waste collection b) waste bins c) buying solar lights d) treating the toilets and e) planting plants/vegetable in Zones 98 and Zone 100 of Kanyama Ward 10 as of 2018.

Note: The extreme ends of the boxes are the upper and lower quartiles, box heights are interquartile ranges, the top and bottom whiskers represent the amount of money residents spent on transforming their households into environmentally sustainable ones in a particular month. The vertical lines in each box are the estimated median cost of environmental sustainability per month/household.

5.4.3 Cost of household environmental sustainability and mean monthly income for Kanyama residents

There was a significant positive correlation (Zone 98: $r = 0.94$; $p = 0.001$ Zone 100: $r = 0.599$; $p = 0.001$) between monthly income and the cost for waste collection in both Zones (Figure 5.7b, f).

This meant that monthly income of the residents determined how much one would pay for waste collection at the minimal rate of ZMW 25 for Zone 98 and ZMW 67 for Zone 100 per month. Likewise, on the cost for treating toilets, a negative correlation in Zone 98 ($r = -0.642$; $p = 0.001$) meant that the higher the monthly income of the resident the lower the amount they spent on treating their toilets at the rate ZMW 148 per month (Figure 5.7d) as they said that treating toilets was not a priority as compared to buying food for their families.

A female married respondent from Zone 98 aged 38 said this

"Life is expensive nowadays, hence treating toilets is not as important as buying food for my children. I just pour ashes from the brazier in the toilet as a way of treating it"

A significant positive correlation in Zone 100 ($r = 0.475$; $p = 0.01$) (Figure 5.7h) meant that the higher the monthly income of the resident the higher the mean monthly cost for treating the toilets at the rate of ZMW 41 per month.

A male married respondent from Zone 100 aged 42 said this

"I buy toilet treating chemicals from Shoprite or pick and pay because I find them to be more effective"

