

SOCIAL FACTORS ASSOCIATED WITH IMPROPER WASTE DISPOSAL AT THE
CENTRAL MARKET IN LILONGWE CITY

MASTERS OF SCIENCE IN COMMUNITY HEALTH NURSING THESIS

By

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UNIVERSITY OF MALAWI

KAMUZU COLLEGE OF NURSING

DECEMBER, 2014

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Submitted to Faculty of Nursing, Kamuzu College of Nursing, University of Malawi, in
partial fulfilment of requirements for the Degree of Master of Science in Community Health

UNIVERSITY OF MALAWI

KAMUZU COLLEGE OF NURSING

DECEMBER, 2014

DECLARATION

I, Modesta Banda, declare that this dissertation titled **Social Factors Associated with Improper Waste Disposal at the Central Market in Lilongwe City** is my own original piece of work and that it has never been submitted in part or whole for any other award or purpose before. All resources utilised in this piece of work have been fully acknowledged by means of referencing. This is an original piece of work submitted for a Master of Community Health Nursing Degree.

Student: Modesta Banda

Signature: _____

Date: _____

CERTIFICATE OF APPROVAL

I hereby declare that this thesis is the student's original work and where any additional information has been used, this has been duly acknowledged. It is therefore submitted with my approval.

Signature: _____

Date: ____/____/____

Genesis Chorwe-Sungani, MN-MHL, (Lecturer)

Supervisor

DEDICATION

Firstly, I dedicated this work to the Lord God Almighty for his abundant blessings, grace, and compassion and for the gift of life.

I dedicate this piece of work to my late parents Mr John Chimbavi and Mrs Christina Hlupekire Banda. You fought a good fight. God bless you eternally. Thank you for all the love, guidance, and support that you gave me and helping me to succeed in Life. Thank you for everything.

I love you!

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ABSTRACT

Urbanization in the developing countries such as Malawi has brought about a serious environmental degradation due to a rapid and uncontrolled population growth. One of the consequences of such population increase is improper waste disposal as solid waste is enormously generated. Additionally, poor sanitation facilities, along with high population pressure and waste management systems, are becoming a threat to the health of the residents of the cities. Current solid waste management in many places has not met the required standard for proper waste collection and disposal creating excess waste that accumulate within the urban environment causing immense health and environmental hazards. The deterioration of sanitation in the urban environment has reinforced incorrect disposal habits as people do not understand their individual impact on such an environment.

The overall aim of this study was to explore the social factors associated with improper waste disposal at the Central Market in Lilongwe City. The study used a descriptive cross-sectional design where quantitative method of data collection from the respondents was used at Lilongwe Central Market. The target population was vendors who have been doing business at the market within a period of 6 months prior to the study and buyers who have been shopping at the central market within that same period. Systematic random sampling was used to select 128 vendors and 127 buyers who met the inclusion criteria at Lilongwe Central Market. Data were collected using a structured questionnaire and the analysis of the quantitative data was done using SPSS 16.0.

The major findings of this study on social factors associated with improper waste disposal were; use of un-recommended methods to dispose waste at the market because of lack of bins and responsibility by vendors and buyers towards waste management. However, results showed that 78% of the respondents were willing to participate on issues concerning waste management in order to reduce health and environmental problems.

In conclusion, improper waste disposal can cause health and environmental problems to the general public if proper measures are not put into place. For example, making waste bins available at strategic places in the market. Therefore, waste should be managed at all times to prevent negative outcomes.

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ABBREVIATIONS AND ACRONYMS

APO	:	Asian Productivity Organization
BEAM	:	Beautify Malawi
CCAP	:	Church of Central Africa Presbyterian
COHN	:	Community Health Nursing
COMREC	:	College of Medicine Research and Ethics Committee
IEC	:	Information Education and Counselling
KCN	:	Kamuzu College of Nursing
Msc	:	Masters in Community
MDHS	:	Malawi Demographic Health Surveillance
MOH	:	Ministry of Health
MSW	:	Municipal Solid Waste
MSWM	:	Municipal Solid Waste Management
NSO	:	National Statistical Office
NGO	:	Non-Governmental Organization
SW	:	Solid Waste
SPSS	:	Statistical Package of Social Science
UN	:	United Nations
UN-HABITAT	:	United Nations Human Settlement Program

UNDP	:	United Nations Development Program
UNEP	:	United Nations Environmental Program
USEPA	:	United States Environmental Protection Agency
WHO	:	World Health Organization

CHAPTER ONE

Introduction

Introduction and Background

Urbanization brings about basic life by creating access to different social and infrastructural facilities and this depends on the progress of proper planning and management of urban centres (Selin, 2013). On the contrary, urbanization in the developing countries of Africa has brought a serious environmental degradation due to rapid and uncontrolled population growth. One of the consequences of such population boom is improper waste disposal as solid waste is enormously generated. Besides high population pressure along with poor sanitation facilities waste management system is becoming a threat to the health of the residents of the cities especially in market places.

Lilongwe City just like any other city in Africa has witnessed a high urbanization rate of 4 percent per annum (UN-HABITAT, 2010). The UN-HABITAT (2010) report has attributed this to the relocation of all government head offices from Zomba to Lilongwe. Lilongwe City's population has grown from 19,425 people in 1966 to 669,021 people in 2008 making it the fastest growing city in the country (UN-HABITANT, 2010). The major factor contributing to urban population growth in Malawi is the higher natural increase and rural-urban migration. People have migrated from rural areas to the city in expectation of good life in urban areas through employment and business opportunities (Namadzunda, 2010).

This rapid urbanization has come along with effects that are both wanted and unwanted in the city of Lilongwe especially at Lilongwe Central Market. Lilongwe is the largest city in the country, and is divided into two sections, namely; new city centre and old town (UN-HABITAT, 2011). Lilongwe Central Market is located at the heart of old town

along Malanga-langa road in Lilongwe city where the study was conducted (Fitzpatrick et al., 2015). The market is bordered by Bwaila Hospital and minibus depot commuting in the city, shops, and restaurants in the west, Police Mobile Force Headquarters and Falls lines and Bwalo la Njobvu (Area 2) where there are big shops and Devil street, a narrow road lined with bars, shops, cheap hotels, where there departure points for buses heading to Tanzania and Zambia to the Northern side (Fitzpatrick, et.al., 2015). Furthermore, the market is boarded by the main bus depot for Lilongwe in the southern part of the market. Lilongwe central Market being at the centre of other busy institutions, it is confronted with a problem of congestion which contributes to poor waste management leading to poor sanitation at the market. However, the market plays a vital role in the economic life of the people and is essential in the distribution of a number of commodities. In addition, the market strengthens the economic base of a town and also sustains the tax base of the Local Authority (UN-HABITANT, 2011). Apart from the business done in shops and stores surrounded by Lilongwe Central Market, most of the trading activities take place inside the Lilongwe central market.

In addition, markets serve as social entity which brings together people of diverse ethnic groups, racial backgrounds and cultural traits (Adekunle, Adebola, Aderonke, Pius & Toyin, 2011). However, the influx of people during market days leads to other challenges in the market such as waste generation which leads to poor sanitation. Waste generation from markets contribute immensely to the environmental degradation when it is not well managed (Adekunle, et al., 2011). Observations reveal that Lilongwe market poses so many challenges to the physical environment because of improper disposal of waste.

This improper disposal of waste has undesirable effects on sanitation as evidenced by heaps of waste around the city and dirty roads (Khungwa, 2010). This increase in waste has contributed to one major environmental problem of solid waste disposal that has confronted

the authorities of Lilongwe City. Waste disposal problems are characterized by the presence of heaps of uncontrolled rubbish bags, polythene bags dumped near or around residential areas (Babereyir, 2009). Other countries in Sub Saharan Africa such as South Africa, Zambia and Zimbabwe have reported the same problem (Kamara, 2006). This problem of disposing used plastic bags has also not spared Lilongwe City especially the central market where disposed plastic bags have been observed hanging on fences, and some have even been disposed in gutters or pavements leading to blockage of drains. This has led to production of foul odour, thereby causing air pollution.

In addition, uncollected refuse is a common site at Lilongwe Central Market and the Lilongwe River becoming a major cause of environmental degradation (UN-HABITAT, 2011). In many cases polluted water sources are used by a large segment of poor population, for multiple purposes such as drinking, laundering, washing and bathing. On the other hand some of the population living downstream who depend on water from the river for drinking and bathing have suffered from various types of communicable diseases such as dysentery, cholera, typhoid fever and scabies for years (Kayuni & Tambulasi, 2005). The outbreak of these diseases and other hazards are common in similar setting of most developing countries where waste disposal is not managed properly (Kamara, 2006). The reason being that many infectious diseases thrive where there is poor sanitation (Kamara, 2006).

Furthermore, in many smaller urban centres in towns the major method of solid waste management is open dumping (Kayuni & Tambulasi, 2005). This is a more harmful type of waste management that leads to many environmental and health hazards. This is worse in urban areas where the communities dump their waste anyhow and no one is available to check if they are doing the right thing or not (Khungwa, 2010). Public sanitation facilities such as bins, skips and toilets are not adequately available in the cities and this situation forces the citizens to urinate and dispose wastes anywhere. On the other hand, some of the

indiscriminating behaviour cannot entirely be blamed on lack of such facilities but on issues of bad attitudes and irresponsibility on the part of the citizens. In addition, there are some activities, such as, mobile restaurants operating along the roads, being the common site within the city that do not have proper waste management facilities.

Management of solid waste in Lilongwe City is run by the City Council (UN-HABITAT, 2010). However, efforts by the City Council cannot cope with the rate of solid waste generation at Lilongwe Central Market. The frequency of garbage collection is limited to once a week due to a limited number of garbage collection vehicles at the Lilongwe City Council (Namadzunda, 2010). The consequence of inadequate garbage collection has led to high levels of waste contamination at Lilongwe Central market which is greatly affecting the lives of people. The uncollected solid wastes are causing the closing up of sewerage canals leading to spillage and creating odour, making people around the area feel uncomfortable. This is seriously contributing to the environmental pollution and ecological deterioration (Alam & Ahmade, 2013). A dirty environment affects the standard of living, aesthetic sensibilities, health of the people and quality of their lives (Awomeso, Taiwo, Ghadeho & Arimoro, 2010). Therefore, it is obvious that the issue of solid waste will become worse in the near future unless timely action is taken to adhere to appropriate waste management strategies.

On the other hand, cities are generating an ever-increasing volume of waste, while the effectiveness of their waste collection and disposal systems are declining (Danbuzu, 2012). This is the case for Lilongwe Central Market where refuse is not properly disposed of. According to Regassa, Sundara and Seboka (2011), in urban centres throughout the African region less than half of the solid waste produced is collected, and a certain percentage of that amount is either indiscriminately thrown at various dumping sites on the periphery of the urban centres or at a number of temporary sites scattered throughout the city.

In addition, improper waste disposal is not only unsightly but it may affect the public health and the environment (Kayuni & Tambulasi, 2005). The level of potential harm depends on the type, location and amount of waste identified in open dumping site. This rudimentary solid waste collection and inadequate methods give rise to serious environmental problems such as odour, dust, pests, and scavengers as well as the pollution of surface water and ground sources, smoke and fire hazards (Kamara, 2010).

In Lilongwe City, there is only one poorly managed dumpsite on the outskirts of the City under the jurisdiction of the Lilongwe City Council (United Nations Development Program (UNDP), 2011). The effective management of municipal waste has become a challenge in the town with high population density and experiencing the problem of rapid urbanization that has contributed to an increase of waste generation. However, the social factors associated with improper waste disposal at the Central Market in Lilongwe City are unknown. Therefore this study is going to explore the social factors associated with improper waste disposal at the Central Market in Lilongwe city.

Problem Statement

The concentration of the population and business activities in Malawian cities is being accompanied by a rapid increase in the volume of solid waste generated from production and consumption activities. An example is Lilongwe City where rural to urban migration is very high and has led to careless disposal of waste by individuals resulting into its accumulation in public places such as the central market. Another reason for improper waste disposal is the peoples' wrong perception and unconcerned attitudes towards solid waste management. Improper waste disposal in the city has given rise to negative environmental, social and health implications such as unhygienic conditions where the proliferation of disease is facilitated and risks of surface and ground water contamination are high.

Many Studies conducted on waste management in Malawi have been on waste management problems caused by institutional deficiencies in terms of insufficient technical expertise, inadequate legislation and resource constraints and lack of awareness on waste management issues (Hover, 2011; Manda, 2009). However, not much has been done on social factors associated with improper waste disposal hence this study.

Definition of terms

Disposal

The term disposal means the discharge, deposit, dumping, or placing of any solid waste or hazardous waste into or on any land or water so that such solid wastes, hazardous wastes, or any constituent thereof may enter the environment or be discharged into the air or any waters from community activities (Abdul, 2010).

Municipal Solid Waste (MSW)

Municipal Solid Waste (MSW) refers to waste arising from domestic, commercial, industrial and institutional activities in an urban area (Medina, 2010). Categories of municipal solid waste include: household garbage and rubbish, yard waste, commercial refuse, institutional refuse, construction and demolition debris, street cleaning and maintenance refuse, dead animals, bulky wastes, abandoned vehicles, and sanitation residues.

Municipal Solid Waste Management (MSWM)

Municipal Solid Waste Management (MSWM) refers to the collection, transfer, treatment, recycling, resource recovery, and disposal of solid waste generated in urban areas (Ogwueluka, 2009). MSWM is a major responsibility of local government and a complex service involving appropriate organizational, technical, and managerial capacity and cooperation between numerous stakeholders in both the private and public sectors.

Waste

Waste is something that is no longer useful to the owner or when used fails to fulfil its purpose (Puopeil, 2010).

Social factors

Social factors are the facts and experiences that influence individuals' personality, attitudes and lifestyle in waste management (Post, 2007). These factors also refer to the community's day-to-day practice in relation to solid waste management.

Solid Waste (SW)

Solid waste is defined as a discarded non-liquid material arising from a human activity of which has no value to the person who is responsible for it (Puopeil, 2010). Solid waste includes non-hazardous industrial, commercial and domestic waste including: household organic trash; street sweepings; institutional garbage and construction wastes. Synonymous to solid waste are terms such as garbage, trash, refuse and rubbish (Zurbrugg, 2009).

Purpose of the Study

The main aim of the study was to explore the social factors associated with improper waste disposal at central market in Lilongwe city.

Study objectives

1. Identify the type of waste commonly disposed of around the central market in Lilongwe City.
2. Assess people's willingness to participate in waste management.

3. Describe the attitudes and perceptions of people towards waste disposal at the central market in Lilongwe city.
4. Determine the effects of improper waste disposal at the central market in Lilongwe city.

Research Questions

Objective number one

- What are the items and materials that people commonly dispose of at the central market?

Objective number two

- Are people willing to take part in waste management?

Objective number three

- What are the attitudes and perceptions of people towards improper waste disposal?

Objective number four

- What are the effects of improper waste disposal at Lilongwe central market?

Significance of the Study

The study is significant because it is the first of its kind on social factors associated with improper waste management at Lilongwe Central Market. The study findings give an insight on the issues contributing to improper waste management to the general public. The findings may be useful to personnel working at Lilongwe central market to make recommendations about proper waste management to vendors and buyers at the market. They may also be used by policymakers and program managers in Malawi such as Beautify Malawi (BEAM) on ways of improving waste disposal and maintenance of good sanitation. The study will also act as a baseline for further research on waste management to improve issues on sanitation in the country.

CHAPTER TWO

Literature Review

Introduction

Literature review includes what others have done in a similar, though not necessarily identical area of study (Leedy & Ormrod, 2010). Its aim is to generate an understanding of what is known on a particular situation (Burns & Groove, 2009).

Literature review and analysis was conducted to gain knowledge on the solid waste situation that was essential for setting the context specifying the focal points of the project. The literature search focused on English language articles and was dated between 2005 and 2015. Studies from different places in the world published from 2005 to 2015 were studied, summarised and synthesised. A ten year period was chosen in order to have recent information which is relevant and related to the topic under study.

An extensive search of research articles from electronic data bases such as PubMed, Science Direct and websites (online) was conducted. It has also helped to locate relevant methods from previous research such as research designs and assessment tools that have been adopted in previous studies, which are applicable in the current research. It should be pointed out that whenever possible, the use of academic sources of information was preferred. Also, data from International Organizations and information from national authorities were considered as valid and reliable. It is acknowledged that relevant articles might have been available in other data bases.

