

**FACTORS CONTRIBUTING TO THE RECURRENCE OF
CHOLERA OUTBREAK IN GEORGE COMPOUND OF
LUSAKA**

BY

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**THE UNIVERSITY OF ZAMBIA
SCHOOL OF MEDICINE
DEPARTMENT OF NURSING SCIENCES**

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OUTBREAKS IN GEORGE COMPOUND, LUSAKA DISTRICT**

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**A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF
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LIST OF ACRONYMS

CBVs	Community Based Volunteers
CSO	Central Statistics Office
DRC	Democratic Republic of Congo
EHT	Environmental Health Technicians
IEC	Information, Education and Communication
JICA	Japan International Cooperation Agency
LDHMT	Lusaka District Health Management Team
LWSC	Lusaka Water and Sewerage Company
MDGs	Millennium Development Goals
MoH	Ministry of Health
MSF	Medicins Sans Frontieres
NHC	Neighborhood Health Committee
NS	National Service
PAHO	Pan American Health Organization
PHAST	Participatory Hygiene and Sanitation Transformation
PHC	Primary Health Care
UTH	University Teaching Hospital
VIPs	Ventilated Improved Pit-latrines
WHO	World Health Organization
ZRCS	Zambia Red Cross Services

DECLARATION

I, Evelyn Chilufya, hereby solemnly declare that the work presented in this study for a Bachelor of Science in Nursing Degree has not been presented either wholly or in part for any other degree and is not being currently submitted for any other degree.

Signed Evelyn Chilufya

Date 7/6/2011

(Candidate)

Approved [Signature]
8 JUN 2011
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STATEMENT

I, Evelyn Chilufya, hereby certify that this study is entirely the outcome of my own independent investigations. The various sources to which I am indebted are clearly acknowledged in the text and references.

Signed-----Chilufya-----

(Candidate)

Date-----7/6/2011-----

Dedication

I dedicate this study to my dear late mother Christine Mulenga, father, brothers and sisters and other family members, my Pastor and friends for their support and their endless encouragement. Without these people, this work would have not been a success.

ABSTRACT

Cholera is endemic in Zambia – its cycle coincides with the rainy season every year and is directly related to the lack of access to proper water and sanitation facilities. The first outbreak of cholera was reported in the country in 1977/1978 having the major outbreak occurred in 1990 and since then cholera cases have been registered every year throughout the country (WHO, 2010).

In Lusaka, cases and deaths mostly appear in the peri-urban of western and southern suburbs of the city, characterized by severe overcrowding and almost non-existent of water and sanitation facilities and poor drainage state due to blockages by heaps of garbage generated everywhere in the city and most of the compounds hardly have drainage systems leading to floods in the rainy season (WHO, 2010).

This study was conducted in George compound, Lusaka. This compound was selected because it is one of the largest compounds with a population of 102,309 and large numbers of cholera cases come from this compound and many lives are lost due to cholera every year. It was for this reason that this study was conducted to determine the factors that contributing to the recurrence of cholera outbreaks in George compound, Lusaka.

A descriptive cross sectional study design was used. The respondents were selected using stratified sampling method to stratify the compound into 10 zones and systematic sampling was later the sample size was determined from the study population. A sample size of 50 households was used. The study population consisted of the head of households aged 18 years and above, both males and females who have lived in George compound for the past 5 years and were available at the time of data collection in the month of October, 2010 because they were be able to give data on the contributing factors to the recurrence of cholera outbreaks in their area.

Primary data was collected using self administered questionnaires. Data was analyzed using a data master sheet and a calculator. The findings were presented in frequency tables and cross

tabulation were used to determine the relationship between variables.

This study showed that some people had moderate knowledge on the causes of cholera and its prevention as they were able to identify factors such as the poor sanitation, contributed to the recurrence of cholera. It also revealed that some respondents were still using unprotected wells for their water supply as well as using open space to dispose their refuse despite the continued health education on cholera and its prevention. Further the study showed that the majority of the respondents did not have the toilets instead used their neighbour's toilets while others used open space as toilets. This study also revealed that the respondents could not practice basic hand washing to prevent contamination of food with the dirty hands. The study also showed high levels of unemployment of 50% and 36% were self employed which contributed to their inability to maintain a high standard of environmental and personal hygiene posing a great risk of diarrheal disease outbreaks such as cholera.

On the basis of these findings, it can be concluded that the contributing factors to the recurrence of cholera outbreak in George compound was due to usage of unsafe water, high poverty levels and poor personal hygiene and environmental sanitation.

CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND INFORMATION

Cholera is a disease that continues to ravage developing countries and remains a serious public health problem in low-income countries despite efforts in the past to promote oral rehydration therapy as major treatment. Epidemics of cholera are characteristically abrupt and often have a high potential to spread fast and cause deaths because it induces acute severe diarrhea and can result in death if oral rehydration is not administered quickly. The epidemic reaches a peak and subsides gradually as the "force of infection" declines. Often-times, by the time control measures are instituted the epidemic has already reached its peak and is waning (WHO, 2010).

It affects all ages and both sexes. In endemic areas, attack rate is highest in children. The vibrio is destroyed in an acidity of pH 5 or lower. Conditions that reduce gastric acidity may influence individual susceptibility.

The incidence of cholera tends to be the highest in the lower socio-economic groups, and this is attributable mainly to poor hygiene. Vibrio transmission is readily possible in a community with poor environmental sanitation. The environmental factors of importance include contaminated water and food. Flies may carry *Vibrio cholerae* which later contaminate the food. Numerous social factors comprising of certain human habits favouring water and soil pollution, low standards of personal hygiene, lack of education and poor quality of life also contribute to cholera (Wanyama, 2010).

Transmission can also occur from man to man via faecally contaminated water: uncontrolled water sources such as wells, lakes, ponds, streams and rivers pose a great threat, ingestion of contaminated food and drinks have been associated with outbreaks of cholera. Bottle-feeding could be a significant risk factor for infants. Fruits and vegetables washed with contaminated water can also lead to cholera outbreak. To improve cholera control efforts in addition to maintaining and improving existing water supply, sanitation and hygiene behaviour measures must be considered Nevondo and Cleoto, 2010.

Cholera is endemic in Zambia. The first outbreak of cholera was reported in the country in 1977 and 1978, and affected Northern Province with 300 cases and with 30 deaths. The cases were reported again in 1982 and 1983 and affected Luapula and Northern provinces and 995 cases were reported with 95 deaths. The first major outbreak occurred in 1990 and lasted until 1993 and affected the five (5) provinces namely Lusaka, Northern, Copperbelt, Central and Southern. Since then cholera cases are reported every year in Lusaka and the surrounding areas (WHO, 2010). The most affected areas are the shanty compounds such as George, Kanyama, Chawama, Chipata, Misisi and Kuku compounds. Cholera outbreaks continue to occur throughout the country, despite advances in cholera surveillance, treatment, and prevention. According to WHO, 2010, the main contributors to cholera outbreaks include a lack of clean water, inadequate sanitation, and suboptimal food-handling practices. Once a cholera outbreak occurs, simple interventions can prevent infection such as washing hands with soap before eating, cooking, and after defecation; eating cooked food served hot and drinking water treated by a recommended method (e.g., boiling, chlorination).

In recent years Lusaka has become a popular urban settlement for many Zambians leading to formation of unplanned settlements called shanty compounds. Due to these shanty compounds, Lusaka has become densely populated with the projected estimated population at 1,359,812 for 2010 (CSO 2000). Lusaka is privileged of being equipped with all forms of modern telecommunications and mass media which are used as key vehicles for the dissemination of health related issues such as Information, Education and Communication (IEC) on various health issues such as cholera and any other diseases or outbreaks.

Lusaka, being the capital city of the country, is a hive of all international and inter-city trade and commercial investments such as shops and small and medium scale enterprises. This has also contributed to street vending resulting in accumulation of garbage in the city (George Health Centre, 2009-2010). The city is entirely urban with over 40% of the total population living in the peri-urban areas. A number of peri-urban settlements have severe water and sanitation problems. Approximately 90% of the peri-urban inhabitants rely on ordinary pit latrines, which they also use as bathing shelters (allafrica, 2010).

Once the pit latrine is filled up, residents are faced with the problem of space for locating new pit hence they end up having no pit latrines. The other factors at play include the geographic make up of Lusaka, which is naturally flat with impervious rock formation and high ground water table and periodic flooding during the rainy season (November – March) (allafrica, 2010).

Lusaka has seen repeated outbreaks during the rainy season. The lack of provision of drainage, access to clean water and poor hygiene and sanitation conditions are the route causes of the recurrence and severity of outbreaks. "The vast majority of the population in Lusaka is living in such conditions that make them extremely vulnerable to cholera due to the lack of access to safe water, drainage and good sanitation facilities. There is also a need for political commitment to long-term infrastructural investment in drainage, sanitation and water provision in these unplanned peri-urban areas of Lusaka to rid the city of this deadly cholera.

For the last 10 years, the Zambian economy has generally been declining and is most evident in the poor socio-economic status of the people and the poor environmental sanitation of the communities. This is evidenced by the growing of hazardous refuse disposal in almost all residential areas and this environment with refuse favors the growth of *Vibrio Cholera* that causes cholera. Poverty has continued to affect the majority of households in Lusaka with an estimated 70% of the population classified as the poorest of the poor (LDHMT, 2009-2012).

The LWSC provides water and also manages excreta and liquid waste disposal. Only one third of the city is serviced by a waterborne network disposal system. Other excreta disposal systems available include on site disposal mechanisms such as septic tanks and pit latrines. However, due to its financial constraints, the council is unable to collect all the accumulated wastes in the city leading to outbreak of diseases especially in the rainy season and blockage of drainages by the garbage. Lack of transport due to insufficient funding to the Lusaka city council, has also led to large amounts of waste being burnt in the streets causing nuisances of bad smells and causing the environment to be dirtier than ever before leading to cholera outbreak in the rainy season (LDHMT, 2009-2012).

As a result of this decline in economy, the country as a whole is struggling to combat an outbreak of cholera, a disease associated with poor sanitation, a lack of hygiene and access to potable water, which has claimed many lives year in and year out during the cholera outbreak, mostly in the capital, Lusaka. The absence of a solid waste disposal system and potable water in informal settlements, and the unhygienic street vending of fruit, vegetables and other foodstuffs across the city of Lusaka have been identified as the main reasons for the spread of this highly contagious disease. Many of Lusaka's 37 informal settlements, each with a population of around 50,000, depend on shallow wells for water and use pit latrines, which are not serviced by the municipality. The raw sewage from the pit latrines, often located near the shallow wells, contaminates the water sources (allafrica, 2010).

Due to high levels of poverty in the informal settlements, people have no money to pay for water bills; as a result, the residents opt to draw water from the shallow wells.

The community under study is George compound, situated in Lusaka district and is located West of Lusaka off Commonwealth Avenue Road and a gravel road from Commonwealth road links to it. The compound was named after a white man called George who was a farmer and lived in that area in the 1970s. It started as an illegal squatter which is the historical basis of the absence of the city planning such as street lights, water supply and sewage lines. Unplanned settlements were created due to large scale and rapid migration from rural areas that outpaced urban planning. These people migrated mainly from agricultural areas as a result of economic depression. George compound has a catchment population of 102,309 for 2010 (George Health Centre, 2009-2012). George community has three (3) sub clinics and the main clinic (George clinic). There are also seven (7) Private clinics managed by individuals.

George is a large compound where the residents are among the poorest of Lusaka's population with most of them being self employed involved in vending. The vast majority of the people of George compound live in such conditions that make them extremely vulnerable to cholera due to the lack of access to safe water, drainage and good sanitation facilities. As such it is one of an area in Lusaka that loses lives to cholera every year. At

the rains approach, it is evident that more lives will be lost from the deadly epidemic as sanitation and hygiene standards in the area fall short from being habitable. There are no drainages in some areas and while those areas with drainage systems are blocked by garbage which people throw in the them leading to floods in the rainy season. There are many bars in the community and they open as early as 06:00 hours and close after midnight and most of the bars have poor sanitation facilities making the people use the shake-shake containers to answer to the call of nature which are later disposed indiscriminately posing a danger of cholera outbreaks in the rainy season (George Health Centre, 2009-2012).

Despite cholera outbreak being a public concern occurring in many places and affecting many people in the nation, some places have not experienced these outbreaks and these include Kansenshi in Ndola, Woodlands, Ibex hills, Kabulonga in Lusaka due to the good water and sanitation in these areas. These areas also have good drainage systems and they are not over populated (WHO, 2010)

There are a number of health facilities including the biggest hospital in the country in Zambia the University Teaching Hospital (UTH), Private and Military hospitals and the health centers which are under the LDHMT. Despite the number of health facilities in Lusaka almost every rainy season brings with it cholera outbreaks and the people must brace themselves to survive the disease.

The decline in the country's economy has also affected the health sector in the sense that the funding has been reduced making the carrying out of community health activities almost impossible. However, despite the reduced funding to the LDHMT, the MoH and its collaborating partners have been carrying out community activities to prevent cholera outbreaks in Lusaka, George compound inclusive (LDHMT, 2009-2012). These activities include continuous sensitization on cholera and causes and its prevention by the community volunteers with the health worker provider such as the Environmental Health Technicians (EHT), burying of shallow wells to prevent people using contaminated water and the continuously distribution of chlorine to the residents of George compound and liming the pit latrines. Social gatherings are also discouraged during cholera outbreaks

and attending funerals, handling bodies of cholera confirmed or suspected cholera cases to prevent the spread of disease. The EHTs also inspect the sanitation in public places such as the taverns and the market places including the toilets.

The provision of safe water supply by the JICA and CARE international by sinking boreholes in George community has improved the water problem situation. Various activities have been implemented by the LDHMT in trying to prevent the recurrence of cholera and these activities include the formation of the Task Force committee incorporating the stake-holders such as the MSF, Zambia Red Cross Services (ZRCS), Lusaka City Council and the National Service (NS). This committee meets every month to prepare and respond to any outbreak. The health centers have also formulated emergency preparedness committees which respond to emergencies, cholera being one of them. The Zambia Red Cross Society has also stepped up their door-to-door community health education, mainly in Lusaka's George settlement, where most of the cholera cases have occurred (George Health Center 2009-2012).