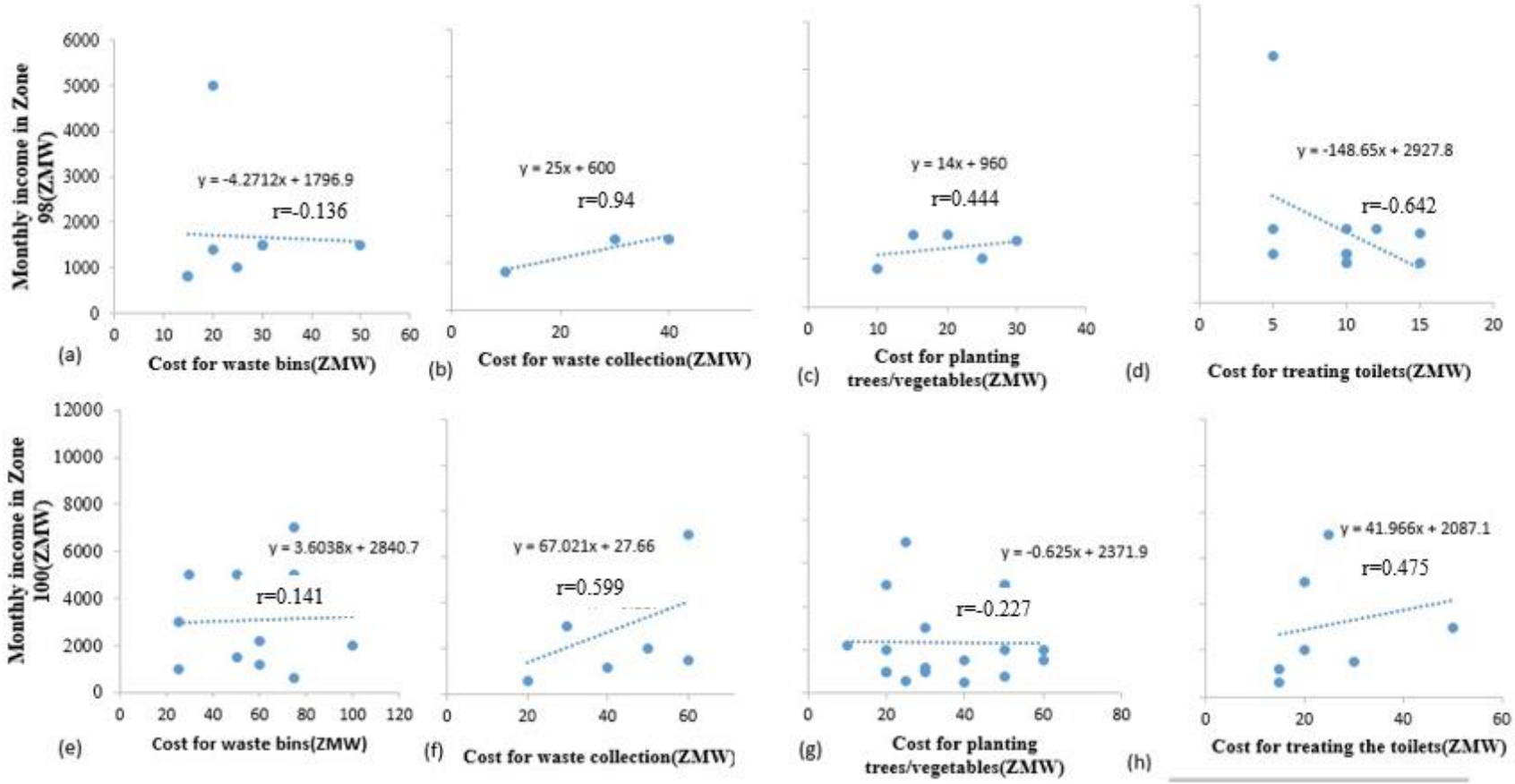


Figure 5.7: Scatter graphs showing correlation between Monthly income and (a) cost for waste bins in Zone 98 (b) cost for waste collections in Zone 98(c) Cost for planting trees/vegetables in Zone 98 (d) Cost for treating toilets in Zone 98(e) Cost for waste bins in Zone 100 (f) cost for waste collection in Zone 100(g) Cost for planting trees/vegetables in Zone 100(h) cost for treating the toilets in Zone 100

5.5. Willingness of the residents to pay for the transformation of their households into greener ones

At 0.05 level of significance, the residential Zone where one came from had a significant influence on their willingness to pay for household practices sustaining environmental solutions (X^2 =2.1236; p-value =0.0162). From the results, 95 out of 145 respondents (Table 5.6) were willing to pay for the transformation of their households but where not yet doing so because some respondents (51 percent) thought that the government was responsible for paying the costs and only 49 percent of the residents (15 from Zone 98 and 45 from Zone 100) were able to pay for transformation of environmental concerns into environmental solutions at the household level, (Table 5.3).

Table 5.5: Chi-square test showing the association between residential income level and respondent's willingness to pay for household environment sustainability

	Responses		Zone100	Zone98	Total			Value	D.F	P-value
Willingness to pay	yes	Count	69	67	136		Pearson Chi-Square	3.636[a]	2	0.162
		Expected count	69.4069	66.5931	136					
	No	Count	5	4	9					
		Expected count	4.59209	4.13791	6					
Total			74	71	145		Ratio			
							Number of Valid Cases	145		

Chapter Six

Discussion

6.0 Introduction

This chapter discusses the findings of the study with respect to the objectives which were; i) to identify environmental issues in Kanyama informal settlement that constrain possible household environmental sustainability, ii) to identify household practices capable of enhancing environmental sustainability in Kanyama Ward Ten iii) to assess the cost of transforming selected household environmental issues into environmental solutions and iv) to assess the willingness of the residents to pay for the transformation of their households into greener ones.

6.1. Sustainable household practices that can transform environmental concerns into environmental solutions

Sustainable household practices that transform environmental concerns into environmental solutions in Kanyama Ward 10 included use of waste bins for solid waste disposal, paying for solid waste collection, planting trees and vegetables at their households, cleaning the surroundings, use of clean sanitation and use of solar lights for lighting. These practices were key in transforming environmental concerns into environmental solutions in informal settlements where municipal services were not provided. The findings also showed that more residents in Zone 100 (high income area) were engaged in environmentally sustainable household practices in Kanyama Ward 10 as compared to residents in Zone 98 (low income area).This is in line with the findings by UNDESA,(2015) that people in low income areas were less environmentally conscious than those in high residential areas. Linking economic well-being to environmental sustainability would entail that, urban planning programmes must promote poverty eradication which was likely going to have a counter effect on environmental sustainability.

Generally, low income areas were more severely vulnerable to effects of environmental issues than the high income areas. This has also been reported by other researchers such as Brundtland (1987) who viewed poverty to be the major cause of environmental issues in low income areas. The dwellers had a choice whether to use the available resources for economic sustainability or environmental sustainability. The scales of choices always almost tip towards economical sustainability as their immediate survival always outweighed their desire to maintain the

environment which would give those benefits in the long term. This could explain why low income areas have usually been looked at as areas of resource over exploitation and eventual environmental destruction (Finco, 2009).

In this study, it was found that increased monthly income within the ranges of low income did not also translate into increased expenses towards environmental sustainability for low income residents in Zone 98. The reason for this could have been that, the increase in incomes considered did not cross the social class threshold for economic sustainability. The increased income looked at, still maintained residents within low income and did not move them into classes of middle or high income. While residents in Zone 98 were willing to pay for environmental sustainability, they always had to contend with a potential trade-off between environmental sustainability and household livelihood sustenance. The choice however, was usually tailored towards household sustenance, for instance, the results showed that more residents in Zone 98 depended on charcoal and firewood for domestic energy use instead of using solar lights which was a more sustainable household practice. Use of firewood and charcoal promotes deforestation and introduces the greenhouse gas carbon dioxide into the atmosphere while removing the carbon sink in form of forests, albeit at a local level. According to Bai and Dent (2009:150) "Land or environmental degradation is a long-term loss in ecosystem function and productivity from which the land cannot recover unaided, requiring progressively greater inputs to repair the damage", yet residents still continued using destructive methods of energy because it was deemed affordable in the short-term as compared to the more sustainable solar lights.