The key words that were used when looking for the research articles included waste, types of waste, waste disposal methods, improper waste disposal, waste management, social factors, willingness to participate, attitudes and perceptions towards waste management and effects of improper waste management. While numerous articles relating to the topic under

study were retrieved from the data bases, the literature search yielded very little on research that had been conducted in Malawi.

This chapter consists of literature review describing concepts of waste, sources of waste, waste disposal methods practiced, willingness of individuals to participate in waste management, attitudes and perception of people towards waste disposal, environmental and health impacts of improper dumping of waste. This may help readers to appreciate that problems affecting waste management are similar globally.

Concept of Waste

Solid waste is defined as a non-liquid and non-gaseous product of human activities, regarded as being useless (Babayemi & Dauda, 2009). This is corroborated by Baabereyir (2009) who asserted that waste comes from human activities and there is no such a thing as waste in nature where limits of one species becomes food for another. Solid wastes are all domestic refuse and non-hazardous wastes which can be commercial and institutional waste, street sweepings and construction and debris (United Nations (UN), 2009). They could be regarded as garbage which is discarded by the owner or as something which is useless to the owner. Some materials that are regarded as waste can be recycled into valuable products making them useful to those who may need them (Davies, 2008). However, the definition of waste for this study is any unwanted substance discarded into the environment.

Types of Waste

The criteria used to classify wastes into types include their sources, physical state, material composition and the level of risk associated with waste substances. Such classification of waste provides a basis for the development of appropriate waste management practice. According to UNDP (2010) there are different categories of waste namely municipal wastes, industrial wastes, agricultural waste, mining and quarrying wastes. Municipal waste are composed of wastes generated by households and wastes of similar nature from shops,

market, offices, open areas and treatment plant sites. However, it has been indicated that less than 20% of this urban solid waste is disposed properly (UN-HABITAT, 2006; Wokekoro & Inyang, 2007).

Classification of wastes by their sources is a useful way of determining the relative contributions of the different sectors of society to the waste stream and how to plan for their collection and disposal. However, of all the various sources of waste, attention in waste disposal is devoted to municipal solid waste, because it is highly visible. For the purpose of this study concentration will be on municipal waste because this is the type of waste which is highly produced at Lilongwe City's Central Market. This type of waste is commonly found in municipal solid waste in the form of food waste, yard waste, discarded plastic and paper.

Waste could be also bio-degradable and non-biodegradable (Baabereyir, 2009). The biodegradable wastes are those domestic wastes which include food remains, garden cuttings and paper which can easily be decomposed by microbes. Other biodegradable waste materials include human excreta, animal droppings, and slaughterhouse waste while non-biodegradable waste includes plastics, metals and ceramics, which cannot be broken down by natural processes or living organisms (Baabereyir, 2009).

Lilongwe Central Market, the biggest market in Lilongwe City, produces waste which is predominantly high in biodegradable materials such as food-waste and non-biodegradable materials such plastics and papers which are mostly seen lying around the market premises. Most of this waste can easily be recycled. This implies that developing countries such as Malawi produce waste which can be recycled and composted if measures were to be put in place.

Waste can also be classified according to its effects on human health and the environment (United States Environmental Protection Agency (USEPA), 2008). These are the hazardous waste and non-hazardous waste. The non-hazardous waste are safe and can be

recycled or can be economically valuable if put into use. However, hazardous waste deserves some extra attention because it is harmful to human and environmental health.

Furthermore, living standards and cultural habits can also influence the type of waste generated (Visvanathan and Glawe, 2006). The changing lifestyles and consumption pattern of the growing urban population increases the complexity and composition of the waste streams in Africa (Mwesigye, Mbogoma, Nyakongo, Idan, Kapindula, Hassan & Berkel, 2009). In Malawi, especially in Lilongwe, changes in the lifestyles of people results in the changes in the types of waste generated. An example is the use of plastics in packaging of items purchased at the market. Most of the items at Lilongwe central market are packaged in thin plastics. Additionally, Changing lifestyles such as the use of canned soft drinks, mobile phones, and disposable diapers, poses waste management challenges, as waste management systems in developing countries are incapable of frequent adjustment to match these lifestyle changes. Therefore, these changes in the types of waste generated call for urgent actions in order to minimise waste in the country especially at Lilongwe Central Market.

Composition of municipal solid waste provides a description of the constituents of the waste and it differs widely from place to place (Lindell, 2012). The most striking difference is the organic content which is much higher in the low income areas than the high income while the paper and plastic content is much higher in high income areas than low income areas. This reflects the difference in the consumption pattern, cultural and educational differences.

A study conducted by Chandra and Devi (2009) in India revealed the type of waste composition based on income generating areas namely high, medium and low income areas. In this study, it was revealed that high income group throw away more plastics while low and middle income groups throw away mostly food-waste.

Similarly, studies conducted in Blantyre-Malawi, Akwe-Nigeria and Chihuahua-Mexico showed that the most generated waste was food waste followed by other wastes such as plastic, paper and glass (Hove, 2011; Ogwueleka, 2012; Gomez, Meneses, Ballinas & Castells, 2007). However, it was indicated that studies which were conducted in Nigeria and Mexico used questionnaires for data collection and they were quantitative studies, except the one which was conducted in Blantyre, Malawi used interviews and observations.

In addition, Edema, Sichamba and Ntengwe, (2012) conducted a study in Ndola, Zambia with an aim of evaluating the types of waste generated from households. The results revealed that solid waste comprised mainly of food-waste, while paper and textiles were the least abundant in the household waste. This study used stratified random sampling which is one of the probability sampling, therefore, enhancing the representativeness of the study. It was recommended that concerted efforts towards waste minimization and management should be applied (Edema, Sichamba & Ntengwe, 2012).

Contrary, Yahaya and Ebenezer (2012) conducted a descriptive study using stratified random sampling and recruited 90 participants. The study indicated that plastics were the most generated type in the household at 56.7%, paper 8.9% and others which included organic materials at 6.6%. However, in this study the sample size was small and the results cannot be generalised to the whole population.

This gives an indication that the type of solid waste generated in developing countries is mostly organic in nature which can be composted and used as manure in farms. Malawi as a country, especially Lilongwe, can also compost waste and utilise it as manure and this can reduce the burden of buying fertiliser which is costly especially to the people residing in the rural areas. Currently literature available on the types of waste generated and categories in Malawi especially Lilongwe Central Market is not enough, hence the need for more studies on these areas. The classification of different types of waste may help in waste management

planning by providing useful information that enables municipal authorities to organize waste management activities. These waste management activities, such as the use of appropriate disposal methods, should be organised in a more effective manner for the activities to be successful during implementation. Therefore, it is important to classify types of waste in towns and cities to come up with proper plans of waste management.

Waste Disposal Methods Practiced

Solid waste disposal is one of the elements concerning waste management. Methods of waste disposal depends normally on several factors such as types of waste, equipment capacity, finance and many more. There are various methods of waste management, and these include incineration, sanitary land fill, recycling, composting and open dumping. These waste management methods are practiced in developing countries such as Malawi but the most widely used method is open dumping (Khatib, 2010). This method common as it may be is ranked the least on the hierarchy of waste management methods as it leads to health problems for the people in Malawi. A walk through Lilongwe Central Market may show that waste is not properly disposed of, people use open dumping and this is evidenced by heaps of waste seen in open places, drains, littering of the streets and empty skips surrounded by litter. This is an indication that this is a predominant type of waste disposal method at Lilongwe Central Market. However, in a study conducted in India by Visvanathan and Glawe (2006) recommended land filling as the best method to use in waste disposal.

Despite many good practices of waste management being available from around the world, Malawi continues to use unsanitary methods of disposing waste just like many other developing countries especially in cities and towns such as Lilongwe. In most of the cities of developing world, open dumping is the most preferred method for the final disposal of solid

waste and remains the cheapest and most effective solution to get rid of the mounting garbage (Visvanathan and Glawe, 2006). However, in Malawi's urban centres especially Lilongwe, solid waste disposal is mainly through open dumping (Kayuni and Tambulasi, 2005).

Landfill

Sanitary landfill is a disposal method whereby refuse is placed in trenches, abandoned mines or quarry sites after the site has been properly designed (Adogu, Uwakwe, Egenti, Okwuoha & Nkwaocha, 2015). The landfill process is designed to contain refuse without creating a nuisance or hazards to public health or safety (Ekemeni, 2012). The idea is to confine the waste, reduce its volume and cover it with compacted soil to keep out insects, rodents, seagulls, and avoid ground water percolation. However, lack of financial and human resources coupled with absent enabling policies, limit the extent to which landfills can be built, operated, and maintained at minimum standards for sanitary practice (United Nations Environmental Program (UNEP), 2006). United States Environmental Program (USEP) (2009) asserts that land filling is currently the number one method of waste disposal in the United States.

Landfills in developed countries are of high standard for safe disposal of non-hazardous waste while in developing countries they are of poor quality making them difficult to cope with huge volumes of waste produced in cities. This was evident in Pakistan where difficulties were experienced due to inadequate financial support and to poor design of the landfill to manage a huge influx of waste (UNEP, 2006). Similarly, in Lilongwe the only landfill available is not managed properly according to standards. This may affect people residing close to the area.

The placement of solid waste in landfills is the oldest and definitely the most prevalent form of ultimate waste disposal (Puopiel, 2010). Puopiel further argues that

landfills are nothing more than open, sometimes controlled dumps. The difference between landfills and dumps being the level of engineering, planning, and administration involved while open dumps are characterized by the lack of engineering measures. In contrast to what the various authors have said about sanitary landfill as an option for waste management, they have failed to recognize that landfills have some disadvantages. A Landfill is costly to construct and maintain, can pollute ground water through leaching and is not easy to locate in terms of availability of land particularly in the cities (Puopiel, 2010). Therefore, there could be an alternative in developing countries such as Malawi, which is, recycling. This method is discussed in the next sub-section.

Recycling

Recycling is the method used in minimizing the amount of household solid wastes that can be disposed of to the dump sites (Momoh & Oladebeye, 2010). Recycling method aims at converting waste into valuable materials. It is a source of income; saves energy; water and generates less pollution, reduces the amount of wastes to be collected, transported and disposed of and prolongs life of disposal facilities (Achi, Adeofun, Ghadebo, Ufoegbune & Oyedepo, 2012). It may also reduce the need of land filling. In this method, materials that have no further use by the consumers, for example, old aluminium cans and glass bottles are re-used usually melted and recast into new cans and bottles. This gives an indication that this method is set to be the best, effective and efficient type of waste disposal method because materials are re-used and this will help in reduction of waste. In Malawi especially in Lilongwe recycling of waste is done at a smaller scale mainly on plastics and is mostly done by scavengers who sell it to factories. This problem may be improved by conducting awareness campaigns on proper waste management such as reduction of waste through recycling method. However, for many people in African countries such as Malawi, the way to dispose of waste is to simply drop it someplace instead of recycling the waste.

Composting

Composting is a biochemical process in which organic materials such as lawn clipping and kitchen scraps decompose to a rich solid like material (Ekemini, 2012). This is a popular technique in Europe and Asia where intensive farming centres' demand for the compost. In this method natural microbial organism is used to decompose the organic fraction of waste. Composting is aerobic and produces primarily carbon dioxide, while anaerobic processes produce methane. However, methane contributes to global warming (Ekemini, 2012). Composting is the option that best fits within the limited resources available in developing countries (UNEP, 2009). A characteristic that renders composting suitable is its adaptability to a broad range of situations.

According to Puopiel (2010), a low-technology approach to waste reduction is composting. He further says that in developing countries the city's municipal waste stream has a high content of organic material suitable for composting. Composting is considered a more viable and sustainable option for developing countries due to the high organic content of waste generated and this may help in the reduction of waste (Troschinetz & Mihelcic, 2008).

Incineration

Incineration is a process where combustible wastes are burned at temperatures high enough to consume all combustible materials leaving only ash and non-combustibles to be disposed of in a landfill (Kamara, 2006). Incineration is an approach which is commonly used in European and American countries in generating electricity power and used for heating in cold countries, instead of disposing the waste in the landfill (Nagabooshnam, 2011). Under ideal conditions, incineration may reduce the volume of waste by 75% to 95% (Ekemini, 2012). However, burning waste causes irritation of the respiratory tract and aggravates asthma and contributes to chronic obstructive pulmonary and acute/chronic respiratory

disease. Many people who are healthy may experience shortness of breath, sore throats, and breathing difficulties, dizziness and headaches (Ekemeni, 2012).

In Malawi, incineration is commonly done in health facilities for incineration of hazardous waste contaminated by fluids and blood such as used syringes and gloves. This helps in prevention of contamination of infectious materials in these facilities. A report by UNEP (2005) revealed that in Africa, incineration remains the less favoured option for MSW. The report indicated that one energy recovery plant constructed in Tanzania did not work because of a high capital and operating costs. Therefore, this makes incineration inaccessible technology for most African cities. Incineration can also cause air pollution through the emission of chemicals which produce acid rain and ground level ozone metals such as Zinc.

Furthermore, incineration in African countries such as Malawi would be difficult to put into practice if the waste stream is 70% putrescible organic content. These conditions will likely make incineration to be an energy-consuming rather than energy-producing option (UNEP, 2005). This report indicated that incineration does not play significant roles in MSW in Africa due to high costs relative to other MSW options due to a limited infrastructure of human, mechanical, and institutional resources and the composition of the waste stream. However, it is suggested that incineration is an inappropriate technology for Africa now and in the foreseeable future.

Open dumping

The least prioritized strategy of waste management is open dumping. In open dumping waste is buried, deposited, discharged, dumped or released in places where they remain for the long-term (Wokekoro & Inyang, 2007). This is the cheapest form of waste disposal but a source of a number of public health and safety problems such as diseases, air, water pollution and fire. Open, unregulated and uncontrolled dumps are still the major method of waste disposal in most developing countries such as Malawi (NSO, 2011).

According to NSO (2005) the majority of the Malawians (25%) dispose of their waste using un-recommended methods such as open dumping. It is substantiated that some people (21%) who live in informal settlements of three cities of Malawi (Blantyre, Lilongwe and Mzuzu) use open dumping as a method of waste disposal (Manda, 2009). Similar studies conducted by Momoh and Oladebeya (2010) in Nigeria; Mengistie & Baraki (2010); Achi, et al. (2012) in Ghana showed that the respondents used improper waste disposal methods such as disposing household waste in rivers, gutters, drains, roadsides and unauthorised sites. In these studies it was also revealed that burning and burying of refuse was also a common practice. The studies, recommended that recycling of wastes was to be formalized and publicized among residents. In addition, laws on waste management were to be enforced and offenders duly punished. However, Achi, et al. (2012) added that waste management planning was not supposed to be left entirely to the discretion of the local government. All these studies were conducted in rural and urban settings with different groups of participants' involved. Different research and data collection methods such as a questionnaire were used with large enough sample size of more than 400 respondents for all the studies. This stipulates stability and trustworthiness of the research findings. This validates that the results can be generalised to a larger population.

In Malawi, the two most common method of solid waste disposal that are widely practiced is open dumping and landfill (Kayuni & Tambulasi, 2005). However, considering it from the environmental, public health and aesthetic point of view, sanitary landfill is a fully approved and controlled method of disposal, while dumping is uncontrolled and not accepted. Even though open dumping is the world's most common disposal method especially in developing countries such as Malawi, no amount of careful collection and treating of waste will reduce the hazards to health and the environment from disposal if the final disposal of waste is an open dump.

Use of a combination of all types of methods of waste disposal may be encouraged in the municipalities since different types of waste require different methods of waste disposal. It is also to be noted that some methods of waste disposal which work in some other countries may not be appropriate for others and this depends on specific issues, problems, environmental conditions and existing socio-economic situation. However, various studies on solid waste issues bring about prospects of certain methods as being at least adaptable to many developing country situations such as Malawi. At all cost waste should be managed using different types of methods to limit its effects to the environment except open dumping.