From 1997 to 2007, the Ministry of Health implemented Lusaka District Primary Health Care (PHC) in close collaboration with the Japan International Cooperation Agency (JICA) in George compound to find effective ways of improving the knowledge and behavior of people on environmental health. The JICA project trained Community Based Volunteers (CBVs) and introduced Participatory Hygiene and Sanitation Transformation (PHAST) in George community in 2000. PHAST is an innovative approach used to promote hygiene, safe water and good sanitation in order to reduce water-borne diseases such as diarrhea and cholera through promotion of behavioral change. The CBVs together with the Environmental Health Technician (EHT) developed the capacity to analyze and conducted planning to solve environmental health problems in their communities. They constructed 156 Ventilated Improved Pit-latrines (VIPs) at the households and a total of 1,800 meters of drainage. They also provided services such as solid waste management and vector control, health education on hygiene and sanitation to improve the environmental health condition in their community. The project has constructed a number of communal taps for use by the community to reduce diseases such as cholera and other diarrheal diseases. The project also constructed a fee paying

toilet at the main market (Lilanda market) to be used by the marketers and any member of the community such as bus drivers and conductors. This has also helped in keeping the market place clean by proper disposal of excreta and has reduced in the outbreak of diseases. After implementation of all these activities, a research was conducted by JICA, 60.9% respondents showed that they had knowledge on the prevention of diarrheal diseases in 2006 as compared to 46.2% in 2002 (MOH/JICA, 2007).

Make Zambia Clean and Healthy campaign also made the people of George community to participate in the clean up. Despite all these activities, cholera breaks out almost every rain season and year in, year out lives are lost and it appears no lessons are learnt.

As a result of the above observations, I feel a further research should be conducted to determine the factors that contribute to the recurrence of cholera outbreaks in George compound.

1.2 STATEMENT OF THE PROBLEM

Cholera still remains a public concern as many lives are lost during an outbreak every year in George compound. Beene (1992) conducted a research to determine the knowledge, attitude and practice on cholera in George community. According to Beene (1992), it was discovered that people had the knowledge on cholera but could not practice on what they knew because some still believed that cholera was 'air borne disease' which people have no control over and can occur anytime. Another research was conducted by JICA on behavioral change in hygiene and sanitation in 2002 and 2006 respectively. The percentage of households that had access to safe water increased from 85.7% in 2002 to 94.4% in 2006. The number of people using latrines also increased from 87.2% to 91.7% (JICA/MOH, 2007).

The cholera situation in 2009/2010 started between 19 and 25th October 2009 with the cases initially recorded in 4 provinces: Southern, Lusaka, Copperbelt and Northern. Persistent rains and flooding aggravated the situation in Lusaka which recorded 4,464 cases and 73 deaths from 1st January until 28th March, 2010 (WHO, 2010).

The cholera outbreak was reported in January 2010 and it only became an emergency from mid March 2010 when heavy rains flooded Lusaka. The first cases were recorded in Kanyama, a poor neighborhood (slum) where the biggest open market in town is situated. The disease spread then to the Chawama, Misisi, Kuku, Matero and George neighborhoods, in the western part of the city. The situation in most of our towns and cities is frightening especially when one looks at the state of drainage and sewer systems as well as the inability by local authorities to collect garbage. Many places in Lusaka have clogged drainage systems, and the slightest of rain leaves many places flooded. Our markets in Lusaka are fertile breeding grounds for all sorts of germs in the rain season and it is always surprising to imagine how people continue to trade there. The environments are filthy and places strewn with mounds of garbage while public conveniences like lavatories are insufficient and hardly kept clean. Thousands, if not millions of tones of garbage, are generated everyday in our cities and our local authorities are failing to cope with the situation. The residents do not help matters as they throw and dump litter anywhere as long as it is not in their yard. Street corners and any empty spaces have been turned into garbage dumps and even the Make Zambia Clean and Healthy campaign has largely been ignored (allAfrica, 2008).

Due to the heavy rains, poor drainage systems in Lusaka, sanitation has greatly deteriorated in the city leading to increase in cholera cases. Shallow wells which are a source of drinking water are contaminated with dirty running water much of which is from collapsed pit latrines. Further more water tables have risen thereby worsening the sanitation situation in the affected areas leading to cholera outbreak. Despite the disease being deadly some households choose to hide information on cholera cases for fear of stigmatization. Infected people in such households are likely to stay away from the hospital due to ignorance and thereby exacerbating the spread of cholera. Among contributing factors to the spread of cholera include poor management of solid waste disposal. High density areas have very poor or no system for garbage collection from various households. Households wait for the night and throw the garbage along the roads or any vacant spaces within the community. These areas become the breeding grounds for various diseases carrying pathogen, compromising the overall community hygiene and sanitation. The way food is handled in these compounds is a major challenge contributing

to the spread of cholera. Communities use unsafe water sources for drinking, cleaning and package of various food stuff and sometimes foods are also eaten cold and sometimes even staying overnight in the homes (WHO, 2009).

With this scenario, despite having many health institutions in Lusaka, it is not surprising that cholera breaks out almost every rainy season and year in, year out lives are lost and it appears no lessons are learnt.

Table 1: Morbidity due to cholera in George compound from 2008-2010

Cholera cases	2008	2009	2010
Morbidity	59	628	554
Mortality	2	8	6

Source: District Office HIMS department 2010.

From the table above, the cholera outbreak for the past 3 years in George compound is still a public concern as it has been seen rising despite all the efforts by the LDHMT, CBVs, Stakeholders and the community itself to prevent the outbreak of cholera.

1.3 FACTORS INFLUENCING THE RECURRENCE OF CHOLERA OUTBREAK

These factors can be classified as listed below:

- Socio-economical and knowledge related factors
- Service related factors
- Geographical/Climate related factors

i) Socio-economical and Knowledge related factors

These factors may contribute to cholera outbreak in the sense that if the community has inadequate knowledge on causes, transmission and prevention of cholera will lead to poor personal and environmental hygiene. This will later lead to food and water contamination with the vibrio cholera causing an outbreak resulting from the people ingesting water or food contaminated with the vibrio cholera. The disease occurs in rainy season due to water source contamination with fecal matter as a result of flooding of pit latrines. This is common in areas where the water table level is high and also where the water source is

less than 10 meters away from the pit-latrines. This is very common in George community due to limited space as it is unplanned settlement area.

The high poverty levels by the community will lead to the inability of the community even to buy chlorine or buy charcoal to boil drinking water to make it safe for human consumption. The people cannot afford to rent good homes where there is safe water and good sanitation due to poverty hence they opt to live in shanty compounds where these facilities are not adequate and this contributes to the cholera outbreak. High poverty levels make some of the community members unable to pay for water charges by the LWSC resulting to using water from contaminated shallow wells which make them develop cholera.

ii) Service related factors

This factor may contribute to the cholera outbreak for instance; George health centre has only one Environmental Health Technician (EHT) and few of other health workers making it difficult to give health education on health problems affecting the community. This has led to inadequate community sensitization on public health resulting in indiscriminate refuse disposal which leads to cholera outbreak in the rainy season. Lack of adequate funds has led to the inability of buying chemicals to chlorinate the shallow wells to kill the *Vibrio cholera* contributes to cholera outbreak. The inability by the LWSC to provide piped water has increased the chances of the outbreak of the disease. The lack and poor drainages systems, inability to collect garbage by Lusaka Waste Management Team and absence of the toilets in the community have greatly contributed to the outbreak of the disease.

iii) Geographical/Climate related factors

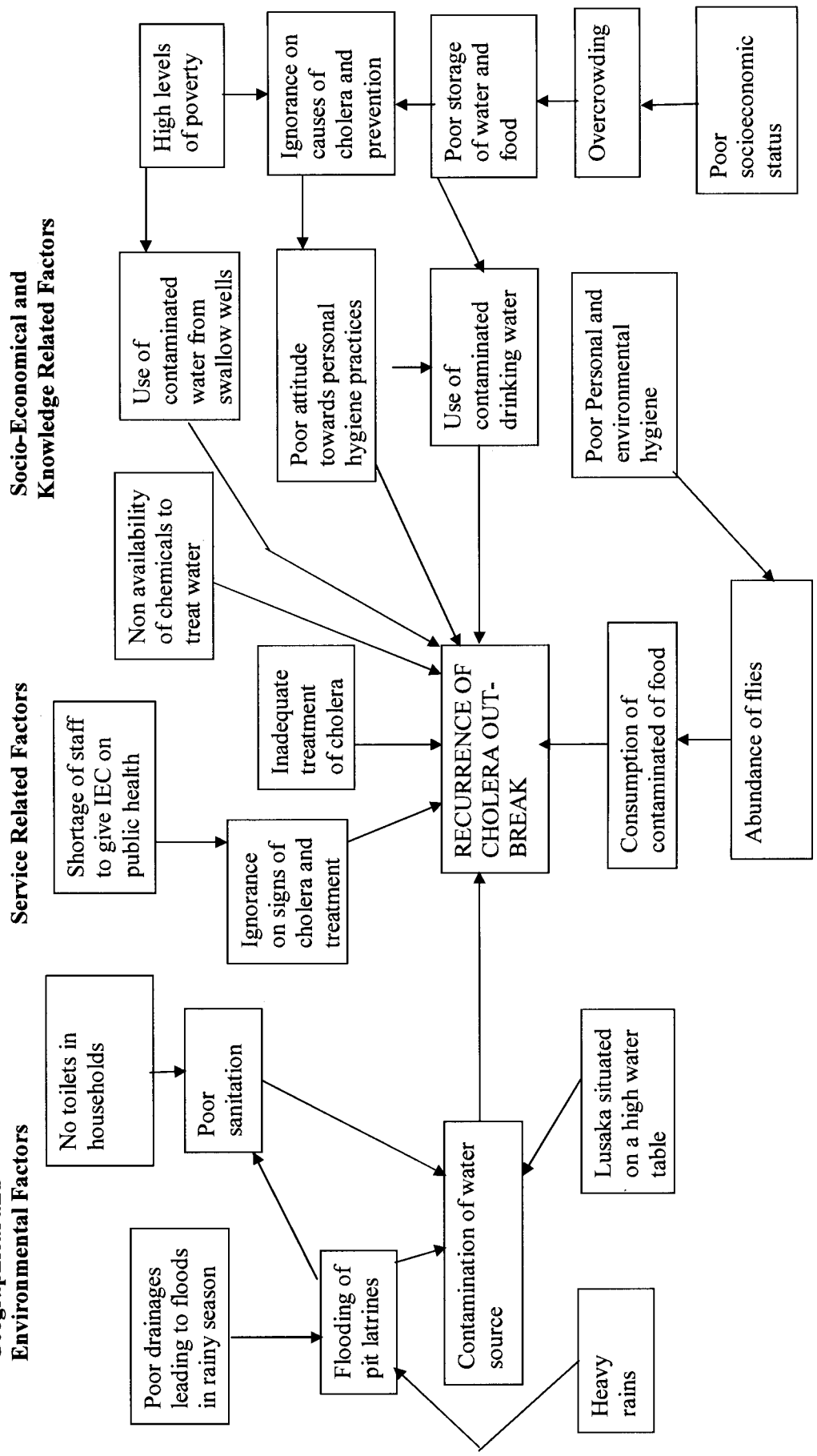
The factors at play include the geographic make of Lusaka, which is naturally flat with impervious rock formation and high ground water table and periodic flooding during the rainy season. Most of the areas are water logged especially in the compounds due to lack of drainages and blocked drainages. This contributes to the outbreak of diseases such as cholera and any other diarrhea especially in the rainy season.

Climatic variables, such as rain and environmental temperature, are related to the increase in cholera cases during the epidemic period because it allows the bacteria to multiply in

enhanced conditions. A rise in temperature and heavy rainfalls caused by climate change create conditions for the bacterium that causes cholera to multiply, bringing about a global resurgence of the disease in the presence of heaps of garbage.

As being shown from the problem analysis diagram below, many factors can contribute to the cholera outbreak in George community.

**1.3.1 Figure 1: PROBLEM ANALYSIS DIAGRAM
FACTORS CONTRIBUTING TO RECURRENCE OF CHOLERA IN GEORGE COMPOUND OF LUSAKA**



1.4 JUSTIFICATION OF THE STUDY

Cholera still remains a public concern as many lives are lost during an outbreak every year in George compound. Therefore it is important to identify the factors contributing to the recurrence of cholera in George compound, Lusaka. A study done by Beene, 1992 to determine knowledge, attitude and practice revealed that people had knowledge on cholera.

Despite the various interventions done in George compound such as burying of shallow wells, improving the water supply by JICA, construction of Ventilated Improved Pit-latrines (VIPs) to supplement on sanitation and community sensitization on cholera, George community has continued to experience cholera outbreaks every year during the rainy season.

It is for this reason that this study should be conducted to determine the factors contributing to cholera outbreaks recurrence in George compound. This study is important as it will add to the body of nursing knowledge and results of the study will influence policy makers to find ways of assisting in cholera prevention in George community and many lives will be saved.

1.5 OBJECTIVES OF THE STUDY

1.5.1 General Objective

To determine the factors contributing to recurrence of cholera outbreaks in George compound in Lusaka.

1.5.2 Specific Objectives

- To determine whether or not knowledge on cholera by the community contributes to cholera recurrence in George compound.
- To determine whether or not poor sanitation contributes to the recurrence of cholera outbreaks.
- To determine whether or not poverty among the people of George compound can be associated with recurrence cholera.

1.6 HYPOTHESIS

Hypothesis is the statement that predicts the relationship between two or more variables (Burns and Grove, 2005).

Hypothesis of the Study

There is a relationship among Socio-economic, Knowledge and Environmental related factors, to recurrence of cholera outbreak in George compound.

1.7 STUDY VARIABLES

A variable is a characteristic of a person, object or phenomenon that can take on different values (Burns and Groves, 2005). Variable to be included in this study are derived from the problem analysis diagram and from the research objectives.

Dependent Variable

The dependent variable is the variable that is as a result of the effect of the action of independent variable and cannot exist by itself, (Burns and Groves, 2005). This is the variable used to describe or measure a problem under study. The dependent variable for this study is recurrence of cholera.

Independent Variable

This is the variable that is believed to cause or influence the dependent variable, in experimental research, the manipulated variable, (Burns and Groves, 2005). In this study, the independent variables are: Source of water, Knowledge levels on cholera, Food safety and Environmental Sanitation.

Table 2: FRAMEWORK FOR DEFINING VARIABLES

VARIABLES	QUESTION NUMBER	INDICATORS	CUT OF POINTS
Dependent Variable			
Recurrence of Cholera	24-29	Having cholera outbreak every rainy season	Recurrence
			No Recurrence
Independent Variables			
Source of water supply	7-15	Use of water from unprotected shallow wells Use of dirty utensils to draw water	Unsafe
		Use of protected wells Use of tapped water Use of boreholes	Safe
Food safety	7-15	Eating leftovers food Eating food with dirty hands Buying uncovered and cooked food from street vendors Eating fruits not washed	Unsatisfactory
		Warming food before eating Washing hands before eating	Satisfactory
Environmental Sanitation	7-15	Use of their own pit latrines Clean surrounding	Good
		Use neighbor's toilet Disposal of refuse indiscriminately	Poor
Knowledge levels on cholera	16-23	Able to stated the causes of cholera correctly Able to mention the signs and symptoms of cholera Able to mention factors that contribute to cholera outbreak Able to state preventive measures correctly	High 15-21
			Moderate 8-14
			Low 1-7

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 INTRODUCTION

Literature review is a broad, comprehensive in-depth, systematic and critical review of scholarly publications, unpublished scholarly print materials, audiovisual materials and personal communications. Review of literature will assist the researcher analyze the existing knowledge while conducting a study, when interpreting the results of the study and when making judgments about application of the new knowledge in nursing practice (Basavanthappa, 2006).