The overall goal of sustainable development was the long-term stability of the economy and environment and it could only be realized through the integration and acknowledgement of economic, environmental, and social concerns throughout the decision making process (Emas, 2015).As this study has shown, income status and environmental sustainability are interconnected. Low income residents may over-stress the environment through unsustainable household practices, whereas poor managing of environmental issues could contribute to failure of economical sustenance among low income residents. Bryceson (2002) summarised this in his study stating that, the well-being of poor people was inseparably linked to the environment in terms of their livelihoods, health, and vulnerabilities. Hence, one way of enhancing sustainable household practices among informal settlements would be by enhancing household income generation.

Household income can as well be enhanced by implementing certain practices such as "economizing separation" (giving incentives to residents who separate waste) were residents can separate the usable waste for income generation at the source. This could also reduce indiscriminate waste disposal as residents would know that they could sell the bottles or any other waste generated.

6.2. Cost for transforming environmental concerns into environmental solutions

As earlier mentioned, most residents in low income areas (Zone 98) focused more on economic sustainability than caring for their environmental sustainability in terms of securing sustainable waste disposal methods and improving household sanitation. This was because the use of waste bins for waste disposal and treating their latrine/toilets was not a priority for residents in Zone 98 and was deemed expensive hence no additional allocation was assigned to such activities. The findings are congruent to the findings by World Bank Group (2015) who concluded that toilet treating fees were prohibitively high for most low-income households, which partially explained why many households could not appropriately maintain their toilet systems.

Generally, residents in high income areas (Zone 100) spent more money on sustainable household practices that transform environmental issues into environmental solutions than residents in low income areas (Zone 98). Since residents in high income areas were at a higher stage of economic sustainability compared to residents in low income areas, they could afford to be more concerned about environmental sustainability and long term sustainable means of improving their well-being. These findings were in line with the report by Ombis (2018) who reported that in Nairobi, low and middle-income areas did not have waste collection systems in place while in high income areas, private waste collection companies were booming and residents paid handsomely.

From the results it was clear that residents did not appreciate the need for environmental sustainability in that some residents even in high income residential areas were not paying for environmental sustainability. Environmental education significantly influences the levels of engagement in household environmental sustainability because education helps in changing people's mind set, attitudes and perceptions as regard to their environment and it broadens their understanding of environmental sustainability. The United Nations Education and Scientific Organization (2011) reported that education was a powerful tool that should be used towards building a more sustainable society that was better informed, had critical views and had wiser and more responsible people. As such, the residents' attitudes towards environmental sustainability

were shaped by the perceived norms within their surroundings. These developed attitudes explain why respondents in high income areas where more environmental conscious than their counterparts. As Söderholm (2011)stated, many sustainable behaviours originate from personal norm and environmental awareness that acts as a motivation and entail some kind of sacrifice from the individual because there are a number of costs attached to the green behaviour

.

6.3. Resident's willingness to pay for transforming environmental issues into environmental solutions

The results showed that a high percentage of households in Zone 100 were willing to pay for the transformation of environmental issues into environmental solutions at their households. Although residents in Zone 98 were willing to pay for environmental sustainability, they were not actually paying for this cause, saying that they did not have enough money to pay and that it was the governments' responsibility. Their attitude was different from their actions. There was need for the government to provide environmental infrastructure in the area so as to facilitate residents' engagement in environmental sustainability. The findings are congruent to the findings by Simukali (2009) that stakeholders need to come on board to ensure that all projects surrounding water and sanitation are participatory of the beneficiaries to ensure their success and relevance. Pieterse (2000) commented that municipalities can strengthen urban governance in co-operation with the private sector by fostering partnerships and local economic development (LED) strategies that combine local skills, resources and ideas to stimulate the local economy and environmental infrastructure provision. The government would also provide assistance to the poorest families through the provision of micro-finance (Franceys and Wietz, 2003) in order facilitate their engagement in sustainable household practices. The contrast with this was that, in high income areas residents were paying for environmental sustainability which was also contrary to the findings by Littlefair (1998) in India who stated that the higher income households with the greater levels of ability to pay were less willing to pay for the public water utility supply compared to those with less income and less ability to pay in Kerala and Akulam Village. The findings are different from those in India because in the study area high income areas had also high levels of higher education as seen in the respondents' characteristics (Table 5.1). It was hence, assumed that since residents in high income residential areas had higher levels of education than those from low income areas, it should imply that the higher the levels of monthly income and education level of

the respondents, the more they were willing to pay for household services that would enhance environmental sustainability. Hence, the findings that the residents with a higher monthly income and educational level were paying for household services that would enhance environmental sustainability was not surprising as the level of education enhances an individual's willingness to take responsibility for his/her own health.