Willingness to Participate in Waste Management

The success of any solid waste management program requires willingness of the public to participate on issues of waste management (Post, 2007). Participation can comprise varying degrees of the involvement of the local community. It involves storing garbage in proper bins or bags, separating recyclable materials from organic waste, placing the garbage at the right time in the right place for collection (Kayode, 2012). It also involves bringing garbage to communal collection points such as skips for the municipal to transfer. Cleaning the area around the house is also one of the activities. At a community level participation can mean more organized activities such as meetings, clean-ups of drains and public spaces and awareness raising campaigns. It can also take the form of contribution of cash and labour, adaptation of behaviour and involvement in administration, management and decision-making in waste management (Kayode, 2012).

Participation by the public is one of the most important approaches in contributing to sustainability, efficiency and effectiveness of the waste management system. Moreover, participation and sound waste management can promote empowerment, improved health and sustain important physical assets (Kumar & Nandini, 2013). Willingness of the community to

participate in waste management has a direct bearing on efficient Solid Waste Management. Yet, the municipal authorities have failed to mobilize the community and educate citizens on the basics of handling waste and proper practices of storing it in their own bins at the household, shop and establishment level (Asnani, 2006).

Studies have been conducted in Nigeria on householders' willingness to participate in solid waste recycling program (Kumar & Nandini, 2013; Momoh & Oladebeye, 2010; Odufuwa, Odufuwa, Ediale & Oriola, 2012). Findings revealed that the majority of the participants were willing to participate in waste management such as on use of the recyclable products. Positive attitudes towards recycling were observed in these studies with an inclination towards a pro-environmental attitude and ecological motives for participation in the programmes. It was recommended that this could be achieved through campaigns, environmental education, particularly on waste disposal and management approach towards improving the household participation in domestic waste management in their cities.

In a study that was conducted in Kratovo, Macedonia by Finn (2007), it was revealed that 67% of households were willing to contribute to an improved solid waste management program. The study used a pretested questionnaire which ensured validity and reliability of the tool and the number of participants were 269. The results further revealed that recycling and composting were viable options for Kratovo to reduce the amount of solid waste that was being disposed of at all the landfills. This can be facilitated by putting in place legislations which are acceptable by the public. Community participation in the formulation of waste management by-laws helps to improve solid waste disposal in the township (Lauwo, 2005) which fosters public willingness to contribute towards waste management. Cooperation from citizens is the vital aspect of managing solid waste in the market (Visvanathan & Glawe, 2012). There is also a need for financial commitments towards waste management in addition to adequate understanding of the problem and public willingness in order to improve the

present situation of waste management (Bandara & Hettiaratchi, 2010). Thus, sustainable waste management requires concerted effort to increase public awareness, capacity building and establishment of partnership between the community, municipality and Non-Governmental Organization (NGO). It is evident that public awareness and public participation is vital in the implementation of the solid waste management system (Visvanathan and Glawe, 2006).

Attitudes and perceptions towards waste disposal

One of the problems concerning waste management is attitude towards improper waste disposal (Sichaaza, 2009). Attitudes and perceptions of people in the community appear to be crucial as their point of understanding of household solid waste management may play an important role in providing answers to environmental problems. Attitude is defined as a way of thinking or organized set of feelings and beliefs which will influence an individual's behaviour (Opeyeni, 2012). The attitude and perception of one's capability sets limits to what to do and ultimately what can be achieved in waste management (Kumar & Nandini, 2013). Individual's attitudes and perceptions may influence the cultural values, responses, and success of the solid waste management system. Hence, the people's attitude and perceptions on waste disposal is primordial for their willingness to participate in waste management. Attitudes portrayed by the community members on waste management can be both positive and negative. Positive attitudes can enhance waste management practices and negative attitudes can hinder waste management (Sichaaza, 2009). In Philippines, many people (96%) had positive attitudes and perceptions towards waste management and recognised that attaining sustainable waste management is a joint responsibility of the government and its community members (Macawile & Su, 2009). This is corroborated by Etengneng (2012) and Wesley High School (2011) who found that people agreed that responsibility in waste

management was for both council and the community. People who perceive that they are responsible for waste management may be willing to participate in proper waste disposal. On the contrary, some people have negative attitudes and perceptions about waste management activities such as discriminating behaviour in household waste management (Longe, Longe & Ukpebor, 2009). This is a case in the cities of Malawi where many people (87%) had negative attitudes towards waste management (Manda, 2009).

The negative attitudes include public perception that it is government's responsibility to manage waste (Adeyemo, Oyadiran & Afemikhe, 2013; Longe, Longe & Ukpebor, 2009). This can be a cause for public health concern because attitudes and perception of individuals can affect waste management system. Most people know that it is not healthy to have waste in their homes and this makes them throw waste outside their homes. The best option is changing their mind-set by making them understand that waste management is the responsibility of everyone in any given society. This can be done through environmental education from schools to develop the awareness of the general public becomes important (Visvanathan & Glawe, 2006) and public awareness campaigns on the negative aspects of improper waste disposal. Such campaigns should inform the general public of their responsibility towards waste management as waste generators and their duties as citizens. Greater awareness on the need for cleaner environment is also needed among the urban population. As a result it will reduce indiscriminate disposal of waste in the markets and other places. A good example of awareness campaigns are being conducted by the First Lady of Malawi under Beautify Malawi initiative in cities of Lilongwe and Blantyre (Malawi News Agency, 2014). These campaigns are aimed at facilitating change of attitudes and mind-set of Malawians to become responsible citizens with regard to proper waste management. It is evident that attitudes and perceptions of people towards waste can affect

the way it is managed (Adeyemo, Oyadiran & Afemikhe, 2013). Therefore, it is essential to understand attitudes and perceptions of people on solid waste and its disposal since they play a major role in the planning and running of municipal council.

Effects of improper waste disposal

People tend to consume more goods and generate more waste as they search for better life, improved and higher standard of living. These wastes may create problems in the society such as health and environmental problems if they are not managed properly many negative impacts may result. Waste disposed on land or water becomes toxic and infectious material that are dangerous to human health. These infectious materials can also cause skin and blood infection, eye and respiratory infection as well as different diseases that result from the vector borne disease to name a few (Opeyeni, 2012). Some accidents like chemical burns may also occur. Improper waste dumping also leads to soil pollution, water pollution, and contamination of food (Aprilia, Tezuka & Spaatgaren, 2012).

World Health Organization (2006) estimated that about a quarter of diseases in the world occur due to prolonged exposure to environmental pollution which partly result from poor waste management. It is clear that improper waste disposal pose serious public health challenges to many communities worldwide (Kimani, 2007; Prüss-Üstün & Corvalán, 2006). In Malawi, increased urbanization has led to dramatic increase in both solid waste generations, without corresponding response to manage those wastes (UN-HABITAT, 2011). This has resulted in contamination of rivers, streams, and groundwater leading to outbreaks of communicable diseases especially during the rainy season (Manda, 2009). Waste that is not properly disposed from households and the community are serious health hazard and may lead to the spread of diseases which may put additional burden on the scanty health services available in resource-poor developing countries (UNEP, 2006). In agreement is Hove (2011)

who found that the consequences of poor waste management include water and air pollution and aesthetically unpleasant sights which affect the quality of life of people. In addition, waste creates ideal conditions for disease vectors such as Mosquitoes to thrive and it is recommended that solid waste and other streams of waste be removed from the society in order to avoid rubbish and pollution that can pose risks to public health.

Public suffer from health related diseases such as malaria, chest pains, and diarrhoea, cholera, dysentery and typhoid due to the disposal of waste close to their settlements (Ejaz & Janjua, 2012; Sankoh, Yan and Tran, 2013; Joshua, 2013; Bandara & Hettiaratch, 2010). This clearly shows that open dumping of solid wastes affects the health and environment of the people residing near the open dumps. Unfortunately, it appears most solid wastes are still disposed on the land in open dumps around Lilongwe City market. There is an urgent need to mitigate this problem at the market before it worsens. This means that waste should be managed at all costs to limit its effects to the environment (UNEP, 2006). The general public should know that proper waste management is of great concern in a bid to prevent disease occurrence. Therefore, it is unavoidable for the authorities and the people to act now to manage waste properly to avoid the occurrence or incidence of communicable diseases through education, clean up campaigns and strengthening laws on waste management.

Summary

In this study, literature has been reviewed to ensure that it builds on the relevant work previously carried out by others. The literature has also revealed gaps, unresolved issues and debates regarding the study topic. It has also revealed that something can be done to address the problems encountered here in Malawi. Those gaps, unresolved issues and debates form a basis for the research on waste management in Lilongwe at the central market.

Literature has indicated that the most generated waste was plastics followed by food wastes in developing countries such as Malawi of which can be recycled and composted if measures were to be put in place. However, Open, unregulated and uncontrolled dumps are still the major method of waste disposal in most developing countries such as Malawi. Despite many good practices of waste management being available from around the world, it has been stipulated in literature review that most developing countries such as Malawi are still using unsanitary methods of waste disposal. This is the most preferred method in developing countries for the final disposal of solid waste and remains the cheapest and most effective solution to get rid of the mounting garbage. The method is inappropriate for it pollutes and constitutes aesthetic blithe in the environment as it has been indicated in most of the studies. However, proper waste disposal management is essential to sustain healthy living conditions in any environment and strict adherence to appropriate waste management practices in any community will protect the inhabitants from detrimental and hazardous environmental conditions and improve the living standard of the people. It is evident that in all studies reviewed that public participation is vital in the implementation of solid waste management system.

Currently literature available on improper waste management in Malawi especially Lilongwe Central Market is not enough. Although there have been few studies conducted in Malawi that could be used as a template for this study, a review of the literature from other countries in developing countries provided insight into ways the study should be facilitated.

CHAPTER THREE

Methodology

Introduction

Methodology refers to the steps, procedures and strategies for gathering and analysing data in a research study (Polit & Beck, 2008). This section gives an overview of the research process that was followed to investigate the topic under study. It gives an account of the research design, study place, study population sample size, instrumentation, validity and reliability of the instrument, data collection procedures, data management, data analysis, limitations of the study and ethical considerations.

Research Design

A descriptive cross-sectional design using quantitative method of data collection from the respondents was used. Descriptive design was used because little was known about the social factors that influence waste disposal in Lilongwe City (Polit & Beck, 2013; Lo Biondo-Wood & Haber, 2010). This study design also helped the researcher to describe and document aspects of the topic understudy (Polit & Beck, 2008) by providing an account of the problem, and describing the relationship that exists among the variables (Jolly, 2010; Polit & Beck, 2006). It was cross-sectional since the study involved one-time interaction with the vendors and buyers as respondents.

This study was drawn from a positivist paradigm that proposes that reality can be predicted or objectively studied. As a positivist, the researcher was not engaged with the phenomenon or participants being researched because she believed in value free research so that personal values could not have influence on the results of a study. The study used a

structured questionnaire where close-ended questions were used to collect the data from the vendors and buyers hence the quantitative method.

Study Setting

The study was conducted at Lilongwe Central Market in Lilongwe City. Interviews were conducted at the same market place.



Figure 1: A map of Malawi showing the geographical allocation of Lilongwe District

Retrieved on October 13, 2014 from <http://www.google.co.za/search?q=map+of+Malawi>

Study Population

The study population included some vendors and buyers at Lilongwe Central Market.

Sample Size

This was calculated using a formula for descriptive statistics by Creswell (2009) as follows:

$n = \frac{[Z^2 (p) (1 - p)]}{d^2}$ where:

$n =$ was the sample size

$Z =$ the value of a normally distributed variate which for a 95% confidence interval

take the value of 1.96.

p = the estimated proportion of people who practice improper waste disposal methods such as dumping the waste in open places in urban areas according to a study by Manda (2009) is 21%.

d = desired level of precision or allowable error, which in this study was set at 0.05

n = $[(1.96 \times 1.96) \times 0.21 \times (1 - 0.21)] / (0.05 \times 0.05)$

n = $3.84 \times 0.21 \times 0.79 / 0.0025$

n = 255 participants.

The sample size was 255 participants comprising of 128 vendors and 127 buyers.

There was almost equal numbers of vendors and buyers in this study based on the assumption that both groups contribute to littering in the market.

Sampling Procedure

Systematic random sampling was used to select 255 vendors and buyers. This was done at the gate when they were entering the market. Every third person passing through the entrance was chosen at random and the starting point was randomly selected. This was done to give each vendor/buyer an equal chance of being selected from a list of all vendors or buyers (Ahmed, 2009).

Inclusion criteria was as follows:

- 18 years old or above
- Vendors who have been doing business at the market at least six months prior to the study.
- Buyers who have been purchasing merchandise from Lilongwe market for six months or more.

- Vendors and buyers who were available at Lilongwe market at the time of the data collection.

Exclusion criteria was as follows:

- Sixty five years or above
- Vendors who have been doing business in the market for less than 6 months.
- Buyers who have been purchasing merchandise from Lilongwe Central Market for less than 6 months.

Data Collection Tool (Questionnaire)

A structured questionnaire with close ended questions was used for data collection from each respondent in the same way. This ensures that the respondents give similar information as expected by the researcher (Polit & Beck, 2008). Close ended questions helped to provide direct quantitative unbiased data. A structured questionnaire had close ended questions on type of waste people dispose of, willingness to participate in waste management, attitudes and perception of people towards waste disposal, and type of problems people at the market meet in terms of improper waste disposal.

The questionnaire had five sections namely section A, B, C, D and E (Appendix 1). Section A had questions on demographic data while section B comprised of questions on type of waste that are commonly disposed of in Lilongwe Central Market. Section C had eight (8) dichotomous variables (Yes=1 and No=0) which measured people's willingness to participate in waste disposal management at Lilongwe City Market. The maximum total score for this section was 8. Participants who achieved a self-rated score of 7 out of 8 in this section were considered as having willingness to participate in waste management. Section D comprised of a five point likert scale which assessed participants' attitudes and perceptions on waste

disposal. The likert scale had 21 items with a maximum total score of 105. The scores for items on this scale were as follows: strongly agree = 5, agree = 4, not sure = 3, disagree = 2 and strongly disagree = 1. Participants who got a self-rated score of 85 out of 105 were considered as having positive attitudes and perceptions towards waste management. Items in sections A, D and E were analysed as individual variables.

Pre-test of Data Collection Tool

Data collection tool (structured questionnaire) was pre-tested to vendors and buyers at the Central Market in Lilongwe city. The questionnaire was pre-tested at the same market because the researcher felt that Lilongwe Central Market is unique because it is the biggest market in the city where people from all walks of life meet for shopping or sell their merchandise. Thus, the diversity of potential participants necessitated the conduct of the pre-test in the same market in order to determine whether the questionnaire could capture the data on waste management which the researcher was looking for. Furthermore, it was done in order to identify ambiguous and/or leading questions, estimate completion time and to familiarize with the natural flow of the interview. This was done one week prior to main data collection exercise (Burns and Grooves, 2011). The sample size was three vendors and three buyers. The pre-testing process was done by the researcher for easy identification of problems with the questionnaire. The tool was revised following findings from the pre-test in consultation with the supervisor.

Validity of Data Collection Tool

Validity refers to the ability of the instrument to measure accurately what it is supposed to measure (Burns & Groves, 2007). The questionnaire was considered valid since the instrument was designed with great care matching the questions with the objectives stated

for the study. In order to ensure content validity, a panel of experts including the supervisor and the Civic Officer, In-charge at the market who is an environmental Health officer carefully evaluated the questionnaire and the researcher conducted an extensive literature review especially journal articles and publications addressing the concept of improper waste disposal. The instrument was also pre-tested on six respondents at the Lilongwe Central Market in order to establish whether there was need to amend it. The pretesting of the instrument ensured that the item questions were feasible and worthy to enable the researcher to meet the objectives of the study. After establishing the accuracy and validity of the data collecting instrument it was then put into use.

Reliability of Data Collection Tool

The data-collection tool was reliable because it had accurate and well-phrased questions to avoid ambiguity and leading respondents to a particular answer (Appendix 1) (Joubert & Ehrlich, 2010). For this study, the computed Cronbach's Alpha for the scale which measured willingness to participate in waste management was 0.6. Similarly a scale which measured attitudes and perceptions of people towards waste management had a Cronbach's Alpha of 0.6. These results indicate good stability of the instrument.

Data Collection Procedure

In this study, data was collected using the questionnaire that was developed by the investigator (Appendix 1). Permission was sought from the Chief Executive Officer of Lilongwe City Council before conducting the study. Then, the researcher met the market chairperson who helped the researcher to find a suitable place, where she was able to identify the respondents of the study.