This chapter will report a detailed synthesis of the literature review on studies done on cholera, an overview of cholera and on the factors contributing to recurrence of cholera worldwide.

2.2 OVERVIEW OF THE CONDITION

Cholera is a severe bacterial infection caused by the bacteria *Vibrio cholera* characterized by profuse rice-water diarrhea and vomiting which leads to rapid dehydration (Chanda, 2010). The main reservoirs of *V. cholerae* are people and about 80% of the people infected with the cholera bacterium never develop symptoms. However, the bacterium stays in their fecal matter for seven to 14 days, leaving others at risk of infection (Wanyama, 2010). Transmission is primarily by the acquisition of the pathogen through contaminated drinking water or infected food. Cholera transmission can also be divided into primary and secondary types. Primary cases are the result of infection by surface water sources, such as when people are directly infected with the bacteria that cause cholera by drinking untreated water. Secondary cases consist of people who are infected through fecal-oral transmission and are related to poor water and sanitation environment, thus illuminating why there are socio-economic disparities with cholera (Nevondo and Cleote, 2010). Cholera transmission is closely linked to inadequate environmental management. Typical at-risk areas include peri-urban slums, where basic infrastructure is not available, as well as camps for internally displaced people or refugees, where minimum requirements of clean water and sanitation are not met. The main symptoms include profuse watery diarrhea and vomiting. The severity of the diarrhea and associated vomiting can lead to rapid dehydration and electrolyte loss, which can lead to death. Of those who develop symptoms,

80% are mild to moderate while between 10% and 20% develop severe diarrhea. If left untreated, about 50% of cholera cases can be fatal. Prevention and treatment in most cases (80%) can be treated through oral rehydration salts. These salts reverse dehydration and restore potassium levels following the onset of acute diarrhea. The most severe cases, in which the patient is extremely dehydrated, can be treated through intravenous fluids and antibiotics. The consequences of a disaster such as disruption of water and sanitation systems, or the displacement of populations to inadequate and overcrowded camps can increase the risk of cholera transmission (Wanyama, 2010).

Throughout history, populations all over the world have sporadically been affected by devastating outbreaks of cholera. Recorded evidence of cholera epidemics goes back to 1563 in a medical report from India. In the nineteenth century cholera spread from its apparent ancestral site in the Orient to other parts of the world, producing pandemics in Europe. The first pandemic was recorded in 1817, and we are now well into the seventh cholera pandemic, which started in Indonesia in 1961 and spread rapidly in Asia, Europe, Africa and reached South America in 1991. The disease spread rapidly in Latin America causing nearly 400,000 reported cases and over 4000 deaths in 16 countries of the Americas that year. Still the seventh pandemic has not receded; on the contrary, cholera has now become endemic in many parts of the world (Nevondo and Cloete, 2010).

According to the Pan American Health Organization (PAHO), a total of 1,076,372 cases and 10,098 deaths of cholera were reported in the region of the Americas by June 1995. However, there were 293,113 cases of cholera worldwide in 1998, with 10,586 deaths. In 1999, a total of 254,310 cases and 9,175 deaths were officially notified to World Health Organization (WHO). This increasing spread of cholera in recent years many reflect a lack of international quarantine enforcement by some countries which also have primitive public water supplies and inadequate sanitary regulations, the international mobility of carriers in the world's population, and the quick transport of contaminated food and water by ships and aircrafts (Nevondo and Cloete, 2010).

Cholera has also continued to ravage developing countries. According to WHO, 58 countries officially reported cholera in 2001, with a total of 184,311 cases and 2,728 deaths (Emch et al, 2008).

The number of cholera cases reported to WHO continues to rise. From 2004 to 2008, cases increased by 24% compared with the period from 2000 to 2004. For 2008 alone, a total of 190,130 cases were notified from 56 countries, including 5,143 deaths. Many more cases were unaccounted due to limitations in surveillance systems and fear of trade and travel sanctions. Recently, new variant strains have been detected in several parts of Asia and Africa. Observations suggest that these strains cause more severe cholera with higher case fatality rates; it is for this reason that careful epidemiological monitoring of circulating strains is recommended (WHO, 2010).

As stated above, cholera has not spared any country throughout the world and many lives have been lost. As the literature review is done, it is evidenced to note that studies have been conducted in various parts of the world to try and find the contributing factors to this recurrence of the outbreak and possibly trying to find lasting solutions to combat the disease. Literature review will be discussed according to the variables that were used in the study as described below.

2.3 Source of Water Supply

A lot of studies have been conducted to try and find out the relationship of the water source to the cholera outbreak. Contaminated water source and untreated water will predispose the community to the outbreak of diarrheal diseases, cholera inclusive especially if it is contaminated with the vibrio cholera a bacteria that causes cholera.

A study conducted by Emch (2008) in Bangladesh showed that village populations of Bangladesh depend on untreated surface water for household use, especially during times of flooding. Furthermore, with the current arsenic crisis in Bangladesh, as many as half of the wells drilled in the late 1960s as the answer to Bangladesh's severe surface water pollution problem have been found to be contaminated with arsenic in amounts of concentrations even 10 times higher in contaminated areas. According to a recent study conducted in Araihaazar in Bangladesh

by WHO, 2010 about 30 million people are exposed to unsafe levels of arsenic in their drinking water, and 20% of the arsenic contaminated tube-well water users switched back to untreated surface water. These findings indicate that surface water has again become important as a source of household water and for drinking when no other safe water is available despite being contaminated and very unsafe for human consumption (Emch et al, 2008).

Although boiling water before drinking is effectively the better practice, because it will kill all waterborne pathogenic microorganisms, it is not used routinely in the villages because fuel wood in rural Bangladesh is both in very short supply and costly. Moreover, during severe flooding, which frequently occurs in Bangladesh, there are geographical areas that experience reduction in the quality of life to mere survival, when even the barest necessities are difficult to obtain and building fires to boil water is simply not possible.

It is common practice in villages in Bangladesh to use sari cloth to filter home-prepared drinks. Laboratory studies showed that sari cloth folded at least four times retained the *V. cholerae* cells attached to plankton, effectively removing about 99% of *V. cholerae*.

Taking advantage of the knowledge that *V. cholerae* is autochthonous to the aquatic environment and resides in and on copepods, a simple filtration procedure was devised for rural villagers in Bangladesh to remove *V. cholerae* attached to plankton in environmental water. A 3-year study was designed to test this hypothesis and was carried out in Matlab, Bangladesh. From January 2003 to December 2007, there were 830 laboratory-confirmed hospitalized cholera cases in the study area (Emch et al, 2008).

According to the study conducted in Zanzibar, it was revealed that the majority of the population (71%) is having access to piped water while a minority has to rely on drinking water from wells (27%) and other sources like street vendors, rainwater, spring water, and open water courses (2%). Such deteriorating environmental conditions subsequently expose the majority of inhabitants on both islands to an increased risk of water-borne diseases due to the scarcity of safe drinking water supplies and a generally poor or lacking sanitation infrastructure in peri-urban and rural areas (Schaetti et al, 2009).

A study conducted in Kalemie city, Democratic Republic of Congo (DRC) located on the side of Lake Tanganyika, North Eastern border of Katanga, experienced the highest number of cases in the province. It was revealed that each year, several outbreaks were identified in Kalemie, occurring each time in areas lacking sustainable access to safe drinking water. Epidemiological studies, conducted by the 4th Direction of the Congolese Ministry of Health and a North-South university network, in Eastern DRC clearly pointed out the role of seven cities located on the lake's shore that act as the main source of cholera epidemics especially among the fishermen. There, more precise epidemiological surveys showed that a great majority of cases occurred in the areas deprived of adequate access to safe drinking water. In these areas, contaminated surface water (mainly lakes) used by thousands of people for drinking and for personal hygiene was obviously the source of cholera epidemics. Thus, remote or lack of access to safe drinking water in some of the limited areas located in lakeshore cities appears to be the primary cause of cholera outbreaks (Pirarroux, 2009).

Similar studies were conducted in Uganda to determine the cholera outbreak after the Health authorities reported about the disease outbreak towards the end of April. The disease also affected another 21 villages and reported cholera cases in one week with records showing that 70 are admitted. The results of the study reviewed that the epidemic was attributed to the lack of clean water for human consumption because many villages did not have pit-latrines around their settlements hence cholera was spread by water contaminated with human excrement. The other factor discovered that cholera spread quickly due to the regular movement of a highly nomadic population and unprotected water sources which were in the interior and inaccessible (Wanyama, 2010).

A study conducted in South Africa revealed Cholera occurs in epidemic from when there was rapid urbanization without adequate sanitation and access to clean drinking water. Other risk factors included poor hygiene, overcrowded living conditions and lack of safe food preparation and handling. The situation was made worse when the municipal government had put locks on people's taps, forcing them to take water from the lake and river. People were made to pay for the water but due to high poverty levels, they could not afford and resorted to drinking water from contaminated wells. This worsened the situation and the cholera epidemic spread throughout the entire community. According to a national survey (2002), two million people

have been evicted from their homes for not paying for water. The water cut-offs forced thousands of poor people to seek water from polluted rivers and lakes and led to South Africa's worst outbreak of cholera, in which thousands of people were sickened and hundreds died because the boreholes were dry and the people had no choice but to get water from the rivers and ponds contaminated with cholera bacteria, and the disease spread like wildfire (Nevondo and Cleote, 2010).

A senior environmental science lecturer at the University of Pretoria, South Africa, pointed out that besides the biological factors, Floods caused by heavy rains contaminated drinking water with the bacterium and in droughts, the bacterium can grow more easily in stagnating water in ponds and river (Nevondo and Cleote, 2010).

A study conducted in Zimbabwe revealed that cholera outbreak was blamed on Zimbabwe's dilapidated water system. It is one symptom of the collapse of a country that has been wracked by political turmoil and violence. Press reports suggest residents were forced to dig shallow wells that rapidly became contaminated by the raw sewerage on Harare's streets. During its rapid spread across the southern African country, cholera killed 4288 people and infected 98,592 according to the Zimbabwean Ministry of Health and Child Welfare's Rapid Disease Notification System. At its peak in February, the Ministry reported over 8,000 cases per week in what has been dubbed Africa's worst cholera epidemic in 15 years. The last known case was reported on July 3 in Budiriro, a high-density suburb of the capital Harare. This is also the area where the country's highest number of cholera infections was reported during the height of the epidemic (Anderson, 2009).

Similarly to South Africa, another study conducted in Zimbabwe revealed that residents were cut off water supplies due to none payment of outstanding water bills. Harare Water, which operates in the areas most affected by the cholera epidemic, said it is owed US\$23m in unpaid bills according to press reports. The threats were made despite the fact that cutting off water supplies could force residents to find alternative water sources, and spark another cholera epidemic (Anderson, 2009). Despite the Zimbabwean government signing the Millennium Development Goals (MDGs), to have the proportion of the world's population without access to clean water and proper sanitation by 2015, little has been done due to the political and economic

circumstances which has created a situation where the availability of clean water and proper sanitation is no longer routine.

To quote the WHO on cholera: "Since 2005, the re-emergence of cholera has been noted in parallel with the ever-increasing size of vulnerable populations living in unsanitary conditions.

The provision of safe water and sanitation remains the critical factor in reducing the impact of cholera outbreaks (Black, 2007).

In Zanzibar a study was conducted to determine the contributing factors to cholera outbreak and it was reviewed that 71% of the population were having access to piped water while 27% had to rely on drinking water from wells and 2% depended on other sources like rainwater, spring water, and open water courses (Schaetti et al, 2009).

Locally, Zambia has also been experiencing torrential rains for so many years and cholera is experienced every year leading to loss of many lives. Since mid March 2010, the rains led to flooding in the Eastern, Central, Lusaka, North-Western, and Southern, provinces (WHO, 2010).

Due to the heavy rains, and the poor drainage system, the water, sanitation, and hygiene situation had greatly deteriorated especially in the City of Lusaka. Shallow wells, which were a source of drinking water, had been contaminated with dirty running water much of which was from collapsed pit latrines. Further, the water table also rose thereby worsening the sanitary situation in the affected areas as it had become difficult to construct new pit latrines. According to the reports from the treatment centers in Lusaka by WHO (2010), a cumulative total as of 24 March 2010 were 2,521 cholera confirmed admissions. A cumulative total of 41 deaths due to cholera were also confirmed at the same time. Apart from the known number of 17 people reported to have left the cholera treatment centers in Lusaka, there were also reported cases of households hiding patients with cholera, this worsened the spread of the disease. Most affected places were Kanyama followed by Chipata, Kamwala, Chawama including Kuku and Misisi, Mandevu, George, Matero and Makeni compounds.

2.4 Environmental Sanitation

It is common knowledge that cholera thrives in dirty environments and cholera mostly affects people living in unplanned settlements commonly in the low income settings. The situation in most of the towns and cities is frightening especially when one looks at the blocked sewer

systems coupled with the poor drainage systems as they contribute to the poor environmental sanitation. The generation of millions tones of garbage everyday in the cities has made the local authorities fail to cope with the situation leading to their inability to collect and dispose of garbage regularly and efficiently.

Cholera outbreaks are an annual occurrence in Cameroon and during the last fall 40 people died from cholera according to the World Health Organization. Meanwhile the 2010 toll is on pace to be the country's worst epidemic in six years.

According to reports from AlterNet, flooding from violent storms aggravated the spread of cholera in Cameroon, leaving at least 100 people dead and another 1,500 infected. Heavy rains caused extensive flooding and sparked landslides that destroyed sanitary facilities as well as contaminated water sources (WHO, 2009).

A report from Zambia stated that among the contributing factors to the spread of cholera is the poor management of solid waste disposal. The high density areas are the most affected and have very poor and in some cases no system for disposal of collected garbage from the various households. As a result, communities have resorted to erratic dumping covering even the road networks. Households dig and bury or burn the waste while others wait for the night and throw the garbage along the roads or any vacant spaces within the community. These are breeding grounds for various diseases carrying pathogens, compromising the overall community hygiene and sanitation (WHO, 2010).

In Zanzibar, a research conducted showed that about 53% of the population had access to pit latrines, while 28% had no toilet facility and 12% mainly in urban areas were using a flush toilet. Poor sanitation contributed to the cholera outbreak (Schaetti et al, 2009).