6.5. Towards a framework that can enhance sustainable household practices in Zambia

In line with formulating a framework aimed at enhancing sustainable household practices for transforming environmental concerns in informal settlements into environmental solutions in Zambia, the following interventions were identified as factors that could contribute to sustainable household practices which can transform environmental concerns in informal settlements into environmental solutions in Zambia.

6.5.1. Environmental Education (EE)

Lack of environmental education in Kanyama Ward 10 contributed to unsustainable household practices because residents did not understand the need for environmental sustainability. EE was vital in imparting an inherent respect for nature amongst society and in enhancing public environmental awareness. UNESCO (2014) emphasized the role of EE in safeguarding future global developments of societal quality of life (QOL), through the protection of the environment, eradication of poverty, minimization of inequalities and insurance of sustainable development. Hence environmental education promotes sustainable household practices.

Sustainable household practices were also vital in transforming environmental concerns in informal settlements into environmental solution and they were dependent on one's knowledge and skills necessary to make in-depth decisions and actions that could address complex household environmental issues. In addition, environmental education was not only equivalent with schooling or formal education alone, but it also included non-formal and informal modes of instruction and learning (Singh, 2010). The non-formal and informal modes could be through posters, entertainment, and peer to peer education and by doing activities with the aim of increasing awareness, participation and commitment to household environmental sustainability.

To ensure community participation and ownership of any environmental education program focus groups would be established that would incorporate all elements of the community. This was supported by the provision in the EMA Act No 3 of 2011 of the Government of Zambia that the

citizen shall have access to environmental information to enable the citizen make informed personal choices which encourages improved performance by industry and the Government and that every person living in Zambia has the right to a clean, safe and healthy environment (EMA, 2011). In line with the findings of Pacey (1990) formal education for women in particular was a precondition for change in sanitation behaviour. Environmental education was significant to make people responsive to environmental problems; they could be well-informed about problems, equipped with skills and motivation to find solution to those problems and to prevent new problems from happening. Phillips and Schweisfurth (2014) reported that most of the secondary school syllabuses in developing countries including Zambia do not emphasize environmental education and may eradicate the exposure to environmental aspects therefore, there was need to include environmental education in school syllabuses as a compulsory subject from elementary grades.

6.5.2 Planning and Creation of Engineered Dump Sites

While the forces impacting on the growth of cities have changed dramatically in many parts of the world, there has been very little change in the planning systems which has contributed to urban problems (UN-Habitant, 2009). There was need to change planning systems so that they are able to function as effective instruments of sustainable urban change, which are, capable of making settlements more environmentally sound and safe, more economically productive and more socially inclusive.

Local authorities in particular, could use a range of principles and practices to integrate the environmental sustainability in urban planning which includes providing of environmental infrastructure like dump sites, water distribution pipes, sewage pipes and septic tanks. Secondly, environmental strategies for urban areas need to be supported by key underlying principles which should be elaborated in local area plans and must explain in detail how households in informal settlements could practice the principles in order to achieve household environmental sustainability.

The findings showed that, unsustainable household practices were exacerbated by the lack of basic services in informal settlements. This gave an indication that Local Authorities do not have a policy to address the needs and priorities of people living in informal settlements which create great challenges for environmental planners and managers. The lack of dumping sites in the area was one of the contributors to unsustainable house hold practices hence, the creation of engineered

dumping sites in the area would aid waste collection and transportation from households to specific areas which would improve environmental sustainability. Achieving this, would involve the introduction of improved technologies and equipment which would be appropriate for and adapted to the local conditions. The engineered dumpsite would include waste sorting and recycling, reuse, sanitary land filling leachate and treatment, and a buffer zone with gardens and farming that would shield the site from the surrounding. For better environmental sustainability, the local area plan should at least have one waste collection point located in each street in order to increase efficiency in waste collection.

6.5.3 Engaging Private Sectors and Non-Governmental Organization (NGOS) in enhancing environmental sustainability

In relation to the engagement of private sectors and Non-governmental organizations (NGOs) in enhancing environmental sustainability, findings reveal that, there has been very minimal involvement of the private sector and NGOs in the provision of municipal services that would enhance sustainable household practices in Kanyama Ward 10. Apparently, there was only one solid waste collection company that was engaged to collect waste in the entire Ward which only used to collect waste once a week. The Ward also lacks private sector involvement in the provision of adequate water and sanitation. Residents depended on water from wells and individually drilled boreholes which was not environmentally sustainable. Interactive planning and decision-making processes in Kanyama Ward 10 are needed to support private sector participation in urban governance and to co-ordinate this participation with municipalities. Pieterse (2000) commented that municipalities can strengthen urban governance in co-operation with the private sector by fostering partnerships and local economic development (LED) strategies that combine local skills, resources and ideas to stimulate the local economy and environmental infrastructure provision. Partnering with the private sector could: extend services into poorer or informal communities, provide safer work places, promote adoption of non-discriminatory employment policies, help the poor access credit, and boost investment in low-cost housing. The private sector will also seek partnerships with residents of informal settlements, NGOs and municipal government.