The prospective respondents were identified by the researcher at Lilongwe Central Market from amongst those who met the inclusion criteria. They were approached by the

researcher through a request to participate in the study. An explanation about the details of the study was given to each of the respondents using the local language (Chichewa) before obtaining consent (Appendix 4) for them to participate in the study. Both verbal and written consent was obtained before conducting the interview with the vendors and buyers. The participants that were willing to participate in the research were asked to meet the researcher in a private room, one at a time to ensure privacy and confidentiality. The investigator asked the market chairperson for a convenient room where a comprehensive explanation of the study and the interview was conducted.

Recruitment

Face-to-face interview approach was used to collect data in avoidance of recall bias. This provided the investigator with an opportunity to yield high response rate since the investigator was able to clarify ambiguous questions when appropriate. The interview took approximately 45- 60 minutes. The investigator conducted the interviews guided by the structured questionnaire soon after the vendor or buyer consented to the study. The approach helped the investigator to hold respondent's attention, hence minimized the time of interview and be able to assess respondent's discomfort to a particular question (Polit & Becks, 2013; Leedy & Ormrod, 2010). The questionnaires filled by the respondents were checked for completeness by the researcher before they left the market place.

Data Management

The investigator reviewed the questionnaire for completeness after completing data collection from each respondent. Data in the completed questionnaires was kept in a drawer under lock and key for confidentiality and safety purposes. Questionnaires were coded and kept in sequential order. This helped to check any missing questionnaire. All data was

managed using SPSS Software program version 16.0 and the software package was installed in the investigator laptop which was secured with a secret password. At the end of the study, both the soft copies and hard copies of data were kept secured and will be kept for a period of 5 years at KCN library after which the hard copies will be destroyed by incineration and soft copies will be deleted from the storage device.

Data Analysis

Data was analysed using Statistical Package for Social Science (SPSS) version 16.0 with the assistance of a statistician. Data was analysed in order to summarize, organize, interpret and numerically communicate the collected information (Polit & Beck, 2006). The analysed data were presented in form of tables, charts, percentages, mean and frequencies. Tables facilitate presentation of large amounts of data and graphs gave a clear picture of results with a sense of proportion (Parahoo, 2006). Section C which measured participants' willingness to engage in waste disposal management was treated as a scale and total score for each individual participant was computed. Similarly, total scores achieved by individual participants in Section D were calculated. The relationship between demographic data and participants' willingness to contribute in waste management; attitudes and perceptions of people towards waste disposal; and effects of improper waste disposal were assessed using Chi square and Spearman's rho correlations.

Ethical Consideration

The researcher was granted ethical approval to conduct this study by College of Medicine Research and Ethics Committee (COMREC) (Appendix 6). The researcher made efforts to minimise any form of harm to study participants by following the ethical principles of autonomy, beneficence and non-maleficence. The researcher explained the study to

vendors and buyers and allowed them to ask questions about the study. Those who accepted to participate in the study were asked to give a written consent (Appendix 3).

The researcher explained to the respondents about the purpose and objectives of the study. The explanation also encompassed issues concerning their liberty to refuse participating or withdrawing from the study in the course of the interview. Once the respondent expressed willingness to participate in the study, the investigator asked from the market chairperson for a convenient room where a comprehensive explanation of the study and the interview was to be conducted.

The investigator provided the respondents with an information sheet (Appendix 3) featuring all information about the research process in a clear and concise manner. A consent form (Appendix 3) was given to respondents after giving full explanation and answering their questions clearly. Good rapport was established through face to face interaction with the respondents to minimize anxiety and emotional stress. Respondents were also informed that they have the right to consent voluntarily and free from coercion in order to enhance the respondent's right to self-determination and autonomy (Coughlin et al., 2009). Assurance was made to all respondents that none of them was subjected to any form of punishment or penalty should they choose to refuse or withdraw from the study at any point in time. In the event that the respondent wanted to seek further clarification about the study, she/he was encouraged to consult the investigator or COMREC chairperson through the contacts provided on the information sheet (Appendix 3). The right to confidentiality was observed, as the investigator protected the respondent's identities through assignment of numbers on the questionnaire instead of names.

The interview was conducted in a room convenient to the respondent where the door was closed and completed questionnaires were kept in a locked drawer that was accessible to the researcher only. Each respondent was treated equally with respect and without judgment

or prejudice. The principle of veracity or truth telling (Joubert & Ehrlich, 2010) was inherently important and the investigator truly told the respondents the study purpose and its rationale in order for them to make an informed decision to participate other than being deceitful for the sake of attracting their participation. The investigator was mindful that the interview could bring up some discomfort or embarrassment to the respondents by their failure to answer some of the questions. To avoid such circumstances, the investigator told respondents before the interview that they were free to inform the investigator that they do not know the response to any particular question asked during the interview. Assurance was made that not knowing some of the answers did not have any negative impact to the respondents.

Finally, the investigator also explained the benefit of this study to the respondents, which was to identify significant areas for improvement in waste management by characterizing social factors associated with improper waste disposal.

Conclusion

This chapter has presented a description of the study design, setting, study population, sample size, instrument, strength and limitations of the study. It has also given an overview of the methodology and procedures which were followed and utilized to collect, manage and analyse data for this study. Furthermore, it has highlighted the ethical considerations that were followed to ensure that neither the study respondents nor the researcher were harmed in any way.

CHAPTER FOUR

Findings of the Study

Introduction

This chapter presents the findings of this study. The sample comprised of 128 vendors and 127 buyers who were systematically sampled. Data was collected using a structured questionnaire and results will be presented using descriptive statistics, tables, charts and narrative form.

Sample Realization

The realization of the sample was achieved through face to face recruitment using systematic sampling. A total of 128 vendors and 127 buyers were approached and accepted to participate in the study. Two hundred and fifty five questionnaires were given out to respondents and 255 completed questionnaires were returned. Some respondents (163) were assisted to complete the questionnaire. In total 255 completed questionnaires were returned representing 100% response rate. This response rate was reached because the researcher directly collected all questionnaires from participants immediately they finished completing them.

Demographic Data of Respondents

The results on the following demographic data: sex, group a respondent belongs to (whether vendor or buyer), age, period an individual has been doing business/shopping in the market, occupation, educational level, religion, and tribe will be presented in this section.

Gender of respondents.

The findings of this study indicated that 54.1% (n=138) of the respondents were males while 45.9% (n=117) were females. Furthermore 56% (n=72) of all vendors were males and 52% (n=66) of all buyers were males.

Age of respondents.

The study results indicated that out of 255 respondents, the majority of the respondents (36%, n=92) were in the 36-45 years age bracket (figure 2). It can be observed from Figure 2 that the age of respondents was fairly distributed making it possible for diverse views from both the young and old respondents.

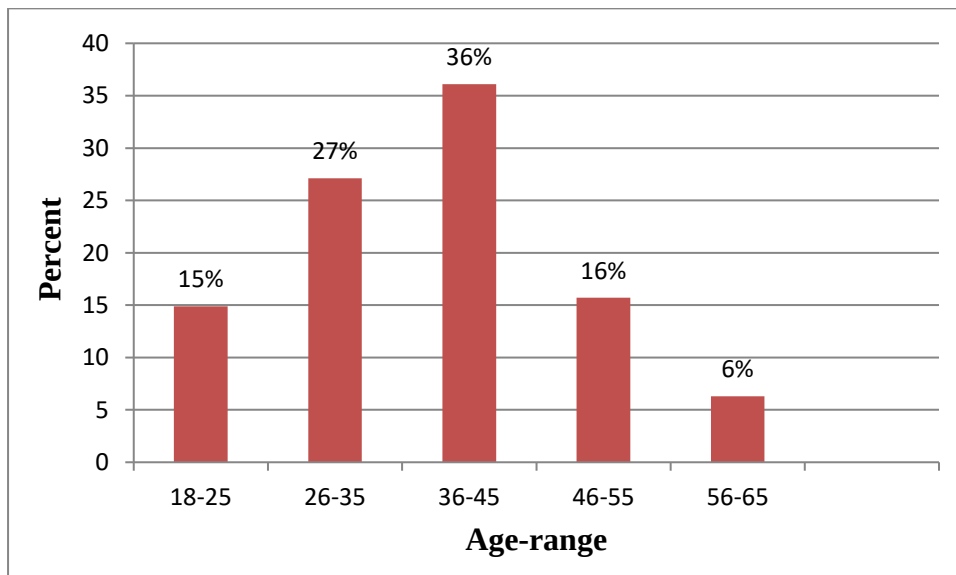


Figure 2: Age of respondents

Period which respondents have been doing business/shopping in the market.

The findings of this study revealed that most of the respondents (64.7%, n=165) have been doing business/shopping in the market for a period of more than 12 months, while 35.3% (n=90) have been doing business/shopping for more than six to 12 months. The results may imply that many of the respondents may be knowledgeable about what goes on around

the market including waste disposal and management because they have been in or around Lilongwe Central Market for some time.

Occupation of respondents.

It was clear from the findings of this study that a large proportion, (58%, n=148) of respondents were business people, followed by those who were not employed (12%, n=31). Eleven percent, (n=29) were professional workers and 8%, (n=20) were skilled workers (Table 1).

Table 1: Table showing occupation of respondents at Lilongwe Central Market

Occupation	n (%)
Business	148 (58)
Farmer	19 (8)
Skilled labourer	20 (8)
Professional	29 (11)
Unemployed	31 (12)
Student	6 (2)
Retired	2 (1)

Education level of respondents.

The findings revealed that most of the respondents (92.9%, n=237) involved in this study attended school and 7.1% (n=18) had no formal education. Among those who has been to school 34.9% (n=89) of the respondents were holders of Malawi School Certificate of Education (MSCE) and 25.9% (n=66) were holders of a Junior Certificate of Education (JCE). Primary School Certificate (PSLC) holders were 17.2% (n=44) while 14.9% (n=38) had either a degree or diploma. The results indicated that most of the respondents had some form of education.

Religion of respondents.

The findings of this study showed that 34% (n=87) of the respondents were affiliated to Church of Central African Presbyterian; 22% (n= 57) were Roman Catholics; 15% (n=38) were of Islamic faith; 9% (n=22) were Seventh Day Adventists and 7% (n=20) belonged to Pentecostal Churches. The rest belonged to various local Churches and none was a pagan (Figure 3).

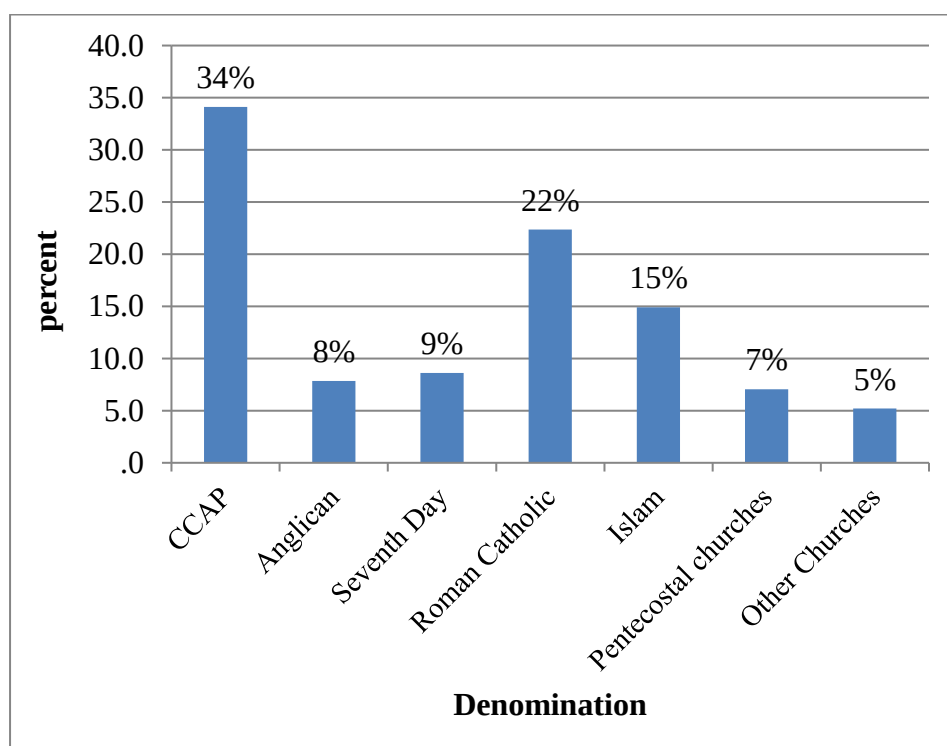


Figure 3: Respondent's denomination

Ethnic groups of respondents.

The respondents in this study belonged to different ethnic groups and the majority 43.1%, n=110 were the Chewa; 14.1%, n=36 were Yawos; and 13.7%, n=35 were the Tumbukas. The rest were as follows: Ngoni (11.4%, n=29), Lomwe (9%, n=23), Tonga (2.7%, n=7), and others were 6% (n=22). The majority were of the Chewa tribe since data was collected in the Central Region where Chewas are a dominant tribe.

Type of Waste Commonly Disposed of at Lilongwe Central Market

The findings of this study revealed that there are various types of waste that are generated around Lilongwe Central Market (Table 2). A greater number of respondents (99.2%, n=253) reported that plastic was the most common waste disposed of while 7.1%, n=18 of respondents reported that old tyres was the least common.

Table 2: Table showing types of waste disposed of at Lilongwe Central Market

Item	Yes	No
	n (%)	n(%)
Food-waste	214(83.9)	41 (16.1)
Paper	212 (83.1)	43 (16.9)
Plastic	253 (99.2)	2 (0.8)
Textiles	191 (74.9)	64 (25.1)
Wood	71 (27.8)	184 (72.2)
Glass	83 (32.5)	172(67.5)
Metal	138 (54.1)	117 (45.9)
Ashes	50 (19.6)	205 (80.4)
Old tires	18 (7.1)	237 (92.9)

Kind of Refuse Disposal Methods Practiced at Lilongwe Central Market

The findings revealed that more than half of the respondents (51.1%, n=130) do not properly dispose of their waste. The findings of this study clearly indicates that most respondents (79.6%, n=203) disposed their waste by the roadsides and major streets, followed by on an open space (71.4%, n=182). Other mentioned methods in this study were dumping waste in drains, gutters and river (79.6%, n=203), burying (31.8%, n=81) and burning

(29.8%, n=76). Some respondents (54.1%, n=138) indicated that they were using bins provided by the government to dispose their waste and a few (38.8%, n=99) were disposing their waste in refuse dump provided by the government. Figure 4 shows a summary of the various methods by which the respondents finally disposed their solid waste at Lilongwe Central Market.