Similarly a study conducted in Uganda reviewed that cholera outbreak was also be due to people defecating in the dry river bed since most of them lack pit-latrine and when it rained, the water carried the waste to the water sources situated on the river bank. According to the district health officer, he noted that the outbreak was due to lack of safe areas of waste disposal as many households especially in the villages did not have pit-latrine around their settlements. Such deteriorating environmental conditions subsequently exposed the majority of inhabitants on both

islands to an increased risk of diseases due to poor or lacking sanitation infrastructure in peri-urban and rural areas (Schaetti et al, 2009).

2.5 Climate Change

Recent studies indicated that global warming creates a favorable environment for the cholera bacteria to multiply. When these conditions are coupled with the rise in temperature and heavy rainfalls caused by climate change, ideal conditions are created for the bacterium that causes cholera to multiply, bringing about a global resurgence of the disease.

A similar study conducted in Bangladesh reviewed that the lowest occurrence of the disease is in the winter (January to March). Cholera was four times higher during the summer (April-June) and autumn (October-December), which is before and after the monsoon season respectively. During the monsoon season (July-September), the occurrence of cholera was two times higher than in the winter season. A World Health Organization (WHO) study found that during the 1997-98, a rise in sea surface temperature coupled with excessive flooding emerged as two significant factors in cholera epidemics in Bangladesh, Djibouti, Somalia, Kenya, Tanzania, and Mozambique (Schaetti et al, 2009).

Apart from the poor water and sanitation in Zambia, it was discovered that climate change had a role to play in the cholera outbreak. According to a recent press release from Alpha Galileo, a resource for European research news, a study lead by researchers from the Madrid Carlos III Institute of Health associated the increase of cholera cases in Zambia with climate factors. Their study results confirmed that an increase in environmental temperature six weeks before the rainy season also increased the number of people affected by cholera at a rate of 4.9%. This was the first time that it had become evident in the sub-Saharan region that the increase in environmental temperature was related to the increase in cholera cases (WHO, 2009).

The research project, which was done in Zambia between 2003 and 2006, analyzed data from three cholera epidemics. The results showed that climatic variables, such as rain and environmental temperature, were related to the increase in cholera cases during the epidemic period because it allows the bacteria to multiply in enhanced conditions, leading to almost 5 percent more cholera cases, while a 50mm increase in rainfall three weeks ahead of an outbreak

pushed up the number of cases by more than 2 percent. The study also showed that a 1° C increase in temperature six weeks before the beginning of the outbreak explains the 5.2% increase in cholera cases during an epidemic. Since the beginning of the outbreak in August of 2008 until March 17th of 2009, 91,164 cases were reported in this country alone, 4,037 of them fatal (WHO, 2009). According to the study done by WHO (2010), it was analyzed that there is an association between cholera epidemics and rainfall in Lusaka, because cholera outbreaks usually start during the month of October and end between mid-May/beginning of June of the following year corresponding to the rainy season.

A similar research conducted in the South Africa, Johannesburg revealed that rise in temperature and heavy rainfalls caused by climate change create conditions for the bacterium that causes cholera to multiply, bringing about a global resurgence of the disease. Warmer surface temperatures increase the abundance of phytoplankton, which supports a large population of zooplankton-animal-like micro-organisms which serves as a reservoir for cholera bacteria, a water born disease (Colwell, 2009).

2.6 Poverty

Cholera remains a serious public health problem in low-income countries and affects the people living in the low socio economic status because they cannot afford to pay for water bills and to pay for decent accommodation hence resort to stay in the shanty compounds where water and sanitation is poor. In 2007, the majority of worldwide cases (94%) and deaths (99%) were reported from Africa.

A study conducted in Zimbabwe revealed that Harare residents had been informed that their new water supplies risk being cut off if they did not pay outstanding water bills by Harare water. This made the residents to find alternative water sources from contaminated water wells, and another epidemic of cholera broke out (Anderson, 2009).

2.7 Knowledge

The knowledge on cholera and its prevention by the community members will enable them to prevent cholera outbreaks in their various places. However, a study was conducted to determine

knowledge, attitudes and practices regarding cholera outbreaks and measure socio cultural practices that influence cholera outbreaks in Ilala Municipality in Dar es Salaam city, Tanzania. The study revealed that the main practices associated with cholera occurrence among respondents with low knowledge and water source were: shallow well 28.6% and deep well 11.7%. The proportions of respondents by low knowledge and water quantity were: adequate water 13.6% and inadequate water 18.3%. About 14% of the respondents with low level of knowledge of cholera, drink water from wells without boiling while 31.8% drink unboiled piped water and 21.6% wash their hands in a common container. Furthermore, the proportion of the hygienic practices concerning cholera prevention was lagging behind knowledge and attitudes (East African Republic Health Association, 2006).

2.8 Food Supply

Contamination of food will cause an outbreak and this may occur due to the absence of basic sanitary conditions. This is more common especially at the market places where thousands of people work and shop daily on a site that lacks latrines and running water and has chronic flooding due to blocked drains. Exposure could occur if the raw produce are handled in markets which lack facilities for maintaining adequate hygiene, particularly during an urban epidemic when environmental *V. cholerae* counts are high. *Vibrio cholerae* can survive on raw produce for 2–5 days and produce can be exposed to these organisms at any time between the farm and the consumer's mouth (Dubois et al, 2006).

A study conducted in Peru on consumption of raw produce was strongly associated with cholera in a Peruvian city where fruits and vegetables were splashed with sewage-contaminated river water during transport to markets.

In Israel, a similar study was conducted and it was revealed that the use of raw sewage for fertilizer on vegetable farms was implicated in cholera transmission (ibid).

Between 28 November 2003 and 23 February 2004, 4343 cases and 154 deaths from cholera were reported in Lusaka, Zambia. A case-control study was conducted in February 2004 to assess potential transmission routes and prevention strategies. It was revealed that consumption of raw vegetables was strongly associated with cholera as it was related to food-borne exposures. However, consumption of any of the raw vegetables included in the composite variable was significantly associated with cholera and was about 95%. It was also revealed that eating leftover

nshima, the local staple maize porridge, was associated with cholera (Dubois et al, 2006).

On the basis of these results, the Zambian Central Board of Health and LDHMT enhanced cholera-prevention efforts by reinforcing hand-washing promotion messages and recommending that vegetables be cooked or washed in treated water. Plans were created to improve hygiene and increase availability of latrines at Lusaka's major market to minimize cross-contamination of produce. Long-term prevention measures under discussion by local authorities include improving the quality and quantity of municipal water supplies (Dubois et al, 2006).

2.9 Relationship Between/Among Variables

From this report it was evidence that there is a link between cholera outbreak and poverty, poor sanitation, quality of drinking water and changes in climate.

According to the research done in various parts of the world, it is clear to note that cholera outbreak can be attributed to poor environmental sanitation, remote or lack of access to safe drinking water. Other risk factors include poor hygiene, overcrowded living conditions and lack of safe food preparation and handling. According to the research done in Bangladesh, South Africa and Zambia, it showed that there was a link between higher temperature and rainfall that is; a rise in temperature six weeks before an outbreak began allowed the cholera bacteria to multiply in enhanced conditions hence causing the outbreak. With the increase in rainfall cholera cases become more increased. The results of the study reviewed that the epidemic was attributed to the lack of clean water for human consumption because water contaminated with human excrement causing cholera to breakout.

The consumption of any of the raw vegetables is significantly associated with cholera as well as eating leftover nshima, the local staple maize porridge, is also associated with cholera.

CHAPTER THREE

3.0 METHODOLOGY

3.1 RESEARCH DESIGN

Research design is the plan, structure and strategy of investigations of answering the research question or blue print the researchers select to carry out their study (Basavanthappa, 2006). The research design includes the description of the subjects, observations of variables, measures of time and selection of the setting.

In the study, the researcher used both quantitative and qualitative methods to obtain data, which allowed statistically reliable information obtained from numerical measurement to be backed up by and enriched by information about the research participants' explanations. Quantitative study design is the assignment of numerical values to objects or events to represent the kind or amount of characteristic of those objects or events (Basavanthappa, 2007). It was used to determine whether characteristic is there and in what quantity is present.

Qualitative study design is a non-numerical data collection or explanation based on the attributes of the graph or source of data (Basavanthappa, 2007). Qualitative research study aims to gather an in-depth understanding of human behavior and the reasons that govern such behavior. The qualitative method investigated the why and how of decision making and will be used to gain in depth the information on the recurrence of cholera outbreak.

3.2 RESEARCH SETTING

The study was conducted in George compound, Lusaka urban district. It is one of the largest compounds with a population of 102,309 and large numbers of cholera cases come from this compound. It is located West of Lusaka off Commonwealth Avenue Road and a gravel road from Commonwealth road links to it. It is accessible mainly by road. George community is divided into two: George Proper and George Complex. George Proper is the initial George compound and George Complex is the extension of the compound and it has compounds like Soweto, Desai, Paradise, and Mhango. The community has nine (9) government basic schools, thirty one (31) private schools and 26 community schools. The community has also four (4)

government health clinics; this includes three (3) sub clinics and the main clinic (George clinic). There are also seven (7) Private clinics ran by individuals. Nyanja and Bemba are the commonly used languages. Most of the families live as extended families, very few live as nuclear families leading to overcrowding (George Health Centre, 2009-2012).

The water supply and sanitation is still a problem as some of the community members still use unprotected shallow wells as sources of water as they cannot afford to pay for the tapped water from the Lusaka water and sewerage company. There is poor drainage system leading to flooding during the rainy season.

The community uses pit-latrines which are personal and communal toilets. The community members with the help of JICA- PHC project have constructed Ventilated Improved Pit-latrines (VIP) communal toilets for public use to reduce on the indiscriminate defecations. Still others have no pit latrines. Some community members use refuse pits in their yards while others just dump indiscriminately wherever a place for disposal was found.

The socio- economic status of most of the people in the catchment area is poor. Most of those who are self employed are involved in vending. Some of the people in the area do not even have any means of livelihood though there are some who can be said to be managing. Most of the people in George community are not in formal employment. Men are involved in charcoal selling, shoe, bicycle, Television (TV) and Radio repairing while women sell vegetables and other food stuff both at the market and at home.

3.3 STUDY POPULATION

The study population is the total population from which the study unit will be drawn from (Basavanthappa, 2006). The study population consisted of the head of households aged 18 years and above, both males and females who live in George compound, Lusaka.

3.3.1 Target Population

A target population is the population that the researcher wishes to study to make a generalization (Basavanthappa, 2006). The units that make up the population must be described in terms of characteristics that clearly identify them.

The target population was the head of households, males and females aged 18 years and above who had lived in George compound for 5 years or more because they were able to give data on the contributing factors of recurrence of cholera outbreaks in their area.

3.3.2 Accessible Population

The accessible population refers to the aggregate of cases which conform to the designated criteria and which is available to the researcher as a pool of subjects for the study present at the time of the study (Basavanthappa, 2006). The aggregate must meet the criteria for inclusion in the study and that is available to the researcher. In this case, the accessible population was the head of households, males and females aged 18 years and above who were available at the time of collecting data in the month of October 2010.

3.4 SAMPLE SELECTION

Sampling is a process of selecting a subset of a population in order to obtain information regarding a phenomenon in a way that represents the entire population (Basavanthappa, 2006). This will also explain how the district, compound and the respondents will be selected.

The study site George compound, Lusaka was conveniently selected because every year the compound experiences cholera outbreaks and many people are affected and lives are lost due to the disease. George compound was also selected because it was easily accessible to the researcher and they were few costs involved. The researcher was also familiar with George compound and this enabled her (the researcher) collect data from the respondents within the stated time.

The respondents were selected using stratified sampling method. Stratified sampling is the selecting of the sample that includes groups/strata study units (Basavanthappa, 2006). This sampling method was used by dividing George compound into 10 zones and later systematic sampling was used. A systematic sampling was formed by selecting every n^{th} item from the universe where 'n' is referred to the sampling interval. The sampling interval was determined by dividing the size of the study population with the sample size. In this case the study population of 25 households from each zone was selected. The needed sample size was 50 and sample interval

was 5. Therefore, every 5th household in each zone was included in the study and a questionnaire was administered.

This type of sampling reduced biasness; it was easier to perform and was less time consuming however, the method did not ensure that the characteristics in the sample were similar to the whole population.

3.5 SAMPLE SIZE

Sample size is the number of subjects in a sample (Basavanthappa, 2006). A sample size of 50 households was used. This was because 50 is the minimum required for the Bachelor of Science in nursing degree. The minimum sample size was used due to limited time, inadequate human resources and financial resources.

3.5.1 Eligibility Criteria

An eligibility criterion is used by the researcher to designate to specific attributes of the target population and to select participants for a study (Polit and Beck, 2006).

3.5.2 Inclusion Criteria

Inclusion criteria involve participants who are eligible to participate in the study. Eligible participants were heads of the households of males and females aged 18 years and above who were residents of George compound for 5 years or more. The researcher selected this group because they would comprehend the questions and they had stayed longer in the research setting and knew the recurrence of the disease outbreak.

3.5.3 Exclusion Criteria

Exclusion criteria involve participants who should not be included in the study (Polit and Beck, 2006). The researcher did not include households who had not stayed for the 5 years in George compound. This group would not be able to answer the questionnaire comprehensively as they did not stay in the community for a long time to know the problems that affected the people.

3.6 OPERATIONAL DEFINITIONS OF TERMS

Epidemic: An outbreak that has a sharp rise in occurrence and affects a lot of people.

Cholera: An acute, notifiable infectious disease characterized by passing profuse watery diarrhea and vomiting leading to dehydration.

Recurrence of Cholera: Repeated outbreak of cholera in every rainy season.

Good Sanitation: Proper disposal of refuse, human excreta, solid and liquid wastes.

Safe drinking water: Water which is not contaminated and causes no disease.

Knowledge on cholera: Information about cholera by the people acquired through health education.

Educational levels: Type of educational level one has attained at the time of administering the questionnaire.

Poverty: A state of being very poor, lack of essentials to sustain life.

3.7 DATA COLLECTION TOOL

Data collection is the process of gathering the information in the course of the study (Basavanthappa, 2007). Several tools can be used to collect the data and in this case a questionnaire was used to collect data during the study. A questionnaire is a paper and pencil instrument that a research subject is asked to complete (Basavanthappa, 2007). It is designed to gather data from individuals about knowledge, attitudes, beliefs and feelings and it comprises of a series of questions prepared by the researcher that are annexed and filled in by the respondents. In this study, data was collected using a structured questionnaire with open and closed-ended questions, comprising of 26 questions written in English. Open ended questions allowed subjects to respond to the questions in their own words while closed ended questions allowed the subjects to have a number of alternative replies such as 'YES or NO' from which the subjects were to choose the one that most closely approximated the right answer. Subjects who were unable to read and write English were assisted by the researcher to interpret in Nyanja and wrote for them since the researcher could speak and write Nyanja.