These collaborative ventures would involve information, education and community campaigns to ensure that residents of informal settlements are involved and have some ownership of programmes. They would also provide assistance to the poorest families through the provision of

micro-finance (Franceys and Wietz, 2003). The adequate involvement of private sectors and NGOs would improve sustainable household practices particularly on waste collection, water and sanitation provision. The private sector and NGOs would be engaged in providing waste banks which places value at every stage of the solid waste value chain and is mutually beneficial to all players as a sustainable model for waste management in the Ward. The objective was to drive the Ward towards zero waste. To achieve this, a framework emphasising the 4Rs would be put in place, which entails waste reduction, reuse, recycling and recovery (4Rs) being promoted as a means of reducing disposal costs, reducing the burden on landfills and reducing environmental impacts. Part of the initiative would be to narrow the gap between recyclers and producers. This should encourage the sorting of waste at the source so that valuable materials can be easily collected. The incentive would be that the small tokens which accumulate overtime would be given to generators who sort their waste at source, the tokens could be redeemed through cash withdrawals or discounts on related services such as water and sanitation bills. Economizing separation of usable wastes would encourage residents to be separating waste at their households since they would know that they could sell the bottles or any other waste. Therefore, supportive efforts and programs in informal settlements to improve environmental quality should begin with the reduction of poverty in a way that contributes to environmental sustainability. This would involve planning and implementation of sustainable household practices in the Ward through effective coordination, collaboration and networking of different environmental actors which was critical in environmental sustainability in terms of having specific roles, responsibilities, functions and resources for environmental management.

Ballanty and Oalafse (2009) argued that, informal settlements are an integral part of the urban environment where people are at a close interface with the environment. It was therefore important that, urban managers and planners find ways of developing informal settlements that enhance household environmental sustainability. Figure 11 summarizes the framework that can enhance sustainable household practices for transforming environmental concerns in informal settlements into environmental solutions in Zambia.