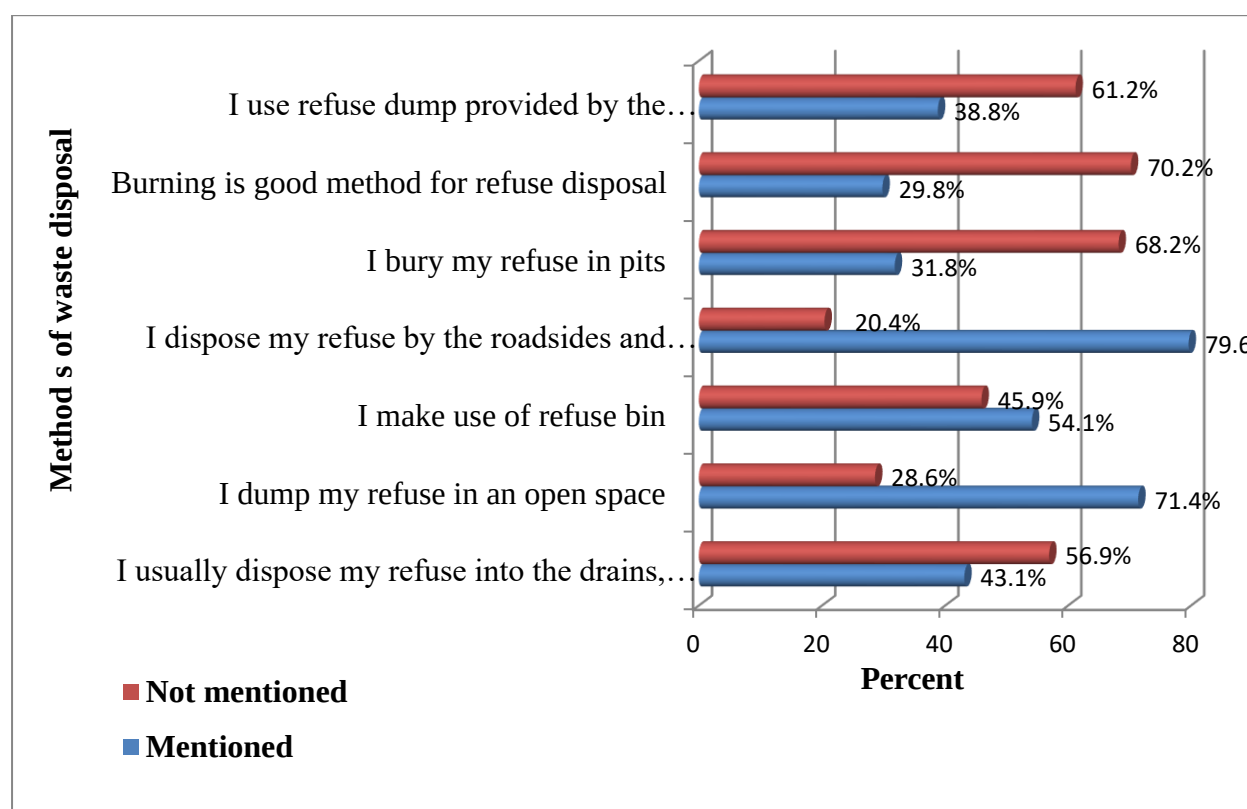


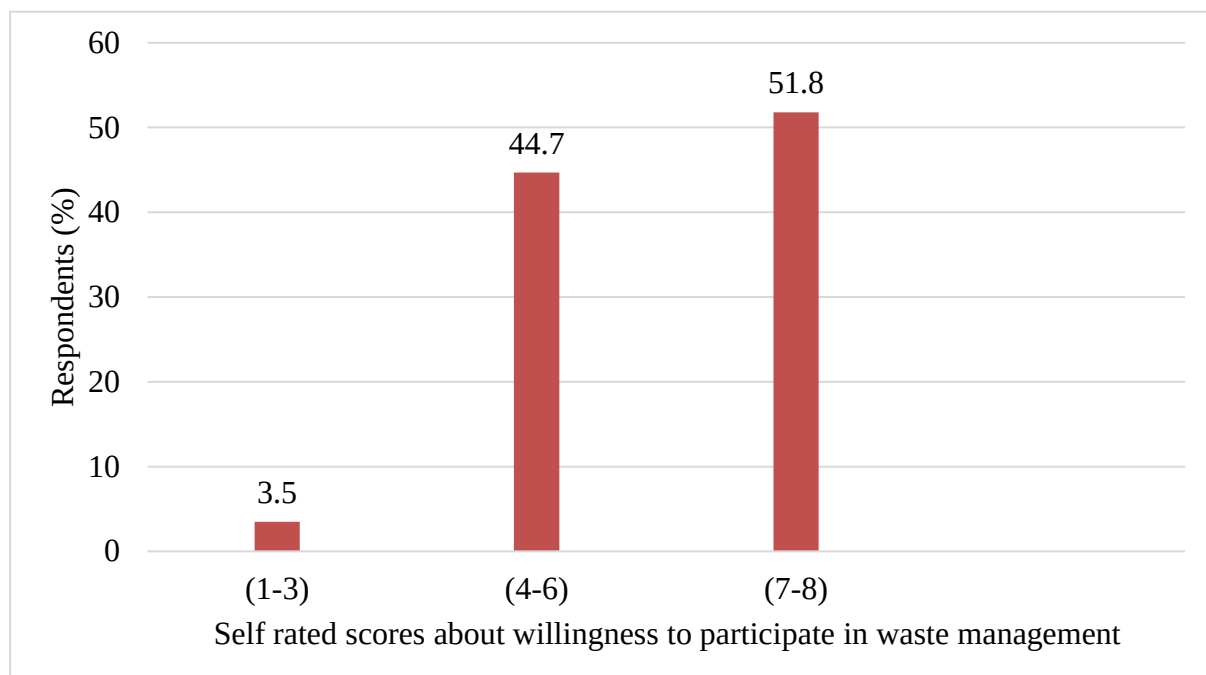
Figure 4: Methods of refuse disposal practiced at Lilongwe central market mentioned by respondents

Willingness to Participate in Waste Management at Lilongwe Central Market

It is evident from the findings of this study that more than half of the respondents (51.8%, n=132) were willing to participate in waste management around Lilongwe Central Market (Figure 5). Many respondents (91.4%, n=233) reported that they were willing to reduce waste at source (Table 3). It was also clear that many respondents (85.1%, n=217) were willing to take part in recycling program. However, it is worrisome that nearly half of the respondents (48.2%, n=123) were unwilling to participate in waste management.

Table 3: Willingness to participate in waste management at Lilongwe central market

Item	Yes	No
	n (%)	n (%)
Willingness to take part in recycling program	217 (85.1)	38 (14.9)
Willingness to participate in composting waste	211 (82.7)	44 (17.3)
Willingness to carry garbage to the skip	178 (69.8)	77 (30.2)
Willingness in maintenance of the skip	133 (52.2)	122 (47.8)
Willingness to throw waste in designated dumping sites	219 (85.9)	36 (14.1)
Willingness to reduce waste at source	233 (91.4)	22 (8.6)

**Figure 5: Willingness to participate in waste management at Lilongwe central market**

Relationship between level of education and willingness to participate in waste disposal

The Chi square test showed that there were no significant differences in willingness to participate in waste management and level of education since all the p values were >.05.

(Table 4).

Table 4: Relationship between level of education and willingness to participate in waste disposal

Statement	χ^2	df	p
I am willing to participate in recycling program	3.545	4	.47
I am willing to participate in a program to compost waste	9.123	4	.06
I am willing to participate to carry garbage to a skiff	1.507	4	.83
I am willing to participate in maintenance of the skiff	7.866	4	.10
I am willing to throw refuse in designated sites	6.134	4	.19
I am willing to reduce waste generation at source	2.960	4	.57

Respondents' Attitude and Perception towards Waste Management at Lilongwe Central Market

The findings of this study showed that many respondents (97.6%, n=249) scored below 85 and this showed that they had negative attitude towards waste management (Figure 6). However, individual responses about their attitudes and perceptions towards waste management varied (Table 6). Results for this study revealed that 84.7% (n=216) of the respondents perceived that waste disposal into drains and around their surroundings is unhealthy and can be disastrous to health. More than half of the respondents (52.5%, n=134) reported that they do not play an important role on garbage management. It was interesting to note that many respondents (65%, n=167) perceived that educating the public on effects of

solid waste helps in raising public awareness about the problem. Furthermore, the findings showed that 69% (n=176) of the respondents felt that recycling laws and programs should be put in place to minimize waste. This may mean that people feel that the government should take a leading role in the issues to do with waste management in the country.

This was also clear when some respondents (80.4%, n=205) expressed concern about the services provided by the garbage truck. In addition, other respondents (63%, n=160) viewed garbage collection as the only solution to waste management. Conversely, some respondents (63%, n=160) indicated that people throw garbage in the major streets, in drains and gullies because they have no other means of getting rid of garbage and other respondents (60.8%, n=155) said that people throw garbage everywhere because it is convenient to do so (Table 5). This may imply that attitudes and perceptions of some people and lack of facilities lead to poor waste management.

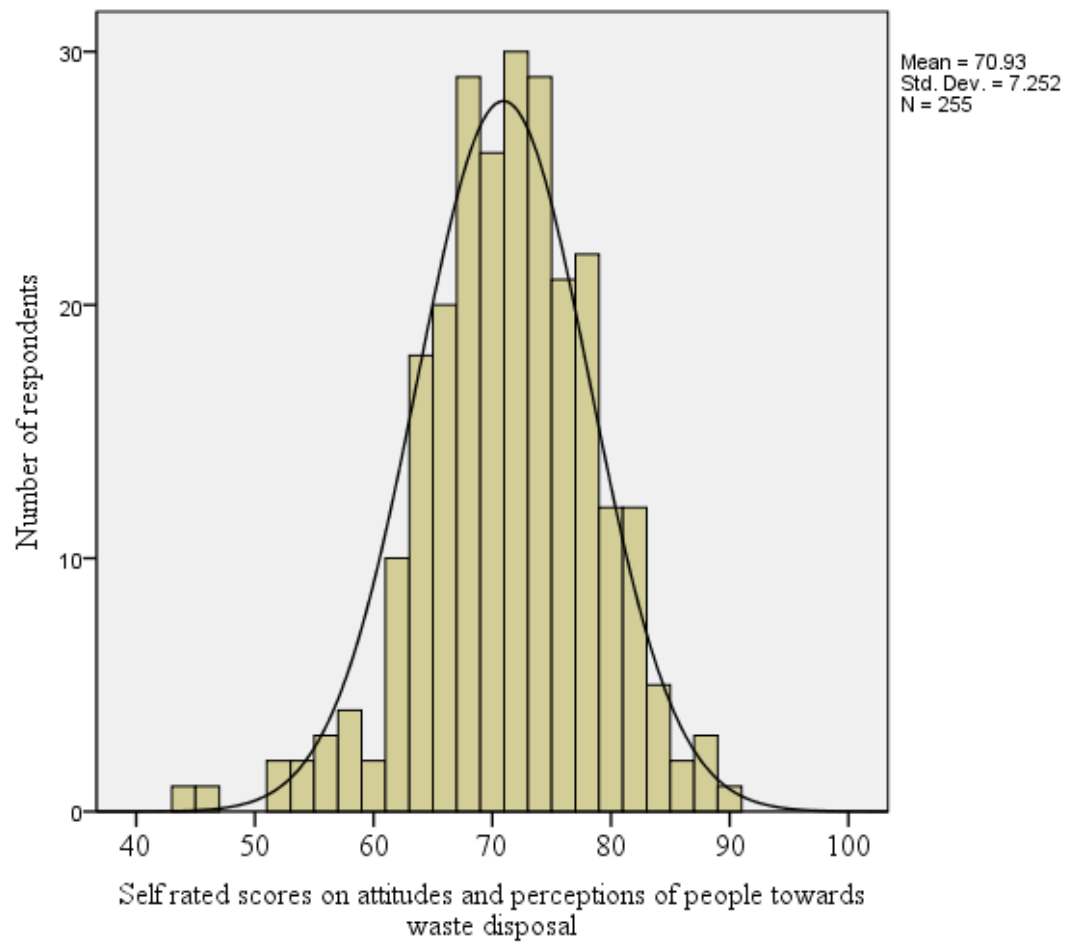


Figure 6: Respondents attitudes and perceptions on waste management

Table 5: Respondents attitudes and perceptions on waste management at Lilongwe central market

Statements	Disagree	Neutral	Agree
	(1,2)	(3)	(4,5)
	n (%)	n (%)	n (%)
Open burning of refuse is a good method of refuse management	204 (80)	26 (10.2)	25 (9.8)
Dumping of refuse in the drains, gutters and open places is not bad	216 (84.7)	17 (6.7)	22 (8.6)
Participating in cleaning of the market surrounding is not necessary	227 (89)	5 (2)	23 (9)
I do not care that burning garbage can be bad for my health and health of others	165 (64.7)	42 (16.5)	48 (18.8)
Picking up garbage around the market is my responsibility as a resident of Lilongwe City	102 (40)	19 (7.5)	154 (52.5)
Correct garbage management should be taught in schools	18 (11)	32 (12.5)	195 (76.5)
Use of refuse bins at the market is a proper way of storing refuse	23 (9)	13 (5)	219 (86)
I am concerned about litter in the market area	22 (8.6)	12 (4.7)	221 (86.7)
I get troubled about flooding due to garbage blocking drains around market	64 (25.1)	71 (27.8)	120 (47.1)
Public education about proper garbage management is one way of fixing the problem improper waste disposal	48 (18.9)	5.7% (40)	167 (65.4)
It is important that local government put recycling laws and programs in place	26 (10.2)	53 (20.8)	176 (69)
Improper refuse disposal can cause occurrence of environment pollution	34 (13)	25 (10)	19 (77)
Improper refuse disposal can cause occurrence of fire and flood disaster	27 (10.6)	14 (5.5)	214 (83.9)
I play an important role in management of garbage at the market	145 (56.9)	16 (6.3)	94 (36.8)
It is the responsibility of the government to collect refuse at the market	94 (37)	24 (9)	137 (54)
People throw garbage on the streets and in the drains and gullies because they have no other means of getting rid of garbage	76 (30)	19 (7)	160 (63)
People throw garbage everywhere because it is convenient to do so	77 (30.2)	23 (9)	155 (60.8)
Regular collection of garbage is the only solution to the garbage problem	72 (28)	23 (9)	160 (63)

Relationship of Demographic Data and Participants Attitudes and Perceptions Towards Waste Management.

Pearson Chi – square test was used to assess the relationship between demographic data and respondents attitudes and perceptions towards waste management. Total scores for each respondent on a scale that measured attitudes and perceptions were computed so that they can be treated as continuous variables. There were no significant differences between demographic data and respondents attitudes and perceptions towards waste management, $p \geq 0.05$. (Table 6).

Table 6: Relationship of demographic data and participants attitudes and perceptions towards waste management.

	Demographic Data	Attitudes and perceptions on waste management		
		χ^2	df	p
1	Age	59.408	70	.81
2	Being a vendor or Buyer	39.789	35	.275
3	Education	141.447	140	.45
4	Occupation	176.805	210	.95
5	Religion	291.283	315	.83

Ways Used in the Reduction of Waste by Respondents at Lilongwe Central Market

The findings of this study revealed that respondents know various ways for waste reduction. Majority of the respondents (89.8%, n=229) reported composting as one way of waste reduction while 64.3% (n=164) of the respondents felt that recycling could be one of

the waste reduction methods. More than half of the respondents (58%, n=148) indicated the use of paper bags instead of plastics bags as a way to reduce waste and 12.5% (n=32) of the study respondents reported that one of the ways of reducing waste was by purchasing enough items for use. This shows that respondents are knowledgeable about waste management measures that are essential in reduction of waste.

Ways to Improve Management of Garbage at Lilongwe Central Market

The respondents indicated that there are various ways for improving management of garbage at Lilongwe Central Market (Figure 7). For instance, the majority of the respondents (84.3%, n=215) wanted the City Council to put enough trashcans to improve on waste management while 58.8% (n=150) of the respondents were of the opinion that individuals should be responsible for cleaning their own surroundings. This may mean that the situation may improve at the market if such measures are put in place.

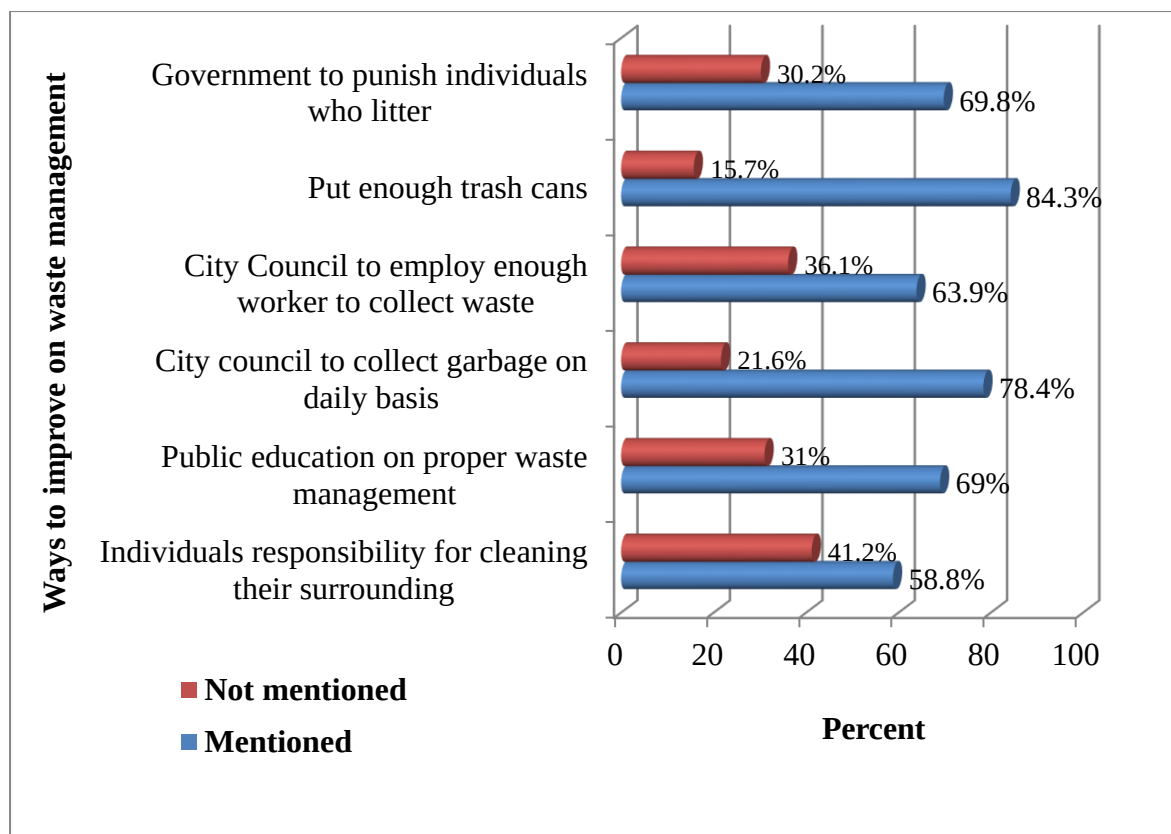


Figure 7: Ways to improve management of garbage at Lilongwe Central Market mentioned by respondents

Effects of Improper Waste Disposal at Lilongwe Central Market

The findings of this study indicated that many respondents were aware of the effects of poor waste management in the market (Figure 8). The study results showed that 98.4% (n=251) of the respondents felt that improper waste disposal can cause diseases while 1.6% (n=4) did not. Furthermore, 96.4% (n=245) respondents indicated that improper refuse disposal can cause fire and floods. The findings also revealed that some respondents (30.6%, n=78) perceived that cleaning up waste costs a lot of money. The summary of the effects of improper waste disposal have been presented in figure 8.