The strength of this type of data collection tool is that the interviewer is required to ask the questions as precise as they were designed. On the other hand, the major limitation is that the researcher would be tempted to further explain the meaning of the question during an interview,

hence, may modify the way in which the question was intended to be asked (Burns and Groves, 2005).

3.8 DATA COLLECTION TECHNIQUES

Polit and Beck (2006) define data collection technique as a procedure of collection of data needed to address a research problem.

In this study questionnaires were administered by the researcher or research assistant. The researcher and the researcher assistant introduced themselves to the respondents. The researcher went further to explain the purpose and instructions of the study to the respondents. The respondents were assured of confidentiality and anonymity was done by the use of serial numbers on the questionnaires and instead of their names. This enabled them to participate in the study free and without fear. The researcher had the informed consent signed by the respondents to signify voluntary participation and the researcher/researcher assistant signed as a witness.

The questionnaires were self administered and those were unable to read and write and the researcher interpreted the questionnaire for them. The researcher read through the instructions with the subjects and made appropriate clarifications. The respondents were given 30-45 minutes in which to complete the questionnaire, and then the investigator collected them. This was the description of how data was collected.

3.9 VALIDITY AND RELIABILITY

3.9.1 Validity

Validity is when the method is really measuring the abstract concept that it was purports to measure (Polit and Beck, 2006). Validity in this study was measured by using the same data collection instrument (Questionnaire) on all the respondents in the same way after pre-testing it.

Furthermore in this study, construct validity was used to determine the relationship among study variables. This helped to interpret and explain the variable relationships.

3.9.2 Reliability

Reliability refers to the accuracy and consistency of information obtained in a study (Polit and Beck, 2006). A reliable measure is one that if repeated a second time will give the same results as it did the first time. Reliability was upheld through making questions simple, concise and the subjects were only exposed to the tool once. To ensure reliability in this study, a Split Half test was conducted. The questionnaires were split up into 2 halves and the results were compared to determine the internal consistency of the test. The 2 halves produced approximately equal scores; this concluded that the test was considered reliable.

3.10 PILOT STUDY

A pilot study is a small preliminary investigation of the same general character as the major study, which is designated to acquaint the researcher with problems that can be corrected in preparation for a large research projects or is done to provide the researcher with an opportunity to try out procedures for collecting data (Basavanthappa, 2006).

The purpose of the pilot study was to assess the practicability of the instrument for improving the instrument or assessing its feasibility. It helps the researcher to correct the data collection tool. The pilot study was conducted in George community. Seven respondents were sampled conveniently due to limited time to conduct a simple random sampling. Explanation for this study was given to the respondents and then permission was sought from them to participate. The questionnaires were tested by administering them to the respondents to answer. They were asked to respond to all the questions, marking those that may be difficult to answer. They were also asked to comment on the readability and the layout. After the pilot the research tool was found to be without errors and the questions were easy to answer as demonstrated by the way the respondents answered them.

3.11 ETHICAL AND CULTURAL CONSIDERATION

Ethics consideration means that the subjects' rights and the rights of others in the research setting are protected (Burns and Groves, 2005). The researcher had an obligation to obtain informed consent from the study participants. Such consent constituted underlying ethical premises of the research processes. It is for this reason that the researcher got a letter from the research supervisor to seek for permission from the Lusaka District Health Management Team (LDHMT) to conduct a study in George compound. The permission was granted which enabled the researcher conduct this research. The researcher got also permission from George clinic sister in-charge and the Neighborhood Health Committee (NHC) chairman for the study could be conducted in the community. Written consents were obtained from the participants after the full explanations on the purpose of the study and confidentiality and anonymity was upheld because no names were being entered onto the questionnaires, instead serial numbers were used. After seeking permission from the participants, those who wanted to participate in the study, the questionnaires were administered to be answered. At the end of the answering the questionnaire, the respondents were thanked for participating in the study.

CHAPTER FOUR

4.0 DATA ANALYSIS AND PRESENTATION OF FINDINGS

This chapter presents results of quantitative and qualitative findings. It also highlights on how data were analyzed and interpreted. The purpose of this study was to determine factors contributing to recurrence of cholera outbreak in George compound, Lusaka. A pilot study was conducted which served as a pre-test of the final study. The purpose of the pilot study was to show any weaknesses in the questionnaire in terms of content and order of questions and sections. Data was collected from respondents using an interview schedule. Fifty (50) respondents participated in the study, five (5) from each of 10 different zones in George compound, Lusaka.

4.1 DATA PROCESSING AND ANALYSIS

Data analysis is the systematic organization and synthesis of research data and the testing of research hypothesis using those data (Polit and Beck, 2009). In this research, both quantitative and qualitative data were collected and analyzed. Anomalies were identified and corrected after which data were checked for completeness, coding and thereafter; it was presented on the data master sheet and were analyzed and processed manually using and a scientific calculator. The data were also written on the computer using Statistic Package for the social science (SPSS) to make the work easy for analysis.

4.1.1 Quantitative analysis

Quantitative data are “data that are collected in a quantified (numerical) form” (Polit and Beck, 2008). Analysis of this type of data involves manipulation of numeric data through statistical procedures for the purpose of describing phenomena or assessing the magnitude and reliability of relationships among them. The interview schedules used were counted to ensure that the correct number was obtained. These were checked for accuracy, completeness and internal consistency. Data collected were entered on the data master sheet, totals were made followed by calculating percentages and the mean according to the questions and responses from the interview schedule.

4.1.2 Qualitative analysis

Qualitative data is information collected in narrative (non numeric) form, such as the transcript of an unstructured interview (Polit and Beck, 2008). The qualitative data were derived from the open-ended questions which were analyzed using content analysis. Each response was transcribed, read and reread to get the concepts in responses and then developed into themes that were used to categorize the content into meaningful groupings.

4.2 DATA PRESENTATION

The various data components were recorded on the data presentation master sheet which was partitioned into 4 (four) sections. These sections included the: demographic data, social, cultural and environmental factors and the last section was based on the knowledge related factors on cholera and its prevention.

Data were further presented on frequency tables and Pie charts which were expressed in percentages and cross tabulations. The use of frequency tables and Pie charts is suitable in data presentation because they summarize the findings in a meaningful way to enable the readers understand the findings of the research study. While it is important to note that, Cross tabulations are necessary and helpful in showing the relationships between variables from which meaningful inferences was drawn. The findings from this study were presented according to the sequence of questions and sections in the questionnaire.

4.2.1. SECTION A: DEMOGRAPHIC DATA

The demographic data consisted of factors which were categorized as according to gender, age, marital status, current employment status, number of people living in the house and their religious affiliation as shown in the table 4.1 on the next page.

TABLE 4.1: DEMOGRAPHIC DATA (n-50)

VARIABLE	FREQUENCY	PERCENTAGE (%)
Gender		
Male	13	26
Female	37	74
Total	50	100
Age		
18- 25 years	13	26
26-33 years	12	24
34- 41 years	15	30
42 years and above	10	20
Total	50	100
Marital Status		
Married	37	74
Single	6	12
Widowed	6	12
Divorced	1	2
Total	50	100
Current Employment Status		
Unemployed	25	50
Self employed	18	36
Formal employed	7	14
Total	50	100
Number of People Living in the house		
1 – 3	13	26
4 – 6	22	44
7 and above	15	30
Total	50	100
Religion		
Catholic	24	48
Protestants	24	48
Moslem	2	4
Total	50	100

The table above shows that more than half (74%) of the respondents were women while 13 (26%) of the respondents were men. The respondent’s ages ranged from 18 to 42 years and

above. Less than half (30%) of the respondents were aged 34 - 41 years, while 13 (26%) of the respondents were in the age category of 18-25 years.

In this study, half (50%) of the respondents were unemployed and more than a quarter (36%) were self employed. Almost half (44%) of the respondents had 4-6 people living in the house while 15 (30%) of the respondents had more than 7 people.

4.2.2: SECTION B: DISTRIBUTION OF SOCIAL AND ENVIRONMENTAL RELATED FACTORS

Data for this section investigated variables influenced recurrence of Cholera. These variables included Source of Water supply, Food Safety Environmental Sanitation and Knowledge levels on Cholera.

The social, cultural and environmental factors consisted of factors these are presented in table 4.2 and the pie charts as shown below.

Table 4.2: Social and Environmental factors (n-50)

VARIABLE	FREQUENCY	PERCENTAGE (%)
Pit latrines		
Yes	37	74
No	13	26
Total	50	100
Toilet Facility		
Have own toilet	37	74
Uses neighbor's toilet	13	26
Uses open space	0	0
Total	50	100
Washing hands with soap by respondents		
Washed hands with soap after using toilet	12	24
Never washed hands with soap after using toilet	11	22
Washed hands occasionally after using toilet	27	54
Total	50	100
Source of water supply		
Unprotected shallow wells	2	4
Communal Taps	45	90
Protected wells	3	3
Total	50	100
Treatment of drinking water		
Boiling	5	10
Chlorination	35	70
Nothing	10	20
Total	50	100
Refuse Disposal		

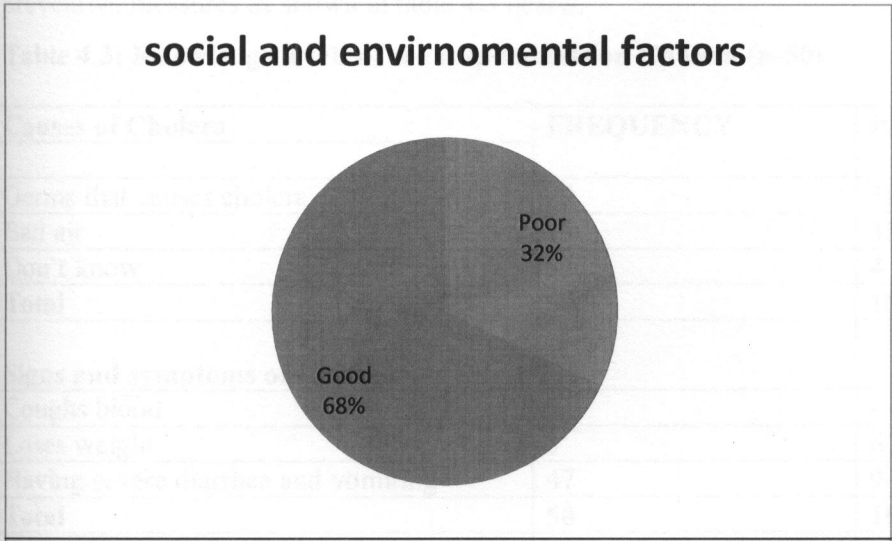
Open Space	7	14
Rubbish pit	13	26
Dust Bin	30	60
Total	50	100
Distance of Pit- latrines from water source		
Less than 10 meters away	20	40
More than 10 meters away (Far)	30	60
Total	50	100

As shown in table 4.2 above, slightly above half (54%) of the respondents washed hands occasionally with soap after toilet use while less than half (22%) of the respondents never washed their hands at all after toilet use. Slightly over three quarters (90%) of the respondents used water from the communal taps whilst 2 (4%) of the respondents used water from the unprotected wells. 3 (6%) of the respondents used protected wells for their water source. Almost 3/4 (70%) of the respondents chlorinated their drinking water to make it safe while less than quarter 10 (20%) of the respondents never treated their drinking water.

More than half 30 (60%) of the respondents used dust bins for refuse disposal and less than half 13 (26%) of the respondents used rubbish pits and while 7 (14%) used open space for their refuse disposal.

Slightly above half (60%) of the respondents had their pit latrines far enough from the water source while less than half (40%) of the respondents had their toilets near the source of water.

Figure 2: Social and Environmental Factors of Respondents (n=50)



More than half (68%) of the respondents had good social and environmental factors while 32% of the respondents was poor.

4.2.3: SECTION C: KNOWLEDGE RELATED FACTORS

This study component investigated the knowledge of the respondents on cholera and its preventive measures as shown in table 4.3 below.

Table 4.3: Knowledge levels of the respondents on Cholera (n-50)

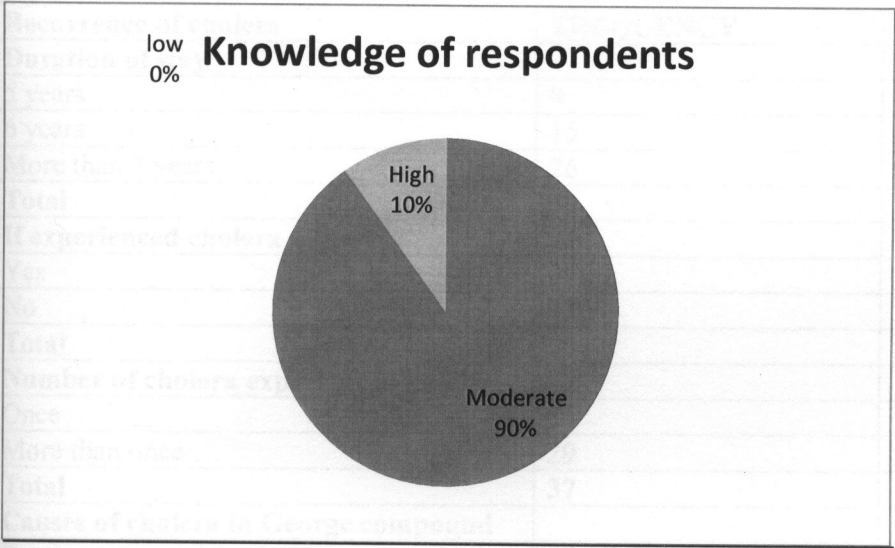
Causes of Cholera	FREQUENCY	PERCENTAGE (%)
Germ that causes cholera	29	58
Bad air	19	38
Don't know	2	4
Total	50	100
Signs and symptoms of Cholera		
Coughs blood	0	-
Loses weight	3	6
Having severe diarrhea and vomiting	47	94
Total	50	100
Self treatment of cholera		
Give traditional medicine	0	-
Give ORS	12	24
Take to the clinic	38	76
Total	50	100
Prevention of cholera		
Clean house and Toilet	15	30
Boil drinking water	10	20
Cover and eat hot food	7	14
Wash hands with soap after toilet	18	36
Total	50	100
Storage of left-over food		
Cover it and reheat before eating	32	64
Cover it and eaten cold in the next meal	7	14
Not covered and eaten cold	0	-
Put in the fridge and reheat before eating	11	22
Total	50	100
Times of washing hands		
Before serving food	6	12
After serving food	4	8
Before eating food	40	80
Total	50	100

Slightly more than half (58%) of the respondent responded that cholera was caused by a germ that caused cholera while (38%) of the respondents thought that cholera was caused by bad air. Slightly more than three quarters (76%) of the respondents had knowledge on how to manage cholera patients by taking them to the clinic for treatment while less than half (24%) of the respondents knew that giving ORS helped manage diarrhea before taking the patient to the clinic. More than half (56%) of the respondents responded that having no toilets contributed to the cholera outbreaks in George compound while slightly more than half (24%) of the respondents responded that the cause of cholera was drinking dirty water while (12%) responded that cholera was caused by overcrowding. Still others (8%) of the respondents responded that the disease was caused by poverty.