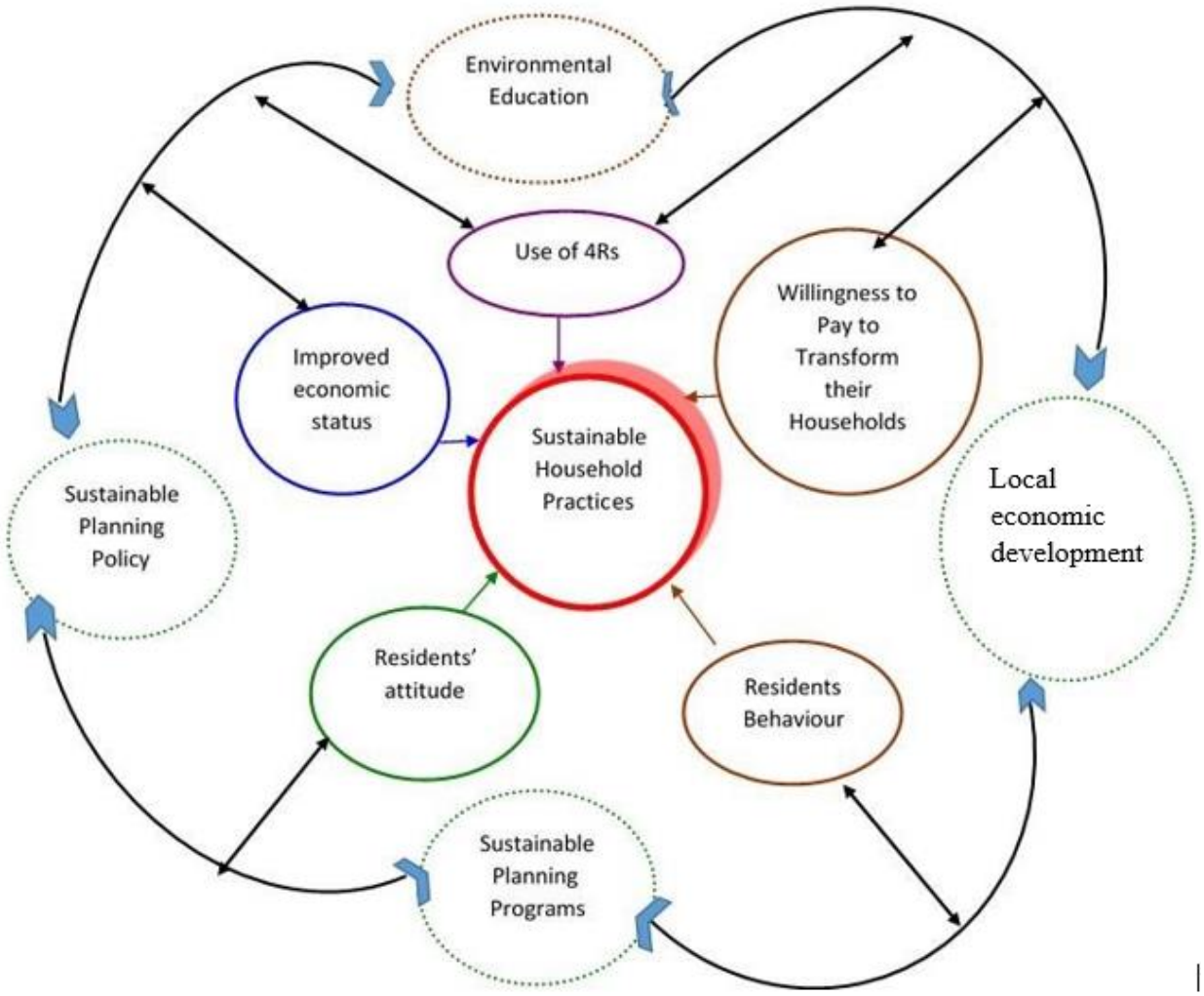


Figure 6.1: Proposed framework for enhancing sustainable household practices that transform environmental issues into environmental solutions in informal settlement

The proposed framework is composed of key entry points and five thematic areas. Sustainable household practices can be achieved by various key practices represented by entry points and thematic areas in Figure 6.1. The key entry points are various activities employed by various stakeholders in order to promote sustainable household practices. Environmental education which is creating awareness to residents on the need for environmental sustainability and how to actualize it is very critical key entry point in transforming a residents' attitudes to be more environmentally conscious. When the household environmental sustainability concept is fully understood then

resident's will not only be willing to live in an environmentally friendly manner, but may also pay for the transformation of their settlements and households into green environments. Once resident's become willing to transform would the programs and plans for environmental sustainability be successful. Implementers of these plans, the private-public partnership and civil societies can hence fund the projects in support by the public sector and the residents involved. Economizing/incentivising separation of waste at the source by various stake holder would improve residents' use of waste reduction, reuse, recycling and recovery (4Rs) at their household and prevent indiscriminate waste disposal.

In this framework it is clear that a sustainable household practice would involve five thematic areas. Improved economic status is vital in that it provides resources for paying for the transformation of environmental issues into environmental solutions at individual households.
Improved economic status through provision of local economic development activities would also enhance residents' willingness to pay to environmental sustainability. Sustainable household practices on solid waste disposal would be enhance by economizing/incentivising waste through separation and selling parts of waste that could be used as raw material in particular companies e.g. plastic. This means that waste would be looked at as an economic resource and not something to dispose of indiscriminately.

Resident's behaviour and attitude provides another critical thematic area in transforming households into environmentally friendly ones. An attitude which is a set of emotional, beliefs and behaviours towards a particular object, person, thing or event are often the result of experience or upbringing and they can have powerful influence over behaviour (Cherry, 2019). Residents attitude are prerequisite to residents' tendency in the use of 4Rs at their households and their willingness to pay for environmental solutions. Resident's attitude towards their environment plays a critical role in their household practices in transforming their household's environmental concerns into environmental solutions.

Chapter seven
Conclusion and recommendations

7.0 Introduction

This chapter presents conclusion and recommendations of the study. The chapter provides this by considering the aim and objectives of the study. It looks at the sustainable household practices that can transform environmental issues into environmental solutions and the costs involved. The chapter proceeds to provide policy implications and make recommendations on how to enhance environmental sustainability in Kanyama Ward 10.

7.1. Conclusion

Generally, the major environmental issues in Kanyama Ward 10 were poor solid waste management, poor drainage systems, flooding, and lack of spaces for planting trees, intermittent water supply and poor access roads. These environmental concerns were more in Zone 98 than in Zone 100 because Zone 98 practiced a lot of unsustainable household practices like burning waste, disposing waste in drainages, use of untreated latrines, use of charcoal, use of shallow wells and indiscriminate waste disposal than their counter parts in Zone 100. However, residents in Zone 100 were engaged in more sustainable household practices such as disposing waste in waste bins, paying for waste collection, treating their latrines, using solar lights, planting trees and cleaning their surroundings than residents in Zone 98. Sustainable household practices in Zone 100 helped to transform their household environmental concerns into environmental solutions.