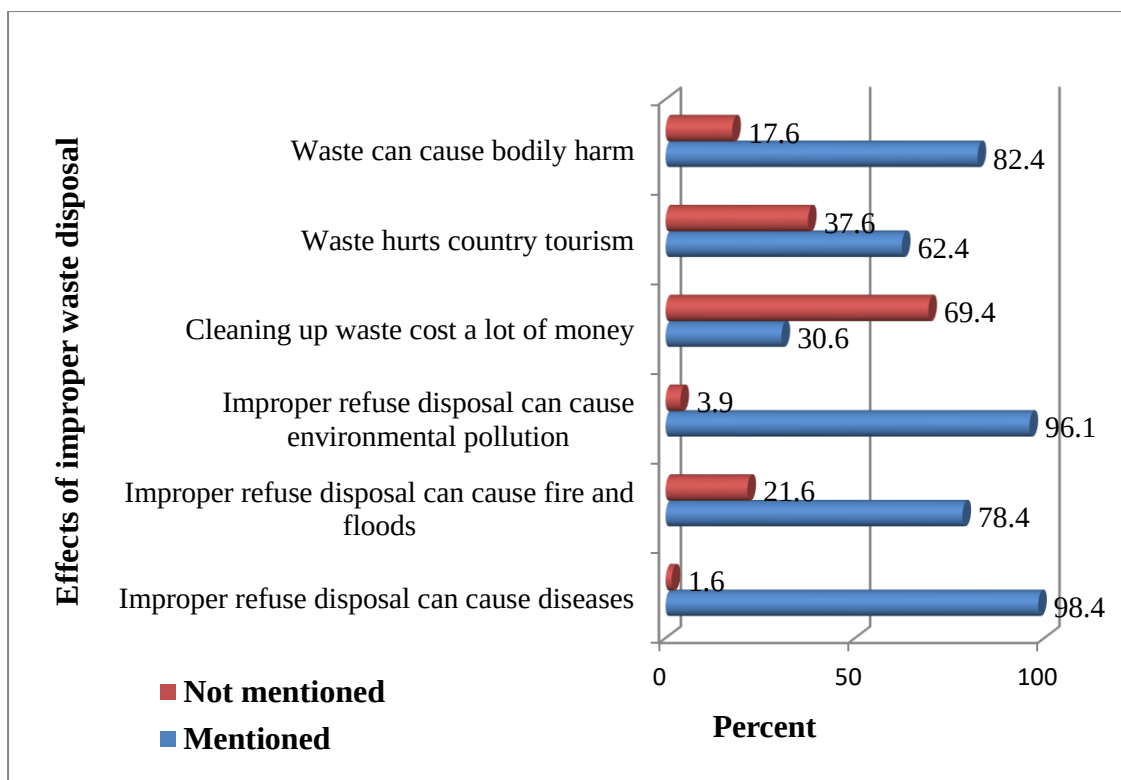


Figure 8: Effects of improper waste disposal at Lilongwe Central Market mentioned by respondents

Health Problems Resulting From Improper Waste Disposal at Lilongwe Central Market Mentioned by Respondents

The findings of this study indicated that the majority of the respondents (98%, n=250) reported that diarrhoea was one of the health problems that can result from improper waste disposal (Figure 9). In addition, some respondents (50.6%, n=129) indicated that malaria can also result from improper waste disposal. This shows that some people are aware of some health problems that arise due to poor waste disposal.

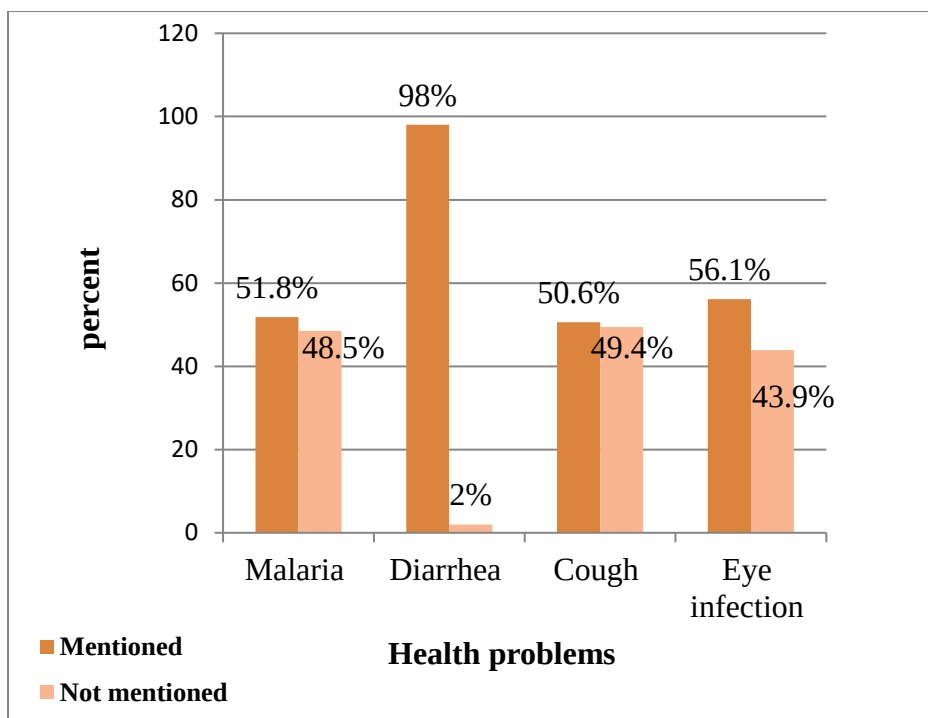


Figure 9: Health problems resulting from improper waste disposal at Lilongwe central market mentioned by respondents

Conclusion

This chapter presented the findings of this study in form of tables, graphs and narratives. A discussion of these findings will be discussed in chapter five.

CHAPTER FIVE

Discussion

Introduction

This chapter presents a discussion of the findings of a study whose purpose was to explore the social factors associated with improper waste disposal at Lilongwe Central Market in Lilongwe City. The discussion will be based on objectives of this study. The section will also present interpretation of results of this study and their implications on practice. This discussion will focus on: demographic data; types of waste disposed of, type of waste disposal practices; willingness to participate in waste management; attitudes and perception towards waste disposal and effects of improper waste disposal. Strengths and limitations of the study; recommendations and conclusion have also been presented in this chapter.

Demographic Data

Gender of respondents.

In this study there were slightly more men (54.1%) than females (45.9%) who participated. This can be attributed to the fact that men are generally the ones who go out for businesses or employment so that they can support their families in Malawi (National Statistics Office (NSO), 2011). There is evidence that there are fewer women than men who are involved in business in southern Africa (Bosma & Levie, 2009; Langowitz & Minniti, 2007). Nonetheless both men and women should take part in waste management although women have greater concern about the environment than men (Mengistie and Baraki, 2010). As such, it can be implied that women can take a leading role together with men in managing waste at Lilongwe Central Market.

Age of respondents.

Most respondents (85%) of this study were over 26 years of age. This shows that most people who sell or buy merchandise at Lilongwe city Market are matured enough to make independent decisions about issues affecting their own life. It is apparent that age influences individual's participation and decision making towards the attainment of sustainable waste management activities because adults who are mature enough can know where to dispose waste (Ehramposh & Moghadam, 2005).

Period which respondents have been doing business/shopping in the market.

More than half of respondents (64.7%) in this study had more than a year of doing business or shopping at Lilongwe Central Market. This may mean that the majority of the respondents were exposed to a variety of experiences in waste disposal and management practices at the market. Sufficient experience provides information that would lead to valid judgments about the phenomenon under study (Ombis, Vliet & Moi, 2009). There is a need for City Council Officials to involve vendors and buyers to work together on waste management because they both have their own experiences regarding this issue. This can help them to come up with effective solutions for managing waste at Lilongwe Central market.

Occupation of respondents.

This study indicate that a large proportion of respondents (58%) were business people while others were unemployed (12%) or professional and skilled workers (19%). It is clear that many individuals who were found at the market had an occupation of some kind. Those without any business and unemployed could also be taken as a resource by harnessing there idle energy to become champions in waste management at the market.

Education level of respondents.

It is clear that almost all the respondents (92.9%) in this study had some form of education. This is supported by NSO, (2011) which stated that over 85% of the population in Malawi had some level of education which makes people to be more receptive to health care messages. It is documented that most people who are educated are able to demonstrate adequate knowledge on waste management (Worlanyo, 2013). Conversely, it is apparent that those without formal education may have negative perceptions and attitudes towards waste management services (Longe et al., 2009).

Religion of respondents.

The study shows that most respondent (91%) were Christians and a few (9%) were Muslims. According to NSO (2011), majority of people in Malawi (85%) are Christians. However, religion did not have any significant effect on waste management in this study.

Ethnic groups of respondents.

The respondents in this study belonged to different ethnic groups and the majority (43.1%, n=110) were the Chewa. This may be attributed to the fact that Chewa is a dominant tribe in the Central Region of Malawi and it is the largest ethnic group in Malawi (NSO, 2011). Nonetheless, ethnicity had no effect on waste management in this study. These results are consistent with Momoh and Oladebeye (2010) who found that a community where an individual comes from had no effect on waste management.

Types of waste disposed of at Lilongwe Central Market

The study revealed that plastic (99.2%, n=253) is the most common waste that is generated at Lilongwe Central Market. The huge amount of plastic waste generated can be attributed to the fact that many goods sold at the market are wrapped in plastic carrier bags made of a very thin plastic (Edema, 2012; Regassa, et al., 2010). This is corroborated by

Mutha, Patel and Premnath (2006) who found that dependence on packaging made India to experience an influx of plastic waste such as polythene bags which could not easily decompose. Therefore, there is need for the government to come up with mechanisms on how plastic bags can be managed so that the amount of waste at Lilongwe Central Market can be reduced. Recycling is an alternative waste management solution for sustainable and environmental friendly waste management system for non-biodegradable waste such as plastic bags (Mutha, Patel & Premnath, 2006). It was encouraging that many respondents (85%) in this study indicated that they were willing to take part in recycling of waste.

Food-waste was reported as the second most commonly disposed waste (83.9%, n=214) at Lilongwe City Market. This is supported by Nabegu (2010) who found that the most commonly disposed waste was biodegradable food-waste in Kanu, Nigeria. Similarly, there is evidence that people generate more organic waste than plastics (Sharma et al., 2013; Ssemwanga, 2006). Organic waste is easily decomposed and can be effectively managed through composting. In South Africa food-waste compost is used to produce methane gas which is used to generate electricity (Notten, Rentel & Rambaran, 2014). Compost can also be used as fertilizer in the garden. This shows that Malawi can benefit from the organic waste if composting can be adopted as a method for waste management at Lilongwe Central Market because it has the potential for generating income for cities and people through the re-use of waste for purposes of energy generation and agriculture. However, the benefits from organic wastes have not been exploited because of the inadequate waste management strategies which are in place at the market. As a result organic wastes pose an alarming public health problem to the residents of Lilongwe City. Therefore, there is a need for the Government to put in place effective and sustainable waste management strategies such as composting.

Methods of waste disposal practiced at Lilongwe Central Market

In this study many respondents (79.6%, n=203) indicated that they dispose wastes they generate by the roadsides and streets. It is of public health concern that less than half of the respondents (38.8%, n=99) reported that they dispose waste in designated refuse dumps provided by the government. This is supported by previous studies which found that many people in developing countries dump their waste in unauthorized sites such as gutters, drains, roadside and major streets (Banjo, Adebambo & Dairo, 2009; Manda, 2009; Momoh & Oladebeye, 2010; Musademba et al., 2010; Sichaaaza, 2009). This practice could be attributed to lack of awareness about effective methods of solid waste disposal as well as the effects of improper waste disposal on human beings. Therefore, city council and other stakeholders should make efforts in increasing public awareness about waste management and establish effective and sustainable waste collection and disposal options at the market. In Sri-Lanka the municipalities collected 56% of the households wastes (Bandara & Hettiarachchi, 2010). This is possible if people are using recommended ways of waste disposal such as bins, skips (Sharma et al., 2013) recycling and composting (Njeroge et al., 2013). Therefore, there is need for government to provide and increase resources for waste management such as bins and skips around Lilongwe Central Market to reduce the incidences of littering.

The indiscriminate dumping of waste which was reported by respondents in this study may result in heaping of wastes which makes the environment filthy and further aggravate littering in the area. Furthermore, it may aid in the spreading of diseases and pollution of the environment. This is supported by Makwara and Magudu (2013) who asserted that cholera epidemic of 2008 in Zimbabwe was due to the collapse of waste management system in the country. Similarly, open dumping of MSW was associated with environmental problems such presence of vermin which caused poor health and ground water contamination in Ethiopia (Tadesse et al., 2008). This implies that the possibility of outbreak

of communicable diseases such as cholera and other environmental related diseases will be high if people dispose of waste anyhow.

Willingness to participate in waste management at Lilongwe Central Market

In this study, it was revealed that many respondents (85.1%, n=217) were willing to take part in recycling program. This is an indication that people at Lilongwe Central Market are ready to participate in waste management and re-use waste as a useful resource for energy or manure. It is evident that many people are willing to participate in solid waste recycling programmes for the better management of waste (Kumar & Nandini, 2013; Momoh & Oladebeye, 2010). Government should make adequate provision for recycling facilities and infrastructure in order to reduce potential barriers to recycling so that more people can willingly take part in recycling of waste. Evidence has shown that, increasing the ease of recycling is one of the most effective methods of increasing participation in recycling (Clay, 2005). Conversely, it is clear that some respondents (63.3%) in a study in Jordan did not want to participate in waste management and thought that recycling was the responsibility of municipality (Alijaradin, Persson & Hossam, 2011). One can argue that people with such views may not be committed adhering or promoting waste management endeavours which might be put in place by authorities.

It was clear from findings of this study that most respondents (82.7%, n=211) were also willing to participate in composting programme apart from recycling. This is similar to Post (2010) who found that 86% of the respondents were willing to participate in composting programme in Jamaica. Therefore, there is the need for City Council to capitalise on the people's willingness to compost waste by introducing composting as a method of managing waste and provide the necessary resources at the market. It is evident that composting contribute significantly to reduction of waste (Njorege et al., 2013).

The Chi square test showed that there were no significant differences between willingness to participate in waste management and level of education since all the p values were $>.05$. Therefore, this implied that there was no association between education and willingness to participate in waste management. Participants who had high education and those who had low education were all willing to take part on issues concerning waste management.