Less than three quarters (64%) of the respondents had knowledge that covering and reheating food before eating prevented cholera outbreaks while less than a quarter (14%) of the respondents covered the food but ate it cold and 22% of the respondents had knowledge that leftover food should be put it in the fridge and reheat before eating to prevent cholera.

More than three quarters (80%) of the respondents knew that washing hands before serving food prevented cholera while only (16%) of the respondents knew that washing hands before serving food prevented cholera and only (8%) of the respondents knew that washing hands after serving food prevented cholera.

Figure 3: Knowledge levels of respondents (n=50)



Majority (90%) of the respondents had moderate knowledge while only 10% of the respondents had high knowledge.

4.2.4 SECTION D: RECURRENCE OF CHOLERA

Table 4.4: Recurrence of Cholera

Recurrence of cholera	FREQUENCY	PERCENTAGE (%)
Duration of stay		
5 years	9	18
6 years	15	30
More than 7 years	26	52
Total	50	100
If experienced cholera		
Yes	37	74
No	13	26
Total	50	100
Number of cholera experienced yearly		
Once	8	16
More than once	29	58
Total	37	100
Causes of cholera in George compound		
Poverty	4	8
Overcrowding	6	12
Drinking dirty water	12	24
No toilets	28	56
Total	50	100
Have suffered from cholera?		
Yes	12	24
No	38	76
Total	50	100
If Yes what lead you to having cholera		
Drunk untreated water	3	6
Attended a funeral of a suspected cholera patient	2	4
Ate unwashed fruits from the market	1	2
Another member at home had cholera	6	12
Total	12	24

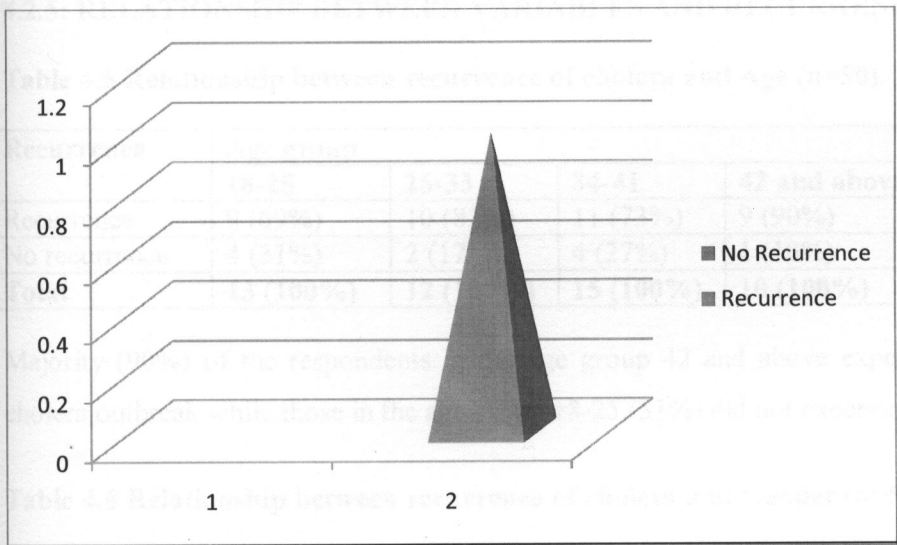
More than half (52%) of the respondents stayed in George compound for 7 years and more while 30% of the respondents stayed for 6 years.

Almost three quarters (58%) of the respondents experienced the recurrence of cholera outbreak while 16% experienced the cholera outbreak only once.

More than half (56%) of the respondents responded that recurrence of cholera is caused by lack of toilets while only 24% of the respondents responded that recurrence is by drinking dirty water.

24% of the respondents suffered from cholera of which 12% of the respondents was due to another member at home had cholera while 6% of the respondents drunk untreated water.

Figure 4: Recurrence of Cholera (n=50)



More than half (68%) of the respondents experienced the recurrence of cholera outbreak while 32% did not experience the recurrence of the outbreak.

Table 4.7 Relationship between recurrence of cholera and occupation (n=50)

Recurrence	Occupation			Total
	Unemployed	Self-employed	Formal	
Recurrence	21 (84%)	17 (79%)	5 (71%)	37 (78%)
No recurrence	4 (16%)	5 (23%)	2 (29%)	11 (22%)
Total	25 (100%)	22 (100%)	7 (100%)	54 (100%)

More than three quarters (84%) of the unemployed respondents experienced the recurrence of cholera while 79% of the respondents in the formal employment did not experience the cholera outbreak.

CROSS TABULATION

Cross tabulation or contingency tables allow visual comparison of summary data output related to two variables within the sample. The tables are a useful preliminary strategy for examining large amounts of data (Burns and Grove, 2005).

4.2.5: RELATIONSHIP BETWEEN VARIABLES AND RECURRENCE OF CHOLERA

Table 4.5 Relationship between recurrence of cholera and Age (n=50)

Recurrence	Age group				Total
	18-25	26-33	34-41	42 and above	
Recurrence	9 (69%)	10 (83%)	11 (73%)	9 (90%)	39 (78%)
No recurrence	4 (31%)	2 (17%)	4 (27%)	1 (10%)	11 (22%)
Total	13 (100%)	12 (100%)	15 (100%)	10 (100%)	50 (100%)

Majority (90%) of the respondents in the age group 42 and above experienced recurrence of cholera outbreak while those in the age group 18-25 (31%) did not experience the outbreak.

Table 4.6 Relationship between recurrence of cholera and Gender (n=50)

Recurrence	Gender		Total
	Female	Male	
Recurrence	27 (73%)	12 (92%)	39 (78%)
Non recurrence	10 (27%)	1 (8%)	11 (22%)
Total	37 (100%)	13 (100%)	50 (100%)

More than three quarters (92%) of the male respondents experienced recurrence of cholera outbreak while 27% female respondents never experienced the recurrence of cholera outbreak.

Table 4.7 Relationship between recurrence of cholera and occupation (n=50)

Recurrence	Occupation			Total
	Unemployed	Self employed	Formal	
Recurrence	21 (84%)	13 (72%)	5 (71%)	39 (78%)
No recurrence	4 (16%)	5 (28%)	2 (29%)	11 (22%)
Total	25 (100%)	18 (100%)	7 (100%)	50 (100%)

More than three quarters (84%) of the unemployed respondents experienced the recurrence of cholera while 29% of the respondents in the formal employment did not experience the cholera outbreak.

Table 4.8 Relationship between recurrence of cholera and number of occupancy (n=50)

Recurrence	Number of occupants			Total
	1-3	4-6	7 and above	
Recurrence	9 (69%)	18 (82%)	12 (80%)	39 (78%)
No recurrence	4 (31%)	4 (18%)	3 (20%)	11 (22%)
Total	13(100%)	22 (100%)	15 (100%)	50 (100%)

Majority 82% of the respondents living in the household more than 4 and above experienced the recurrence of cholera while only 31% of the respondents with 1-3 occupants did not experience the outbreak.

Table 4.9 Relationship between recurrence of cholera and source of water supply (n=50)

Recurrence	Source of water supply			Total
	Unprotected wells	Communal taps	Protected wells	
Recurrence	3 (100%)	36 (80%)	0	39 (78%)
Non recurrence	0	9 (20%)	2 (100%)	11 (22%)
Total	3 (100%)	45 (100%)	2 (100%)	50 (100%)

All (100%) of the respondents using unprotected wells as source of water supply experienced recurrence of cholera while 100% of the respondents using protected wells did not experience cholera.

Table 4.10 Relationship between recurrence of cholera and methods of treating drinking water (n=50)

Recurrence	Methods of treating drinking water			Total
	Boiling	Chlorination	No treatment	
Recurrence	0	31 (79%)	8 (80%)	39 (78%)
No recurrence	1 (100%)	8 (21%)	2 (20%)	11 (22%)
Total	1 (100%)	39 (100%)	10 (100%)	50 (100%)

More than three quarters (80%) of the respondents who never treated drinking water experienced recurrence of cholera outbreak while 100% of the respondents who boiled the drinking water never experienced the outbreak.

Table 4.11 Relationship between recurrence of cholera and hand washing with soap after toilet use (n=50)

Recurrence	Hand washing with soap after using the toilet			Total
	Washed with soap	Washed with soap at times	Never washed hands with soap	
Recurrence	9 (75%)	21 (78%)	9 (82%)	39 (78%)
No recurrence	3 (25%)	6 (22%)	2 (18%)	11 (22%)
Total	12 (100%)	27 (100%)	11 (100%)	50 (100%)

More than three quarters (82%) of the respondents never washed hands with soap after using the toilet experienced recurrence of cholera while 25% of the respondents washed their hands with soap did not experience the outbreak.

Table 4.12 Relationship between recurrence of cholera and distance of pit-latrines to water source (n=50)

Recurrence	Distance of pit-latrines from water source		Total
	10 meters away	Less than 10 meters	
Recurrence	24 (80%)	15 (75%)	39 (78%)
No recurrence	6 (20%)	5 (25%)	11 (22%)
Total	30 (100%)	20 (100%)	50 (100%)

More than three quarters (80%) of the respondents whose pit latrines were 10 meters away from the water source and those (75%) whose pit-latrines are near the water source experienced the recurrence of cholera while 25% of the respondents had pit latrines less than 10 meters from the water source did not experience the outbreak.

Table 4.13 Relationship between recurrence of cholera and Refuse disposal (n=50)

Recurrence	Refuse disposal			Total
	Rubbish pit	Dust bin	Open space	
Recurrence	7 (54%)	26 (87%)	6 (86%)	39 (78%)
No recurrence	6 (46%)	4 (13%)	1 (14%)	11 (22%)
Total	13 (100%)	30 (100%)	7 (100%)	50 (100%)

Majority of the respondents 87% and 86% who used dust bin and open space experienced recurrence of cholera while 46% of the respondents using rubbish pit for the refuse disposal.

Table 4.14 Relationship between recurrence of cholera and toilet facility (n=50)

Recurrence	Toilet facility			Total
	Used own toilet	Neighbor's toilet	Used open space	
Recurrence	27 (73%)	12 (92%)	0	39 (78%)
No recurrence	10 (27%)	1 (8%)	0	11 (22%)
Total	37 (100%)	13 (100%)	0	50 (100%)

More than three quarters of the respondents used the neighbor's toilet while only 27% of the respondents used their own toilet and had no recurrence of cholera.

Table 4.15 Relationship between recurrence of cholera and Knowledge levels (n=50)

Recurrence	Knowledge levels			Total
	Low	Moderate	High	
Recurrence	0	36 (80%)	3 (60%)	39 (78%)
No recurrence	0	9 (20%)	2 (40%)	11 (22%)
Total	0	45 (100%)	5 (100%)	50 (100%)

More than three quarters (80%) of the respondents who had moderate knowledge experienced the recurrence of cholera outbreak while only 40% of the respondents with high knowledge did not experience the outbreak.

CHAPTER FIVE

5.0 DISCUSSION OF FINDINGS AND IMPLICATIONS FOR THE HEALTH CARE SYSTEM

5.1 CHARACTERISTICS OF THE SAMPLE

The discussion of finding is based on data collected from a sample of fifty (50) respondents in George compound, Lusaka. George compound is densely populated as it was seen during the time of data collection. Most of its surrounding is heaped with garbage and there is poor drainage system. The houses are not big enough and the rooms ranged from 2-3 rooms. The houses are close to each other due to lack of space and some complained of lack of money to build big houses due to unemployment. Overcrowding was seen as a common feature in most of these households having more than 6 occupants. This can facilitate the quick spread of cholera during an outbreak due to overcrowding and houses which are close to each other. Very few households had toilets of their own and on inquiry; most of the respondents use the toilets from the nearby bars (drinking places) and neighbor's toilets.

In this study, the demographic characteristics of the respondents comprised of age, gender, marital status, religious denomination, number of occupants in the house and occupation. This was relevant to this study because it gave a background about the community the researcher was dealing with. The age category ranged from 18-50 and the majority of the respondents 15 (30%) were in the age group of 34-41 years.

In this study, nearly three quarters (74%) of the respondents were married while 36% of the respondents were unmarried. This suggests that most of the respondents are within the childbearing age and hence the increased population resulting in overcrowding which compromises the environmental and water sanitation. The number of occupants in the household revealed that less than half (44%) had 4-6 people living in a single household while 15 (30%) of the respondents had above 7 people living in one household. This possesses a great risk of quick spread of cholera during the outbreak due to overcrowding which results from poor environmental sanitation.

In this study, half (50%) of the respondents were unemployed while (36%) were self employed. These research findings signify the poverty levels in the area which resulted in the poor living

conditions as the respondents had no stable income to afford a decent living. This resulted in them getting involved in the small scale businesses such as street vending to earn a living. Street vending is a source of poor refuse disposal as garbage is indiscriminately disposed off on the open space leading to water source contamination of the unprotected wells especially in the rainy season because of floods and eventually causing cholera outbreak.

From the demographical data, it was revealed that slightly close to three quarters (74%) of the respondents were females and slightly above a quarter (26%) were males. These findings in this study could be attributed to the fact that men are usually out for work and others do businesses so at the time of interviews more females were available than males to answer the questionnaires as they are found at home taking care of their families while others do their businesses of vending by the roadside at home.

5.2 DISCUSSION OF VARIABLES

5.3 RECURRENCE OF CHOLERA

Recurrence is defined as the repeatedly occurring (Oxford English Mini Dictionary, 2008). In this study, recurrence means that the repeatedly occurring of cholera outbreak in George compound.

The result of the study showed that 68% of the respondents experienced recurrence of cholera outbreak while 32% of the respondents did not experience the outbreak as shown in figure 4. This could be attributed to the poor sanitation, a lack of hygiene and access to safe and clean water. The absence of a solid waste disposal system and potable water in informal settlements, and the unhygienic street vending of fruit, vegetables and other foodstuffs across the city of Lusaka have been identified as the main reasons for the spread of this highly contagious disease. The raw sewage from the pit latrines, often located near the shallow wells, contaminates the water sources.

These results are consistent with the findings by WHO (2010) that showed that cholera cases continues to occur every year.