The inability of residents to access the affordable and appropriate municipal services in Kanyama Ward 10 had led to their tendency toward unsustainable household practices such as use of charcoal and firewood, use of shallow wells as source of water for drinking, indiscriminate waste disposal in order to satisfy their basic need. This research found out that sustainable household practices were essential in transforming environmental issues in the study area into environmental solutions and were partly affected by the resident's monthly income but significantly affected by their education levels. This was because high levels of education and high income levels enhanced their

environmental awareness and their ability to pay for environmental sustainability. Further, resident's willingness to pay for environmental sustainability was not affect by ones residential area. Although, residents in both low income areas and high income areas were willing to pay for environmental sustainability at their household levels, residents in high income areas were actually paying much more than those in low income areas. This was because residents in high income areas had an understanding of environmental sustainability. Environmental education was significant in making people responsive to environmental problems; they could be well-informed about problems, equipped with skills and motivation to find solution to those household problems and to prevent new problems from happening. Embarking on community education program on sustainable household practices, would have the potential to develop the knowledge, skills and attitudes of the members of the community towards household environmental sustainability.

Changing people's attitude to waste disposal would be exacerbated by access to engineered dumpsites, as well as availability of waste containers and bins in the settlements. Further, residents should be enabled to value waste as a resource by providing them a market for solid waste. When market for waste is provided, they will always manage waste in order to sell it at the market.

7.2. Policy implication

Policy on effective sustainable household practices should focus on infrastructure and physical planning that promote green behaviour at the household level. There was a general need for litigation development to manage this complexity of which households are one component. Among other things, the substantive controls in the Planning and Building Act could be tightened with a view to building physical structures that prioritize accessibility for households (such as access to public transport or recycling facilities) and thus promote environmentally sustainable behaviour. Policy should also be directed at individuals with a view to directly and indirectly influence their practices within their households. The household, and ultimately the individual members who make up the household, thus have a key role in the practical effort towards environmental sustainable development. The increasing focus on the individual in the context of environmental problems, as internationally established through Agenda 21, would improve individual responsibility for the environment. The instruments are to be designed within the Zambian environmental policy with a dual purpose to 1) present a sustainable alternative as more advantageous to the household, and 2) to exacerbate the negative impact of practicing unsustainable activities and thus reduce their prevalence. Policy should also be directed towards

improving individual's income levels which was cardinal in improving environmental sustainability.

7.3. Recommendations

In order to improve sustainable household practices in informal settlements, residents' attitude and behaviour concerning their environment should be changed and various stake holders should provide policy and programs that enhance sustainable household practices. The study recommends that:

1. Residents in Kanyama Ward 10 lack environmental awareness in order to improve sustainable household practices. Zambia Environmental Management Agency (ZEMA), Non-Governmental Organisations (NGOs) and Ministry of General Education should provide environmental education to residents. Environmental education should be provided in all school curriculum from elementary grades by the Ministry 0f General Education. This will enable residents to value their environment from childhood which in turn will change their attitude and behaviour toward environmental sustainability. Informal environmental education should also be provided through poster displays, group discussions, and door to door sensitization by ZEMA and various NGOs. This would include re-teaching both at municipal and local scale on matters of solid waste management system in order to provide a sound collection service that addresses the waste segregation at its source, the minimization of disposed garbage, the preservation of open and natural spaces through prevention of waste disposal in streets and around individual houses.
2. Planning has been seen as the activity which can solve many of the major problems of Kanyama Ward 10 such as lack of water and sanitation, lack of dump site for solid waste disposal. Local authorities should provide sustainable planning programmes and policy that can enhance creation of engineered dump site and provision of clean sanitation facilities in the area. Local Authorities should create solid waste collection points at various locations in the settlement where residents can be dumping waste that cannot be reused.
3. NGOs and private sector with available external donor funding, need to provide green infrastructure through the communal water supply at kiosks and make individual connections to residential households. The private sector and NGOs should also engage in

local economic development activities (LED) that would improve residents' income levels by providing them with entrepreneurship skills and giving them small loans to start their own businesses. Improved income levels of the residents is key in enhancing environmental sustainability.

4. Residents should be encouraged to separate waste at their household by providing market for waste that provide raw materials in particular manufacturing industries. Private sector and NGOs should be involved in providing solid waste management, water and sanitation service delivery and buying of separated solid waste which needs to be recycled or reused.

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Appendices

Appendix 1: Semi-structured interview guide for Households Respondents

THE UNIVERSITY OF ZAMBIA

SCHOOL OF NATURAL SCIENCE

DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES

SEMI STRUCTURED INTERVIEW GUIDE ON ECONOMIC COST FOR GREENING INFORMAL SETTLEMENTS.

SECTION A.