Attitudes and perceptions towards waste management of respondents at Lilongwe Central Market

The findings of this study showed variations in respondents' attitudes and perceptions on waste management. Many respondents (84.7%, $n=216$) perceived that disposal of waste into drains; gutters, major streets and open spaces can cause ill-health. This gives an indication that many respondents knew the dangers of disposing waste anyhow. In agreement are Adeyemo, Oyadiran and Afemikhe (2013) who found that people in Nigeria knew that improper waste disposal was disastrous to their health although most of them do not take part in waste management because they feel it is government's responsibility. This may be implied as one of the reasons which makes some people not take part in managing waste at Lilongwe Central Market. It is clear that people believe that it is the responsibility of the city council to keep the environment clean (Adeyemo et al. 2013; Sichaaza 2009). Therefore, there is a need for authorities to increase community awareness on their involvement in waste management through Information, Education and Communication (IEC). Awareness campaigns help in imparting knowledge and encourage a sense of responsibility in people concerning their participation in waste management (Desa, Kadir & Yusoooff, 2010). In this study some respondents (65%, $n=167$) perceived that educating the public on effects of solid waste may help in raising public awareness about the problem. There is need for public

education and awareness on effects of indiscriminate disposal of waste in order to reduce waste (Abdulai, 2011).

Many respondents (80.4%, n=205) in this study were concerned about the services provided by the garbage truck. They felt that regular collection of garbage was the only solution to the garbage problem. This shows that people are somehow not satisfied with the services offered by city council with regard to some aspects of waste management. It is necessary that city authorities should pay attention to problems arising from the management of SW (Rahman et al., 2005) so that many people can be motivated to participate. This calls for multi-sectoral approach to waste management because the city council cannot have sufficient capacity to collect and dispose of all the waste produced in the city on its own.

This study found that more than half of the respondents (63%, n=160) indicated that people throw garbage along major streets, in drains and gullies because they have no other means of getting rid of garbage such as adequate number of bins. It is worrisome that other respondents (60.8%, n=155) reported that people throw garbage everywhere because it is convenient to do so. Social factors leading to improper waste disposal include lack of bins, convenience and uncertainty of where to dispose of waste (Robinson, Kerr, Finley, Lightfoot & Riker 2012). This may imply that attitudes and perceptions of some people and lack of facilities such as bins may be attributed to poor waste management at Lilongwe Central Market.

Effects of improper waste management at Lilongwe Central Market

This study revealed that respondents were aware of the adverse effects of improper waste handling and disposal prevalent at the Lilongwe Central Market. Majority of the respondents (98.4%) felt that improper waste disposal could cause occurrence of diseases in the market such as malaria, diarrhoea, respiratory and eye infections. In agreement is Joshua (2013) who found that respondents had knowledge of specific diseases which spread as a

result of poor waste disposal in Nigeria. This is corroborated by Adeyemo et al. (2013) who asserted that improper refuse disposal can cause occurrence of disease. As such it can be logical to say that poor waste management can cause disease everywhere in the world and Lilongwe City is not an exception. These wastes serve as breeding grounds for vermin such as houseflies, mosquitoes and rodents.

Almost all respondents in this study (96.1%, n=245) also indicated that improper waste disposal can cause environmental pollution. For instance, improper waste management can sometimes cause methane emission which can pollute water (Bandara & Hettiaratchi 2010). There is evidence that both surface and ground water in some urban areas of Malawi where indiscriminate disposal of waste is practiced have high levels of faecal coliforms and faecal streptococci (Hove, 2011). These are typical examples of consequences which might follow if waste management at Lilongwe Central Market will remain inadequate. Another negative effect of poor waste management is odour (Sharma et al., 2013) which is a nuisance that may increasingly disturb individuals from living comfortably in the community. Therefore, there is need for proper waste management at the market in order to avoid environmental degradation, multiplication of vermin and spread of diseases.

Strengths of the Study

A strength of the study was that its design made it possible for the researcher to collect data at one point in time without causing much inconvenience to participants. Another strength was that the findings from this study may be generalised to other settings since it used a large enough random sample of 255.

Limitations of the Study

A limitation of the study was that it used a self-reporting questionnaire to collect data. Respondents might have been tempted to present themselves in a more favourable way in

their responses. Also, the study failed to establish the issues underpinning the social factors associated with improper waste disposal since the tool collected quantitative data only.

Recommendations

The following are the recommendations based on the findings of the study:

Education

There is a need for public health education on issues concerning waste management such as the dangers of indiscriminate waste disposal in the communities. The media can also play a major role in civic education of the general public on their role in waste management.

Practice

Health workers and other stake holders must take a leading role in promoting effective waste management. This can be done through public awareness campaigns and government should provide all the necessary human and material resources such as placement of bins in strategic places for effective and sustainable waste management.

Policy

Government should reinforce legislations and implement policies which govern effective waste management in the cities and other parts of the country. This will need a multisectoral approach among government departments, traditional leaders, non-governmental organisations and the public.

Research

Further qualitative research needs to be undertaken to uncover the complexities underlying the social factors associated with improper waste disposal in order to have an in-depth understanding of the subject matter.

Conclusion

In conclusion, the results of this study indicated that the commonly disposed wastes are plastic and food-waste which can be recycled and composted. However, people used un-recommended methods to dispose waste at the market because of unavailability of waste bins. The results of the study also identified key social factors associated with improper waste disposal, such as uncertainty of how and where to dispose of waste, inconvenient waste disposal places, and lack of responsibility by vendors and buyers towards waste management. The study revealed that people knew the health and environment implications caused by improper waste disposal such as communicable diseases. Therefore, it is essential that the people in the community be educated on proper waste management in order to prevent health and environmental problems in the community. However, people indicated willingness to take part in waste management of which can help in waste reduction in the community. The respondents suggested ways for improving the situation in the market such as putting enough trashcans and government to punish individuals who litter.

It is clear that there is a big gap in expectations. The city council expect people to take part in waste management and meet the waste collection and disposal service midway; while people expect the council to pick up waste from their places. Once that gap is filled the problem of waste management could easily disappear. This need attention because if nothing is done immediately, the more time passes, the more complicated the solid waste management problem will get. However, there are no doubts that solid waste management would continue to be a challenge in the city council, as long as the population continues to thrive.

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Appendices

APPENDIX 1

Questionnaire (English)

Participant Number.....

CODE.....

Section A: DEMOGRAPHIC DATA			
	Question	Answer code	Comment
A1	Sex of the respondent.	M ----- 1	(Observe and record)
		F ----- 2	
A2	Which group do you belong to?	Vendor-----1 Buyer-----2	
A3	What is your age?	18-25-----1	Circle that apply
		26-35-----2	
		36-45-----3	
		46-55-----4	
		55-65-----5	
A4	How long have you being doing business/shopping in this market?	>6 months-----1	
		6-12months-----2	
		>12 months-----3	
A5	What is your occupation?	Business-----1	
		Farmer-----2	
		Skilled Laborer-----3	
		Professional-----4	
		Unemployed-----5	
		Others (specify-----6	
A6	What is your highest educational level	No formal education-1	
		PSLC-----2	
		JCE-----3	
		MSCE-----4	
		Other-----5	
A7	What type of denomination do you belong to?	CCAP-----1	
		Anglican-----2	
		Seventh Day-----3	
		Roman Catholic-----4	
		Pagan -----5	
A7	Which tribe do you belong to?	Chewa-----1	
		Tumbuka-----2	

		Lomwe-----3	
		Ngoni-----4	
		Other-----5	

Section B: Types of waste			
	Question	Answer Code	Comment
B1	What are the types of waste commonly disposed in this market?	Food waste-----1	Circle all that apply
		Paper-----2	
		Plastic -----3	
		Textiles-----4	
		Wood -----5	
		Glass-----6	
		Metals-----7	
		Other Specify-----8	
B2	What kind of Refuse Disposal methods are practiced by the People at Lilongwe central market?	I usually dispose my refuse into the drains, gutters and river-----1	Circle all that apply
		I dump my refuse in an open space-----2	
		I make use of refuse bin-----3	
		I dispose my refuse by the roadsides and major streets-4	
		I bury my refuse in pits-----5	
		Burning is good method for refuse disposal-----6	
		I use refuse dump provided by the government only--7	
		Other (specify)-----8	
Section C: Willingness to participate in waste management			
C1	Have you ever heard about composting	Yes-----1	Circle that apply
		No-----2	
C2	Have you ever heard about recycling?	Yes-----1	
		No-----2	
C3	If recycling program was set up that collected materials like plastic paper, metals, etc, would you be willing to separate these into bags for the collection purposes	Yes-----1 No-----2	

C4	Would you be willing to participate in a program to compost waste	Yes-----1 No-----2	
C5	If a skiff was located at the market would you be willing to carry garbage to it	Yes-----1 No-----2	
C6	Would you be willing to participate in the maintenance of this skiff	Yes-----1 No-----2	
C7	I am willing to throw refuse in designated dumping sites around the market	Yes-----1 No-----2	
C8	I am willing to reduce waste generation at source	Yes-----1 No-----2	

Section D: Attitudes and perceptions of people towards waste disposal.						
To what extent do you agree with the following statements? Tick number that apply on each statement: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree.						
		1	2	3	4	5
D1	Open burning of refuse is a good method of refuse management.					
D2	I play an important role in the management of garbage at the market					
D3	Dumping of refuse in the drains, gutters and open places is not bad					
D4	Participating in cleaning of the surrounding is not necessary					
D5	It is the responsibility of the government to collect refuse at the market.					
D6	Improper refuse disposal can cause occurrence of environmental pollution.					
D7	Use of refuse bins at the market is a proper way of storing refuse					
D8	I do not care that burning garbage can be bad for my health and health of others					
D9	People throw garbage on the streets and in the drains and gullies because they have no other means of getting rid of garbage					
D10	People throw garbage everywhere because it is convenient to do so					
D11	Correct garbage management					

	should be taught in schools					
D12	I am concerned about litter in the market area					
D13	Regular collection of garbage is the only solution to the garbage problem					
D14	I get troubled about flooding due to garbage blocking drains around market					
D15	Picking up garbage around the market is my responsibility as a resident of Lilongwe City					
D16	Public education about proper garbage management is one way to fix the problem of improper disposal					
D17	It is important that Local Government put recycling laws and programs in place					
D18	I feel concerned about the service provided by the garbage truck at the market					
D19	I am worried about improper dumps polluting rivers, streams and other water bodies					
D20	I feel concerned about diseases that are related to improper waste disposal methods					
D21	Improper refuse disposal can cause occurrence of fire and flood disaster					
D22	What do you think are the better ways of reducing the amount of waste generated?	Recycle/reuse-----1				
		Composting-----2				
		Use of paper bags instead of plastics bags-----3				
		Others (specify)-----4				
D23	What are the ways which can be used to improve on management of garbage at the market?	Individual to be responsible to clean their surrounding---1				
		Public to be educated on proper waste management--2				
		City council to collect				

		garbage on daily basis-----3	
		City council to employ enough workers for waste collection-----4	
		There should enough trash cans-----5	
		Government to punish individuals who litter-----6	
		Other (specify)-----7	

Section E: Effects of improper waste disposal at the market

E1	What are the effects of improper waste disposal?	Improper refuse disposal can cause occurrence of disease-1	Circle that apply
		Improper refuse disposal can cause occurrence of fire and flood disaster-----2	
		Improper refuse disposal can cause occurrence of environmental pollution such as odor-----3	
		Cleaning up waste cost a lot of money-----4	
		Waste hurts country tourism-----5	
		Waste can cause bodily harm to you-----6	
E2	What are the health problems resulting from improper waste disposal at the central market?	Malaria-----1	
		Diarrhea-----2	
		Cough-----3	
		Eye infection-----4	
		Other-----5	

Thank you very much for accepting my request to participate in this study and spending your precious time to answer questions.

Appendix 2

Questionnaire (Chichewa)

Nambala ya Wopanga nawo kafukufuku Kodi.....

Section A: Mbiri Yamunthu			
	Funso	Yankho	Ndemanga
A1	Woyankha Mafunso ngotani	Mamuna ----- 1	(Yang'anani)
		Mkazi----- 2	
A2	Kodi chakufikitsani munsika muno ndi chani?	Kugulitsa malonda----- 1 Kugula malonda----- 2	
A3	Kodi muli ndi zaka ngati?	18-25-----1	Zunguzani yankho loyenera
		26-35-----2	
		36-45-----3	
		46-55-----4	
		55-65-----5	
A4	Kodi muno mu konsolo ya Lilongwe mwakhalamo zaka ngati (wogulitsa/wogula)?	> miyezi isanu ndi umodzi-1	
		Miyezi isanu ndi iwiri mpaka chaka ----- 2	
		> Chaka-----3	
A5	Kodi mumagwira ntchito yanji?	Businesi-----1	
		Mlimi----- 2	
		Ntchito za manja----- 3	
		Pulofeshoni----- 4	
		Sindigwira ntchito----- 5	
		Ntchito zina----- 6	
A6	Kodi Munafika pati ndi maphunziro anu?	Sindinaphunzire-----1	
		Pulayimale----- 2	
		JCE-----3	
		MSCE-----4	
		Ena -----5	
A7	Kodi muli chipembezo chanji?	CCAP-----1	
		Angilikani-----2	
		Seventh Day-----3	
		Katolika-----4	
		Chisilamu -----5	
		Mipingo ina-----6	
A8	Kodi mumaziwika ndi mtundu	Chewa-----1	

	wanji?	Tumbuka-----2	
		Lomwe-----3	

A8	Kodi mumaziwika ndi mtundu wanji?	Chewa-----1	
		Tumbuka-----2	
		Lomwe-----3	
		Ngoni-----4	
		Mitundu yina-----5	

Gawo lachiwiri: Zinyalala zomwe zimatayidwa munsika			
	Funso	Yankho	Zowonjezerapo
B1	Kodi ndi zinyala ziti zomwe anthu amakonda kutaya mumsika wa ukulu wa Lilongwe?	Chakudya chotsala-----1	Zunguzani Yankho mukugwirizana nalo
		Mapepala-----2	
		Zinthu za Pulasitiki-----3	
		Zigamba-----4	
		Zankhuni-----5	
		Magalasi-----6	
		Zachizitsulo-----7	
		Zinyalala za Mitundu ina---8	
B2	Kodi zinyalala mumataya kuti mumsika muno?	Nthawi zambiri ndimataya zinyalala mumu ngalande, zidikha ndi mnsinje-----1	Zunguzani malo amene mukugwiriza na nawo
		Ndimataya zinyalala malo owonekera/paliponse---2	
		Ndimataya muchigoba chotayira zinyalala-----3	
		Ndimataya zinyalala munjira komanso mumisewo yaikulu ya mnzinda-----4	
		Ndimakwilira zinyalala muzenje-----5	
		Kuotcha zinyalala ndinjira yabwino-----6	
		Ndimakataya zinyalala mumalo omwe anayikidwa ndi boma-----7	
		Malo ena-----8	

	Gawo la chitatu: Kutengapo mbali pa nkhani yakatayidwe kazinyalala		
C1	Kodi munamvapo Zopanga manyowa kuchokera kuzinyalala	Inde-----1	
		Ayi-----0	
C2	Kodi munamvapo zogwiritsanso zinyalala	Inde-----1	
		Ayi-----0	
C3	Patakhala dongosolo yogwiritsanso ntchito zinyalala monga za Pulasitiki, mapepala ndi zina, kodi inuyo mungatengepo mbali yosanthulira mumatumba kuti zingwiritsidwenso ntchito?	Inde-----1	
		Ayi-----0	
C4	Kodi mungatengepo mbali mudongosolo lopanga manyowa kuchokera ku zinyalala?	Inde-----1	
		Ayi-----0	
C5	Kodi chigoba chazinyalala chitayikidwa munsika muno mungatengepo mbali yokataya zinyalala muchigobachi?	Inde-----1	
		Ayi-----0	
C6	Kodi mungatengepo mbali mwakufuna kwanu posamalira chigobachi?	Inde-----1	
		Ayi-----0	
C7	Ndili okonzeka kutengapo mbali mwakufuna kwanga kutaya zinyalala kumalo ovomerezeka munsika muno?	Inde-----1	
		Ayi-----0	
C8	Ndili okonzeka kuchepetsa zinyalala kuchokera malo zapangikira	Inde-----1	
		Ayi-----0	