As shown in table 4.7, the majority of the respondents are unemployed and 72% of the self employed respondents experienced the recurrence of cholera outbreak. This could be due to the fact that the poor economic status of the community members makes them unable to maintain a high standard of environmental hygiene, good sanitation in order to prevent the outbreak. This study revealed that 82% and 80% of the respondents had more than 4 occupants and they experienced recurrence of cholera as shown in the table 4.8. This could be due the fact that overcrowding help in facilitating the fast spread of cholera.

As shown in table 4.13, the majority of the respondents 87% and 86% who used dust bin and open space experienced recurrence of cholera while 46% of the respondents using rubbish pit for the refuse disposal. This is because proper refuse disposal is cardinal in the prevention of cholera outbreaks especially during the rainy due to floods which later cause water source contamination. This study revealed that the respondents whose pit-latrines were less than 10 meters to the water source experienced the recurrence of cholera. This increases the risk of water contamination by the fecal matter especially during the rainy season as the toilets get flooded and also underground contamination through sewer seepage. These findings were also reported by allafrica, (2010) indicated that the most common reason for recurrence of cholera is poor sanitation, a lack of hygiene and access to potable water.

5.4 SOCIAL AND ENVIRONMENTAL FACTORS

5.4.1 Hand Washing

This study revealed that 22% of the respondents never washed their hands with soap after using the toilet while more than half (54%) of the respondents washed their hands occasionally with soap after using the toilet as illustrated in Table 4.2. This is very risky because the respondents are supposed to maintain high standard of hand washing after using the toilet to prevent food contamination as they handle food. Dirty hands are a channel of food contamination if there are not washed thereby predisposing to recurrence of cholera outbreak in George compound.

These findings are similar to the study conducted by Zambia Central Board of Health and Lusaka District Health Management Team (LDHMT), (2006) on hand washing of the food handlers in

which it was revealed that contamination of food was due to poor hand washing. Hand washing therefore plays an important role in the control and prevention of cholera outbreaks. Ignoring this important practice of hand washing could lead to the cholera auto-infection and contracting cholera germs from the infected food as well as transferring the cholera germ to others from infected hands during hand shaking.

5.4.2 Source of water supply

The provision of safe water and good sanitation remains a critical factor in reducing cholera outbreaks in George compound.

This study revealed that more than three quarters (90%) of the respondents use water from the communal taps while 2 (4%) of the respondents still used water from unprotected shallow wells. Despite the majority of the respondents using water from the safe source as shown in table 4.2, there were still people using water from unsafe sources. Using unprotected wells by the residents of George compound have been a matter of concern despite the intensified health education on cholera prevention. Furthermore, this study showed that the shallow wells, which were a source of drinking water for some people in George compound, were contaminated with dirty running water much of which was from collapsed pit latrines and floods. This could be the reason why cholera still exists in George compound due to unsafe water source which contributes to the recurrence because of contamination by the bacteria that causes cholera (*Vibrio cholera*). These findings are in consistent with those studies conducted in Bangladesh by who (2010), Zanzibar, Zimbabwe by Anderson (2008) on water source used by the population, the results stated that the factors contributing to recurrence of cholera outbreak were as a result of usage of water from the shallow wells.

5.4.3 Distance of Pit Latrines from Water Source

This study revealed that 75% of the respondents as shown in the table 4.9 had their pit-latrine near the water source experienced cholera. The distance of the pit-latrine from the water source is due to the fact George compound is an unplanned settlement area and the houses built are not according to the Lusaka City Council plan hence the houses are very close to each other. As a result of this, there is no enough space to build toilets 10 meters away from the water source to

prevent water source contamination by the fecal matter either by underground contamination or during rainy season when the toilets get flooded. This makes it impossible to build and maintain good and hygienic pit latrines as recommended. This could be the reason why there is a recurrence of cholera outbreak in George compound due to the shortest distance between the toilets and the water source especially with the unprotected shallow wells. This is in agreement with the study findings from Zimbabwe by Anderson, (2009) on distance of pit-latrines to water source revealed that residents were forced to dig shallow wells that rapidly became contaminated by the raw sewerage and led a rapid outbreak of cholera leading to the death of 4288 people and infected 98,592 and this incidence was considered to be Africa's worst cholera epidemic in 15 years.

5.4.4 Pit Latrines

The results of this study showed that less than half (26%) of the respondents were using the neighbor's toilets while almost three quarters (74%) of the respondents use their own toilets. Toilets are critical in for proper fecal matter disposal in order to prevent cholera. The study further revealed that the respondents using the neighbor's toilet experienced the recurrence of cholera. This could be attributed to the fact hygiene is compromised when many people use one toilet hence increase the risk of cholera outbreak. Pit-latrines can facilitate fecal contamination of water sources especially those that are unprotected. In the rainy season as the toilets get flooded with the rainy water, fecal matter can easily contaminate the water source hence the recurrence of outbreaks of cholera. The toilets also were close to the houses and to water source due to limited building space as the houses are close to each other because of unplanned settlement in the compound.

These findings are in agreement with the study conducted in Uganda by Wanyama (2010) on factors contributing to recurrence of cholera in which the results reviewed that the epidemic was attributed to many villages not having pit-latrines around their settlements hence cholera was spread by water contaminated with human excrement.

5.4.5 Methods of treating drinking water

The treatment of drinking water to make it safe is one of the ways of preventing of cholera. This study showed almost three quarters (70%) of the respondents used chlorine as shown in Table 4.2. while 20% of the respondents never treated their drinking water and this increased the risk of cholera. Drinking untreated water can be a source of cholera outbreak due to contamination of the water by the vibrio cholera, the germ that causes cholera. This is surprising because despite the continuous health education by the health workers and the community health workers on causes of cholera and its prevention, the respondents still use water from unprotected shallow wells which are a source of cholera outbreak due to contamination by the vibrio cholera.

This could be the reason why cholera keeps on recurring in George compound.

Similar findings on contributing factors to recurrence of cholera in Zimbabwe by Anderson, (2009) revealed that untreated surface water for household use was a source of recurrence of cholera outbreak in various parts of the world. This was mostly due to contamination with dirty running water much of which was from collapsed pit latrines.

5.4.6 Refuse Disposal

This study revealed that more than three quarters (86%) of the respondents used open space to dispose their refuse experienced cholera while 54% of the respondents used refuse pits for their refuse disposal as shown in table 4.9. In addition, most of the refuse pits seen during data collection were full with a lot of flies and were not covered which facilitated the transmission of the vibrio cholera from the rubbish pits onto the food by flies. The high levels of poor environmental sanitation were as result of indiscriminate disposal which led to the compound accumulating garbage around. From the description above, this could be the reason why there is recurrence of cholera outbreak in George compound due to the improper refuse disposal because during the rainy season, the refuse is washed away into the unprotected wells and contaminates water leading to outbreaks of cholera. The unprotected wells also have stagnant water that easily allows the vibrio cholerae to settle and multiply in numbers making the water unsafe for human consumption hence causing recurrence of cholera outbreak.

These findings of the current study are consistent with those by WHO (2010), which found that indiscriminately refuse disposal contributed to the recurrence of cholera because the overall community hygiene and sanitation is compromised.

5.5 KNOWLEDGE RELATED FACTORS

5.5.1 Knowledge on recurrence of cholera outbreak

Knowledge is the awareness gained through experience or education (Oxford English Mini Dictionary, 2008). In order to prevent cholera recurrence the individuals need to know about what causes cholera outbreak, the presenting signs and symptoms of cholera, management and the prevention of cholera.

This study revealed that 90% of the respondents had moderate knowledge on the causes of cholera and the prevention of cholera while only 10% of the respondents had high knowledge on causes of cholera and its prevention as shown in table 4.3. The moderate knowledge demonstrated by the respondents in these age categories could be due to the experiences they had on cholera outbreaks in George compound, as the outbreaks occur every year. This knowledge could also be attributed to the continuous health talks on cholera and its prevention given at water points, in churches, during outreach programmes in the community as well as at the health centre by the community health workers and the members of staff especially the Environmental Health Technicians (EHTs) from the George clinic has helped the community to acquire knowledge on cholera prevention.

The knowledge on prevention of cholera will help the community take precautions or measures to prevent the recurrence of cholera outbreak. In order to attain high level of knowledge by the community, the health workers and community health workers should intensify the health education on cholera and its prevention to expel the misconception on causes of cholera as some respondents believed that cholera was caused by bad air.

The present findings seem are consistent with the research conducted in Tanzania by the East African Republic Health Association, (2006) found that many of the practices associated with cholera occurrence among respondents were due to low knowledge and water source. Therefore, knowledge about cholera and its prevention by the community members will help to prevent the

recurrence of cholera outbreak in George compound because knowledge will influence good health practices by the community to prevent cholera.

5.6 IMPLICATIONS ON THE HEALTH CARE SYSTEM

5.6.1 Nursing Practice

According to Oxford English Mini Dictionary (2008), practice is defined as the action rather than the theory of doing something. It is the actual performance of an activity in a real situation.

The implication of the health care system in Zambia has been on preventive measures and curative. However, more emphasis has been placed on preventive measures because it is cheaper to prevent than to cure. Nursing practice should be tailored to intensify the Information Education and Communication (IEC) on knowledge and most especially on practice since the community members had moderate knowledge on cholera and its prevention as revealed by this study finding. The health workers should also understand their role in prevention of the recurrence of cholera outbreak by intensifying the health education to help solve these problems. To achieve this, health workers should reinforce their practice to providing IEC in order to combat cholera. Community participation is very important and in this case, the community members will be encouraged to participate in community activities in order to promote health and prevent cholera in George compound. Despite having moderate knowledge on cholera and its prevention, the community could not adhere to hygienic practices that could help in the prevention of cholera such as hand washing with soap after toilet use and also before serving food. This failure by the community members to understand their role to maintain the good environmental conditions contributed to the recurrence of cholera outbreaks in George compound. It is from this point of view that the health workers and community health workers should work hand in hand by intensifying health education in the community so that good health practices are attained. This will help to reduce the high workload experienced by the nurses during cholera outbreaks.

5.6.2 Nursing Administration

This study revealed that 86% of the respondents disposed their refuse indiscriminately (open space) as indicated in table: 4.16. It also further revealed that the majority 73% of the respondents used unprotected wells for their water supply and some could not treat their water to make it safe for drinking. These research findings implied that the community members of George compound are at higher risk of experiencing the recurrence of cholera outbreaks. For this

reason, the health centre staff should improve on their management of cholera prevention programs by establishing chlorine sale points to enable community members access them at a minimal price. The health centre staff should maintain a good working relationship with the Non Governmental Organizations (NGOs) or collaborating partners such as the Society for Family Health to provide chlorine which the community can use to make their water safe especially during the cholera outbreak when the situation is critical. In addition, the nursing administration should allocate more nurses for outreach activities to carry out preventive activities on diarrheal diseases such as cholera so that the community members can be continuously sensitized on the causes of cholera and in return prevent the cholera outbreak by practicing the preventive measures. However, they have a challenge of not having funds to pay out the allowances.

5.6.3 Nursing Education

This study revealed that most of the respondents received the IEC from the nurses and other health workers. The curriculum for nurses should be regularly reviewed to accommodate new information on public health such as the prevention and control of cholera so as to enable the health training institutions produce knowledgeable, skillful and competent nurses who will be able to provide nursing services in the community on prevention of communicable diseases such as cholera. This study also revealed that some respondents had no knowledge on the cholera and its prevention, this entails that the nurses have to intensify their IEC to community members in order to educate and sensitize them on the causes of cholera and its prevention.

5.6.4 Nursing Research

The study unity of 50 respondents was used to present the cholera situation in George compound. The number was small due to limited time and limited funding; however, the results obtained gave an idea about the contributing factors to the recurrence of cholera outbreak. More studies are needed to assist in developing new tools which can be used to disseminate information on the causes and prevention of cholera in George compound. More organisations and the government should promote and support Research in nursing in the prevention and control of cholera.

5.7 RECOMMENDATIONS

A recommendation is the proposal as to the best course of action (Oxford English Mini Dictionary, 2008).

In view of these study findings, it identified the gaps in areas social, cultural and environmental factors, knowledge and practice and the researcher has made the following recommendations;

5.7.1 To the District Health Management Team (LDHMT)

- i. The Lusaka District Health Management Team (LDHMT) should collaborate with other cooperating partners such as the Lusaka city council and Society for Family Health (SFH) to community sensitization on cholera prevention and providing bottled chlorine supplies for the community members to chlorinate their drinking water and as also to provide financial assistance to train more community health workers to assist in delivering health messages to the community on cholera prevention. The Lusaka City council should work hand in hand with the waste management team to collect garbage, interested in prevention of diarrheal diseases in order to combine effort to fight further recurrence of cholera outbreak in George compound.
- ii. The LDHMT through the Ministry of Health (MOH) should recruit more EHTs so that they can continue to deliver health services to the community members by health education. Currently the clinic has only one (1) EHT and cannot manage to go round the community giving health education on prevention of cholera as well as carry out inspections of toilets and testing of water source and chlorination of unprotected wells. The LDHMT should also provide the IEC materials needed for health workers to disseminate the information about cholera and its prevention.
- iii. The district health office should ensure that the logistics are available at all times such as chlorine, chlorine powder to disinfect the toilets, chemicals to disinfect the shallow wells etc to prevent the recurrence of cholera outbreak.

5.7.2 To George Health Centre

- i. The health centre members of staff should work hand in hand with the community health workers and the Neighborhood committee to continue community sensitization on cholera and its prevention to create awareness on the factors contributing to the

recurrence of cholera in George compound. They should emphasize practicing because knowledge alone cannot prevent cholera.

- ii. The health centre to work in collaboration with the influential people such as the councilors, church leaders, Headmen, headmasters from schools and traditional healers to sensitize the community on causes of cholera and its prevention.
- iii. All health workers should use every opportunity as they encounter with the clients to educate them on cholera and its prevention.
- iv. The Environmental Health Technician (EHTs) should intensify the inspection of the water source, public toilets in bars and market places for environmental sanitation in order to identify early the suspected sources of infection and prevent the possible outbreak. They should continue working with the community health workers.
- v. The health centre to embark on fundraising suggestions to improve and sustain the cholera awareness program.

5.8 DISSEMINATION OF FINDINGS

According to Polit and Hungler (2006), dissemination of findings entails the measures that would be undertaken to communicate the findings from the study to others. The researcher will make a presentation on the findings of the study to Lusaka District Health Management Team and the health centre in-charge and the community. A copy of the summary of research findings will be provided to the health centers (study locations) where the community members can access the information on research findings. Other copies will be made available to key stakeholders; the District Health Office (DHO), the University of Zambia through the School of Medicine library and the Department of Nursing Sciences (DNS).