A: PERSONAL INFORMATION

1. Sex: a. Male [ ] b. Female [ ]
2. Age: ……..
3. Highest educational level attained: ……
4. Mean monthly income.....
5. Household size.....
6. Period of stay in this area…….……
7. Household ownership status. a. Landlord [ ] b. Tenant [ ]
8. Marital status. a. Married [ ] b. Single [ ] c. Divorced [ ] d. Widowed [ ]
9. Occupation: ……..
10. Zone in Kanyama? .....

SECTION B: Environmental issues in Kanyama.

11. Which of the following problems are environmental issues affecting your community?

Waste disposal [ ]

Waste management [ ]

Intermittent water supply [ ]

Toilets [ ]

Sewer systems [ ]

Flooding [ ]

Lack of green parks [ ]

Lack of spaces for planting trees [ ]

Poor drainage system [ ]

Poor access roads [ ]

Inefficient public transport [ ]

Any other (specify)

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12.How is each of the identified environmental issue a problem in Kanyama?……

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13. Of the problems identified in question 11, which problems affect your household?

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SECTION C: Strategies for transforming environmental issues into environmentally friendly ones.

14. What strategies can be employed at your household level to transform these environmental issues into environmentally friendly ones?

Environmental Issue solution

Waste disposal ……

Waste management. …….

Intermittent water supply ……..……..

Toilets …….

Sewer systems ……

Flooding …….

Lack of green parks …….

Lack of spaces for planting trees …….

Any other (specify) …….

15. What can you change in your household to make it environmentally friendly?.....
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16. What size of your plot would you be willing to leave for planting trees and grass?

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17. What is it that your household is doing to make your household environmentally friendly?

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18. How best can the environmental issues identified in your community be solved?

Environmental Issue	solution
Waste disposal	……
Waste management.	…….
Intermittent water supply	……..……..
Toilets	…….
Sewer systems	……
Flooding	…….

Lack of green parks …….

Lack of spaces for planting trees …….

Any other (specify) …….

19. How do you manage each of the identified environmental issues affecting your household/community?.....
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20. Who would you say is responsible for providing the solutions mentioned above?

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SECTION D. The economic cost of transforming environmental issues into environmentally friendly ones.

21. How much can it cost to transform the identified issues into environmentally friendly ones at your house hold level?

Environmental Issue	Cost
Waste disposal	[ ]
Waste management	[ ]
Intermittent water supply	[ ]
Sewer systems	[ ]
Flooding	[ ]

Green parks	[	]
Planting trees	[	]
Any other (specify)	[	]

22. Would you be willing to pay for the identified costs in 21?

Yes [ ] No [ ] Partly [ ]

23. If your answer to 22 is partly, how much would you be willing to contribute?

K.....

24. If there is any interventions employed at your household level, how much has it costed you for each intervention?

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25. Approximately how much can it cost to address each of the identified problems in your community?

Environmental Issue	Cost	
Waste disposal	[	]
Waste management	[	]
Intermittent water supply	[	]
Sewer systems	[	]
Flooding	[	]
Green parks	[	]

Planting trees [ ]

Any other (specify) [ ]

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26. Are you willing to pay for the transformation of your community into an environmentally friendly one? Yes [ ] No [ ] partly [ ]

27. If your answer to question 26 is partly, how much are you willing to pay for the change of your community into an environmentally friendly one?

K……..

28. What is it that your community is doing to make the Kanyama ward 10 environmentally friendly?

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29. If there is any interventions in question 28, how much has it costed you for each intervention?

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30. Is there any outside help that your community receives to transform it into an environmentally friendly one? Yes [ ] No [ ]

31. If yes, what organisation or institution is it that helps to transform Kanyama ward 10?

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32. How much do you think it has costed them to enhance such an intervention?

K…….

33. Did you pay anything in this intervention? Yes [ ] No [ ]

34. If yes, how much did you pay? K……..

END OF INTERVIEW.

THANK YOU SO MUCH FOR YOUR TIME.

Appendix 2: Interview Guide for Key Informants

THE UNIVERSITY OF ZAMBIA

SCHOOL OF NATURAL SCIENCE

DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES

Interview guide on sustainable household practices that transform environmental issues in informal settlements into environmental solutions

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Section A:

1. Name of organisation.....

2. Length of service……..

3. Position of interviewee……..……..

4. Role of interviewee…….

2. Education Level a. None [ ] b. Primary [ ] c. Secondary [ ]

d. Adult [ ] e. College and above [ ]

Section B: What are the environmental issues that hinder environmental sustainability in Kanyama Ward 10?

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2. What household practices could be employed in order to improve environmental sustainability in Kanyama Ward 10?

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3. What is it that has been done to address the environmental issues?

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4. What role does your institution play in addressing these environmental issues?

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5. Who are the other stakeholders that you engage with in addressing these issues?

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6. How much can it cost on average to address each of the environmental issues identified at household level in order to transform them into environmental solutions?

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..……

7. Is your organisation/institution willing to pay for the transformation of the Kanyama Ward 10 into an environmentally friendly?

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