Gawo lachinayi: Chikhalidwe ndi Maganizidwe a anthu pa nkhani yakatayidwe ka zinyalala mu msika

Kodi mukugwirizana nawo motani mayankho awa. Chongani yankho lomwe mwagwirizana nalo motere: 1= sindikugwirizana nazo mpang'ono ponse, 2= sindikugwirizana nazo, 3= Ndiripakati-kati, 4= ndikugwirizana nazo, ndipo

5=ndikugwirizana Nazo kwambiri.						
		1	2	3	4	5
D1	Kutaya zinyalala paliponse/poyerayera ndi njira ya bwino ya katayidwe ka zinyalala					
D2	Ndimatengatepo mbali posamala zinyalala.					
D3	Kutaya zinyalala mu ngalande, makwalala ndi malo wonekera ndi njira yabwino yosamalira zinyalala					
D4	Kutenga mbali posamalira malo ozungulira sikofunikira.					
D5	Ndiudindo wa boma Kutolera zinyalala munsika					
D6	Kutaya zinyalala mosayenera kukhoza kudzetsa vuto loononga chilengedwe.					
D7	Kugwiritsa ntchito zigoba zotayamo zinyalala munsika ndi njira loyenera yosungira zinyalala					
D8	Sindisamalako zoti kuotcha zinyalala kukhozakuononga moyo wanga kapena wa anthu ena.					
D9	Anthu amatayala zinyalala munseu, mumakwalala ndi malo okumbika chifukwa alibe kotaya zinyalala					
D10	Anthu amataya zinyala chifukwa choti amachiona kuti ndi choyenera kutero kuti athane nazo.					
D11	Katayidwe koyenera ka zinyalala kaziphunzitsidwa mumasukulu					
D12	Ndili okhuzidwa ndi vuto lotaya zinyalala paliponse munsika					
D13	Kutolera zinyalala ndi njira yokhayo yomwe ingathetse vuto la zinyalala munsika.					
D14	Ndimadandaula ndi vuto losefukira madzi chifukwa cha zinyalala zomwe zimatseka mumakwalala					
D15	Kuchotsa zinyalala munsika muno ndi udindo wanga ngati nzika ya munzinda wa Lilongwe					
D16	Kuphunzitsa anthu zokhuzana ndi katayidwe koyenera kazinyalala ndi njira imodzi yothetsera vuto lakatayidwe kosayenera kazinyalala					
D17	Ndikoyenera kuti Akhonsolo a mnzinda ayike lamulo loti anthu azithanso kugwiritsa ntchito zinyalala					
D18	Ndimakhuzidwa kwambiri ndi zintchito zomwe zimapelekedwa ndi galimoto yotenga zinyalala					
D19	Ndili ndi nkhwana ndi katayidwe kazinyalala kosayenera komwe kamaononga mnsinje ndi zinthu zopezeka mmadzimo					
D20	Ndimakhuzidwa ndimatenda okudza chifukwa cha katayidwe kosayenera ka zinyalala					
D21	Kutaya zinyalala mosayenera kukhoza kudzetsa moto ndi kutsefukira kwa madzi					
D22	Kodi ndi njira ziti zomwe	Kugwiritsanso ntchito zinyalala zina-----1				Zunguza ni pamalo mukugw
		Kupanga manyowa kuchokera kuzinyalala-----2				

	zingathandizi re kuchepetsa zinyalala zomwe zimapangidw a munsika muno?	Kugwiritsa jumbo ya pepala (osati ya Pulasitiki) ----3 Njira zina-----4	irizana nawo
D23	Kodi ndi njira ziti zomwe zingathandiz e pakatsamalid we ka zinyalala munikawu?	Anthu kutengapo mbali pochotsa zinyalala pomwe akhala -----1 Anthu aphuzitsike za katayidwe koyenera ka zinyalala-2 Akhonsolo ya mmzinda azichotsa zinyalala tsiku lililonse-----3 Akhonsolo akhale ndi antchito okwanira ochotsa zinyalala -----4 Akhonsolo ayike zigoba zokwanira zotayamo zinyalala mnzinda -----5 Boma kutengapo mbali popereka chilango kwa anthu otaya zinyalala mosayenera -----6 Njira zina-----7	Zunguza ni malo amene mukugw irizana nawo

Gawo lachisanu: Zotsatira zomwe zinganeke ngati anthu akutaya zinyalala mosayenera.

E1	kodi ndizotsatira ziti zomwe zingaze chifukwa chotaya zinyalala pena paliponse?	Kutaya zinyalala mosayenera kukhoza kuzetsa matenda - -----1 Kutaya zinyalala mosayenera kukhoza kubweretsa vuto lofefukira kwa madzi ndi moto -----2 Kutaya zinyalala paliponse kukhoza kedzetsa vuto lakuonongeka kwa chilengedwe -----3	Zunguz ani yankho Mukug wilizana nalo
E1	kodi ndizotsatira ziti zomwe zingaze chifukwa chotaya zinyalala pena paliponse?	Kutaya zinyalala mosayenera kukhoza kuzetsa matenda - -----1 Kutaya zinyalala mosayenera kukhoza kubweretsa vuto lofefukira kwa madzi ndi moto -----2 Kutaya zinyalala paliponse kukhoza kedzetsa vuto lakuonongeka kwa chilengedwe -----3 Kuchotsa zinyalala zotayidwa mosayenera kukhoza kuwonongetsa ndalama zochuluka -----4 Kutaya zinyalala paliponse kukhoza kulowetsa pansinithito zokopa alendo -----5 Zinyalala zikhiza kupweteka anthu pathupi -----6	Zunguz ani yankho Mukug wilizana nalo

E2	Kodi ndi matenda ati amene amabwera chifukwa chotaya zinyalala mosasamala munsika wa ukulu wa Lilongwe?	Malungo-----1	
		Kutsekura Mmimba-----2	
		Chifuwa-----3	
		Maso amanthongo-----4	

Zikomo kwambiri polora pempho langa kuti mutengepo mbali pakafukufukuyu ndinso pongilitsa nthawi yanu yamtengo wapatali poyankha Mafunsowa.

Appendix 3

Information and informed consent sheet (English Version)

Introduction and Purpose

My name is Modesta Banda, Nurse/Midwife currently pursuing a Master's of Science in Community Health Nursing at Kamuzu College of Nursing, a constituent college of the University of Malawi. I am conducting a study on social factors associated with improper waste disposal at Lilongwe central market as a partial fulfilment of this program. I wish to ask you to take part in this study. Before doing that, I want to let you know the reason of including you in the study, benefits, expectations of the investigator and possible risks that may be encountered in the course of the study. You have been chosen to participate in the study because you are one of the vendor/buyer at Lilongwe central market. You will not directly benefit from the study; nevertheless, the results will help to improve waste management at Lilongwe central market. The interview will take almost 45 minutes to an hour.

You are free to participate, to refuse, or not to answer any question that you do not want or withdraw at any time during the interview in the study. There will be no punishment or any kind of reprimand should you choose to refuse or not to answer any question. Please note that all information to be collected from you shall be kept safe and will only be accessible by the investigator. Your information will be identified with codes and not by name. Publications will also be in general instead of having names. This study may or may not be directly beneficial to you but to policy makers at all levels to know the status of waste disposal at Lilongwe central market and guide their decision on improving waste management. The study has no risks and you are urged to feel very free to express yourself during the interview.

If you have questions, please do not hesitate to contact the following people: Modesta Banda, Kamuzu College of Nursing, Lilongwe campus, P/Bag 1, Lilongwe. You can also reach her through a cell phone number 0888379499 or email address: banda.modesta@yahoo.com. Mr Genesis Chorwe- Sungani (Research supervisor) of Kamuzu College of Nursing can also be contacted in case of failed attempt to reach this investigator. He can be reached through his email address: genesischorwe@kcn.unima.mw or mobile phone number: 0991167079. For clearance issues, you can contact COMREC secretariat, College of Medicine, Private Bag 360, Chichiri, Blantyre 3. Email Address: Comrec@medcol.mw

If you have understood the information above and you have no questions or your questions have been answered to your satisfaction, you can be served with a consent form to give your consent to participate in the study.

Thank you very much.

Consent Statement (English Version)

I have read and understood the information above and my questions have been answered to my satisfaction. I have been assured that any publications or research dissemination will not bear any names. I am aware that I am at liberty to withdraw from the study at any time should I so desire. I hereby give consent by signing this form to participate in the study, and allow the investigator to use data obtained from me. I voluntarily agree to take part in the study.

-----	-----	-----
Participants name	Signature	Date
-----	-----	-----
Name of Interviewer	Signature	Date

Thank you for your consent.

Appendix 4

Information Sheet (Chichewa Version)

Kalata Yofotokoza za Kafukufuku

Mau Oyamba

Dzina langa ndine Modesta Banda. Ndine m'modzi mwa ophunzira za unamwino wa mudzi ku sukulu ya ukachenje ya Kamuzu College of Nursing. Ndikuchita Kafukufuku wokhuzana ndi zomwe zimapangitsa anthu kutaya zinyalala mosayenera mumsika wa ukulu wa Lilongwe. Ndikukupemphani kuti mutenge nawo gawo pa kafukufukuyu. Musanatero, ndiyamba kukufotokozerani chifukwa chochitira kafukufukuyu, Ubwino wake, zoyembekezera ndiponso zoopya zomwe zingakhalepo nthawi imene tikupanga kafukufukuyu.

Kufunika kwa kafukufukuyu

Cholinga cha kafukufuku ameneyu ndikupeza zomwe zimapangitsa anthu kutaya zinyalala mosayenera mumsika wa ukulu wa Lilongwe. Inuyo mwasankhidwa kutenga nawo gawo pa kafukufukuyu chifukwa ndinu amodzi mwa wogulitsa ndi wogula mumsika wa ukulu wa Lilongwe okwanira 255. Palibe ubwino umene inuyo mukhale mukupeza panthawi ya kafukufukuyu koma mtsogolomu zotsatira zake zizatithandiza ifeyo momwe tingapititsire patsogolo pa katayidwe kazinyala koyenera. Zokambirana za mukafukufukuyi Zitenga pafupifupi mphindi makhumi atatu kwa munthu wina aliyense otenga nawo gawo

Ndondomeko ya Kafukufuku

Muli omasuka kukana, kapena kusayankha mafunso ena amene mungafunsidwe mukati mwa kafukufukuyi ngakhale kusiya kumene Ngati mwayamba kale kuyankha ena mwamafunso amene ali mukafukufukuyi. Pakhala palibe chilango chilichonse choperekedwa kwa inuyo mukakana kapena kusiya kutenga nawo gawo. Dziwani kuti uthenga wonse otengedwa nthawi yakafukufukuyi, asungidwa mwachinsinsi ndiponso pamafunso sipalembedwa

dzinalanu koma nambala yokha. Pa nthawi ya kafukufukuyi, sipakuyembekezeka zovuta kapena kuvulala kwina kuli konse kotero muli omasuka kuyankha mafunso onse bwinobwino amene mufunsidwe mosaopa.

Ngati muli ndi mafunso, mukulimbikitsidwa kufunsa kwa Anthu awa: Modesta Banda, Kamuzu College of Nursing, Lilongwe campus, P/Bag 1, Lilongwe. Mukhozanso kuyimba foni ya m'manja pa namba izi: 0888379499 ngakhalenso kudzera pa email address iyi: banda.modesta@yahoo.com. Mungathenso kulankhulana ndi a Mr Genesis Chorwe-Sungani (oyang'anira za kafukufukuyi) apa Kamuzu College of Nursing kudzera pa email address iyi: genesischorwe@kcn.unima.mw kapena pa foni ya m'manja iyi: 0991167079. Muli omasuka kufunsanso ku COMREC secretariat pa keyala iyi: Wapampando wa COMREC, College of Medicine, Private Bag 360, Chichiri, Blantyre 3. Mukhozanso kuwalembera pa email Address iyi: Comrec@medcol.mw

Mawu omaliza

Ngati mwamvetsetsa ndiponso mulibe mafunso kapena nkhawa zina zili zonse zokhuzana ndi kafukufukuyu, mukhoza kulandira nawo kalata imene mungasayinire kusonyeza kumvetsetsa ndiponso kuvomera kutenga nawo gawo.

Zikomo Kwambiri chifukwa chakumasuka kwanu.

Consent statement (Chichewa Version)

Kalata Yovomereza Kutengapo Mbali pa Kafukufuku

Ndafotokozeredwa ndiponso ndawerenga momveka bwino za kafukufukuyi ngakhalenso mafunso anga onse ayankhidwa mogwira mtima. Ndatsimikidziridwa kuti zina langa silizakhalapo pena pali pa kafukufukuyi mumalo mwake pazakhala nambala. Ndikupereka chilolezo change chotenga nawo mbali pa kafukufukuyi modziwa kuti ndili omasuka kukana ngakhalenso kusiya mkati mwa zokambirana mukafukufukuyi. Ndasankha mwaufulu ndi mosaumiridzidwa Kutengapo Mbali mkafukufukuyi.

-----	-----	-----
Dzina la Otenga nawo mbali mkafukufuku	Sayini la otenga nawo gawo	Tsiku

-----	-----	-----
Dzina la ofunsa mafunso	Sayini ya ofunsa mafunso	Tsiku

Zikomo kwambiri.

Appendix 5

Ethical clearance letter

Kamuzu College of Nursing,
Private Bag 1,
Lilongwe.

9th December 2013.

The Chairman,
College of Medicine Research and Ethics Committee (COMREC),
Private Bag 360,
Chichiri,
Blantyre 3.
Dear Sir,

Application letter for Research Study clearance

I am a second year postgraduate student pursuing Masters of Community Health Nursing at Kamuzu College of Nursing (Lilongwe Campus).

In partial fulfilment of this program, I am required to carry out a research project on any topic of interest within the field of my specialization. The topic of my study is “social factors associated with improper waste disposal at central market in Lilongwe city”.

I, therefore, write to request your committees’ clearance for this study to be conducted at Lilongwe central market.

Your consideration shall be greatly appreciated.

Yours faithfully,


Modesta Banda
(Student researcher)

Appendix 6

Certificate of Ethics approval



Appendix 7

Clearance letter to Lilongwe City Assembly

University of Malawi,
Kamuzu College of Nursing,
Private Bag 1,
Lilongwe.

9th December, 2013.

The Executive Director
Lilongwe City Assembly
P.O Box 30396,
Lilongwe.

Dear Sir/ Madam,

Request to conduct a study at Lilongwe Central Market

I am a second year postgraduate student in Masters of Community Health Nursing at Kamuzu College of Nursing (Lilongwe Campus).

In partial fulfillment of this program, I am required to carry out a research project on any topic of interest within the field of my specialization. The topic of my study is **“social factors associated with improper waste disposal at central market in Lilongwe city”**.

I, therefore, write to request your permission to conduct this study at Lilongwe central market.

Your consideration shall be greatly appreciated.

Yours faithfully.


Modesta Banda

(Student researcher)

Appendix 8

Clearance letter from Lilongwe City Assembly

LILONGWE CITY COUNCIL **CHIEF EXECUTIVE**



Ref No. LCA/ADMN/7

P. O. BOX 30396
LILONGWE 3
MALAWI
Tel: (265) 01773144
Fax (265) 01770885

3rd January, 2014

TO WHOM IT MAY CONCERN

Dear Sir/Madam

Subject : **PERMISSION TO CONDUCT A RESEARCH STUDY IN THE CENTRAL
MARKET**

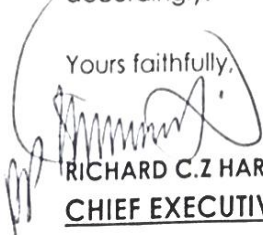
The bearer of this letter is Ms Modesta Banda, a second year postgraduate student at the Kamuzu College of Nursing (Lilongwe Campus) pursuing a Masters Degree Program in Community Health nursing.

She is conducting the research study entitled '*social factors associated with improper waste disposal at the central market in Lilongwe*'. The study is a partial fulfillment of her Masters Degree program.

The Lilongwe City Council has given Ms Modesta Banda permission to carry out the research on condition that the information retrieved shall only be used for academic purposes.

The Council therefore requests members of the general public to cooperate accordingly.

Yours faithfully,


RICHARD C.Z HARA
CHIEF EXECUTIVE

ALL CORRESPONDENCE TO BE ADDRESSED TO THE CHIEF EXECUTIVE