5.9 LIMITATIONS OF THE STUDY

The limitation of the study was that the sample size of 50 respondents was too small to be representative of George compound. Therefore, generalization of the results cannot be made the whole George compound, or other compounds in Lusaka and later on to the whole Zambia. Some respondents were not found at home according to the sampling method that was used. The next house had to be automatically picked. Time allocated in which to carry out the research was not adequate as the researcher had other courses to do alongside with research. The research

should therefore be conducted at the end of the courses when most of the courses have ended, this will give time to the research to conduct the research and be able to write within the stated time.

5.10 CONCLUSION

This study was carried out to determine the contributing factors to the recurrence of cholera outbreak in George compound, Lusaka. The research findings have shown that although the respondents had moderate knowledge regarding prevention of cholera, other factors influenced the recurrence of cholera outbreak in George compound. These factors such as the usage of unsafe drinking water and poor hand washing practices contributed to the recurrence of cholera. The high levels of unemployment of the residents of George compound, worsened the situation because it made it more difficult for the community members to improve their standard of hygiene.

This study also revealed that some people had moderate knowledge on the causes of cholera and its prevention as they were able to identify the most critical areas of causes of cholera such as lack of toilets and usage of water from the unprotected shallow wells. A few households were still using the unprotected wells for their water supply as well as using open space to dispose their refuse despite the health education on cholera and its prevention. This could contribute to the recurrence of cholera outbreak in George compound even though the percentage is low as it *is highly infectious. Since practice was a problem identified as reviewed by the study, the researcher feels that another research can be conducted to determine factors leading to poor health practices by the community members in George compound in order to prevent recurrence of cholera outbreaks.*

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UNIVERSITY OF ZAMBIA

SCHOOL OF MEDICINE

DEPARTMENT OF NURSING SCIENCES

STRUCTURED INTERVIEW SCHEDULE FOR THE COMMUNITY

Subject: Factors Contributing to Recurrence of Cholera Outbreak in George, Lusaka

Questionnaire number.....

Date of interview.....

Name of Zone.....

Instructions to Interviewer

1. Introduce yourself to the respondent
2. Explain the purpose of the study
3. Assure the respondents of confidentiality so that respondents are free to give accurate information to the best of their knowledge
4. Please tick the appropriate response in the space provided
5. Interview Head of household aged 18 years and above who have lived for 5 years or more in George compound

SECTION A

Demographic Data

1. Sex of the respondent	<div></div> <div></div>	<div></div>
a. Male		
b. Female		
2. How old are you?	<div></div>	<div></div>
3. What is your marital status?	<div></div> <div></div> <div></div> <div></div>	<div></div>
a. Married		
b. Single		
c. Widower		
d. Divorced		
4. What is your current employment status?	<div></div> <div></div> <div></div>	<div></div>
a. Unemployed		
b. Self employed		
c. Formal employed		
5. How many people live in your house?	<div></div>	<div></div>
6. What is your religion?	<div></div> <div></div> <div></div>	<div></div>
a. Catholic		
b. Protestant		
c. Moslem		

13. Where do you dispose your rubbish/refuse?

- a. Rubbish pit
- b. Dust bin/sack
- c. Open space

--

14. Is your garbage collected away from the compound?

- a. Yes
- b. No

--

15. If the answer is yes who does the collection?.....
.....

SECTION C
Knowledge on Cholera

Now I would like to ask you a few questions about your views regarding cholera and its prevention.

16. What causes cholera?

- a. Germs
- b. Bad air
- c. I don't know

--

17. How do you know that a person has cholera?

- a. Coughs out blood
- b. Losses weight
- c. Having severe diarrhea and vomiting

--

18. What do you do when a member of your household develops severe diarrhea and vomiting?

- a. Give traditional medicine and keep in the house
- b. Give ORS
- c. Take the patient to the clinic

--

19. Can cholera be prevented?

- a. Yes
- b. No
- c. Not too sure

--

20. If your answer is YES to question 19, explain how it can be prevented?

.....
.....

21. Do you eat leftover food?

- a. Yes
- b. No

--

22. If yes, how do you store and use the leftover food?

- a. Cover it and reheat before eating
- b. Cover and eaten cold in the next meal
- c. Not covered and eaten cold in the next meal
- d. Put in the fridge

--

23. When do people wash their hands?

- a. Before serving food
- b. After serving food
- c. Before eating food

--

SECTION D

Recurrence of Cholera

24. How long have you been staying in this compound?

- a. 5 years
- b. 6 years
- c. More than 7 years

--

25. Have you ever experienced any Cholera outbreak in this compound?

- a. Yes
- b. No

--

26. How many times have you experienced Cholera?

--

--

27. Has any of your family members suffered from Cholera?

- Yes
- No

--

28. If Yes what led to cholera?

- a. Drunk untreated water
- b. Attended a funeral for the suspected cholera patient
- c. Ate unwashed fruits from the market
- d. Another member at home had cholera

--

29. What do you think is the cause of cholera in this compound?

(Tick the appropriate answers)

- a. Poverty
- b. Overcrowding
- c. Drinking dirty water
- d. Not having toilets

--

Thank you very much for according me this chance of talking to you through this interview.

APPENDIX: 3 RESEARCH WORK SCHEDULE

	TASK TO BE PERFORMED	DATES	PERSONNEL	DAYS REQUIRED
1.	Literature review	Continuous	Researcher	
2.	Finalize research proposal	25 th - 7 th September, 2010	Researcher	14 days
3.	Data collection tool	17 th – 24 th September, 2010	Researcher	7 days
4.	Clearance from relevant authorities	7 th – 14 th October, 2010	Researcher Supervisor, LDHMT	7 days
5.	Training research assistant	19 th -20 th October, 2010	Researcher	2 days
6.	Pilot study	21 st – 22 nd October, 2010	Researcher and research assistant	2 days
7.	Data collection	25 th – 5 th November, 2010	Researcher and research assistant	10 days
8.	Data analysis	6 th – 12 th November, 2010	Researcher	6 days
9.	Report writing	13 th – 18 th November, 2010	Researcher	7 days
10.	Submission of draft research report to PBN	19 th – 30 th November, 2010	Researcher	11 days
11.	Finalizing research report and binding	2 nd - 8 th December, 2010	Researcher	6 days
12.	Dissemination of findings	10 th – 16 th December, 2010	Researcher	6 days
13.	Monitoring and evaluation	Continuous	Researcher	Continuous

APPENDIX: 2 RESEARCH GHANT CHART

Task to be Performed	Responsible Person	Time Frame			
		September	October	November	December
Finalise Research proposal	Researcher	↔			
Clearance	Researcher	↔			
Pilot Study	Researcher		◀		
Data Collection	Researcher		↔		
Data Analysis	Researcher			↔	
Report Writing	Researcher			↔	
Draft to DNS	Researcher				↔
Finalising Report	Researcher				↔
Monitoring and Evaluation	Researcher	←			→

APPENDIX: 1 BUDGET

BUDGET CATEGORY	UNIT COST, ZM.K	QUANTITY	TOTAL
1. Stationary			
Typing bond paper	25,000 x 1	3	75,000
Pens	500 x 1	5	2,500
Pencils	200 x 1	4	800
Rubber	1,500 x 1	2	3,000
Note book	5,000 x 1	2	10,000
Markers	2,000 x 1	3	6,000
Staples	12,000 x 1	1	12,000
Stapler	15,000 x 1	1	15,000
Manila files	1,500 x 1	4	6,000
Tipex	15,000 x 1	1	15,000
Research Bag	55,000 x 1	1	55,000
Scientific calculator	60,000 x 1	1	60,000
Subtotal			260,300
2. Typing Services			
Research proposal	3,000 per page	60 pages	180,000
Questionnaire	3,000 per page	10 pages	30,000
Photocopying (Questionnaire)	250 per page	50 x 10 pages	125,000
Typing draft report	3,000 per page	60 pages	180,000
Typing final report	3,000 per page	60 pages	180,000

Photocopying report	250 per page	60 pages	15,000
Binding the report	40,000	4 copies	160,000
Subtotal			870,000
3. Personnel			
Lunch allowance			
Researcher	35,000 x 1	10 days	350,000
Research Assistant	25,000 x 1	10 days	250,000
Transport allowance			
Researcher	20,000 x 1	10 days	200,000
Research Assistant	15,000 x 1	10 days	150,000
Subtotal			950,000
Total			2,080,300
10% contingency			208,030
GRAND TOTAL			2,288,330

BUDGET JUSTIFICATION

In order for the research to be carried out successfully, stationery, secretarial services and personnel was needed.

Stationary

The reams of paper were used for drafting the research proposal, interview schedule and research report. The scientific calculator was used during the data analysis. The other accessories were required for the routine collection of data. I needed pens for writing and pencils for coding and writing on the questionnaire by the respondents. A rubber was used to erase when making some changes.

Secretarial Services

Secretarial services were be used for typing, printing and photocopying the research proposal and the research report with the appendices. Binding of the research proposal and research report was also done.

Personnel

A Research Assistant was needed due to limited time and the nature of the study and that the respondents may not be readily found because some of the respondents went out for various types of work.

Lunch allowance was needed because data collection was taking 12 hours to try and find the respondents. Transport was also needed because the compound was far from the researcher and research assistant's home.

Contingency Fund

The contingency fund was needed to cater for the unforeseen expenses during the research period.

INFORMED CONSENT

Dear participant,

My name is Evelyn Chilufya, I am a student at the University of Zambia, school of Medicine in the Department of Nursing Sciences doing a Bachelor degree programme. I am required to undertake a research project in partial fulfillment of my degree in nursing. My topic of study is: “*Factors contributing to recurrence of cholera outbreak in George compound, Lusaka*”. The main objective of the study is to determine the factors contributing to recurrence of cholera outbreak.

You have been randomly selected to participate in this study and I wish to inform you that participation in this study is voluntary and therefore, you are free to withdraw at any stage of the study if you so wish. You will be asked some questions about cholera, its causes and prevention. Any information you will give will be kept in confidence and no name will be written on the interview schedule.

You will not receive direct benefit from the study or monetary gain. The information that you give will help in developing better understanding of factors that contribute to recurrence of cholera outbreak and such information will be used by health planners and other organizations in finding ways of helping to prevent further cholera outbreak.

I (participant’s name).....hereby understands the guidelines of this study and I am willing to participate in the study.

Dated this.....day of2010

Signature/thumb print of respondent.....

Signature of interviewer.....

Date.....

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DEPARTMENT OF NURSING SCIENCES

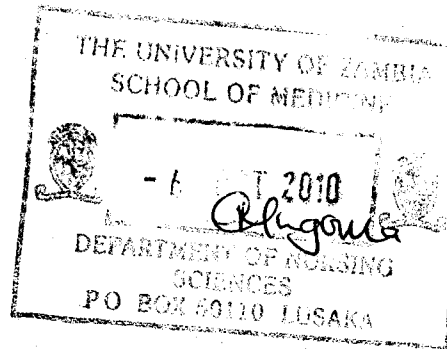
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P. O. Box 50110
Lusaka
Zambia

20th September, 2010

The District Medical Officer,
Lusaka Urban District Health Management Team,
P. O Box 50827,
Lusaka

UFS: The Head of Department
University of Zambia
School of Medicine
Department of Nursing Sciences
P. O. Box 50110
LUSAKA



Dear Madam,

**RE: REQUEST FOR PERMISSION TO CARRY OUT A PILOT STUDY IN
GEORGE COMPOUND, LUSAKA**

I am a fourth (4th) year Bachelor of Science in Nursing student in the Department of Nursing Sciences, School of Medicine at the University of Zambia.

In partial fulfillment of the BSc Nursing Degree Programme, I am required to conduct a research project. My topic is 'Factors contributing to recurrence of cholera outbreak in George compound, Lusaka'. Before the main study, I have to conduct a pilot study. I am therefore, asking for permission to administer the questionnaire to the community members of George compound from 21st -22nd October, 2010.

Your assistance will be highly appreciated.

Yours faithfully,



Evelyn Chilufya

THE UNIVERSITY OF ZAMBIA
SCHOOL OF MEDICINE
DEPARTMENT OF NURSING SCIENCES

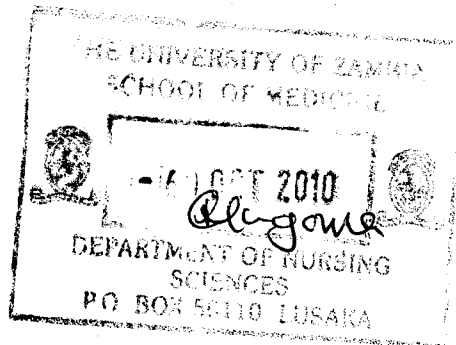
Telephone: 252641
Telegrams: UNZA, LUSAKA
Telex: UNZALU ZA 44370
Fax: +260-1-250753
E – mail: pbn@coppernet.zm

P. O. Box 50110
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20th September, 2010

The District Medical Officer,
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P. O Box 50827,
Lusaka

UFS: The Head of Department
University of Zambia
School of Medicine
Department of Nursing Sciences
P. O. Box 50110
LUSAKA



Dear Madam,

**RE: REQUEST FOR PERMISSION TO CONDUCT A RESEARCH IN
GEORGE COMPOUND, LUSAKA**

I am a fourth (4th) year Bachelor of Science in Nursing student in the Department of Nursing Sciences, School of Medicine at the University of Zambia.

In partial fulfillment of the BSc Nursing Degree Programme, I am required to conduct a research project and contribute to the body of knowledge in any topic or field under study. My topic is "Factors contributing to recurrence outbreak of cholera in George compound, Lusaka. The aim of the study is to identify factors that contribute to recurrence cholera outbreak in George

compound, Lusaka. The data will assist in preventing the outbreak of cholera in George compound.

Therefore, am asking for your permission to conduct this research in George compound, Lusaka.

Your positive response will be highly appreciated.

Yours faithfully,

A handwritten signature in cursive script, appearing to read 'Evelyn Chilufya'.

Evelyn Chilufya

P.O. Box 50827
Lusaka
Tel: +260-211-235554
Fax: +260-211-236429



Republic of Zambia

MINISTRY OF HEALTH

LUSAKA DISTRICT HEALTH MANAGEMENT TEAM

In reply please quote

No.....



15th October, 2010

The Health Centre In-Charge
George Health Centre
LUSAKA.

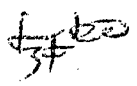
Dear Madam,

RE: REQUEST FOR PERMISSION TO CONDUCT A RESEARCH.

This serves to introduce Evelyn Chilufya a fourth year student at the University of Zambia, who would like to conduct a research on factors contributing to the re-occurrence of cholera outbreak in George Compound as it is a partial fulfillment of a degree programme she is doing. District Health Management Team have no objection to her request as long as it is done with minimal disruption of day to day activities.

Please give her the support she needs.

Yours faithfully,


for **Dr. C. Mbwili-Muleya**
District Medical Officer

cc. Evelyn Chilufya.

