KNOWLEDGE ASSESSMENT OF LEAD POISONING PRECAUTIONARY MEASURES AMONG WOMEN OF CHILD-BEARING AGE IN HIGH LEAD EXPOSURE RESIDENTIAL AREAS IN KABWE DISTRICT

BY

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A dissertation submitted in partial fulfilment of the requirement for the degree

Master of Public Health

JUNE 2014
DECLARATION

I hereby declare that the works presented in this study for the Master of Public Health has not been presented whether wholly or in part for any other study programme and is not being submitted for any other Masters programme. The result is entirely the result of my own independent investigation. The various resources to which I am indebted have been acknowledged.

Signed……………………………………………………………………

Stabbes Mpokota (Candidate)

I have read this dissertation and approve it for examination

Supervisor………………………………………………………………..

Signed……………………………………………………………………

Date………………………………………………………………………
APPROVAL

The dissertation of Stabbes M pokota has been approved as fulfilling the requirements for the award of the Master Degree in Public Health by the University of Zambia

Examiner 1

Signed…………………………………… Date……………………

Examiner 2

Signed…………………………………… Date……………………

Examiner 3

Signed…………………………………… Date……………………
ACKNOWLEDGEMENT

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ABSTRACT

Lead poisoning contributes 0.9 per cent of developing countries’ disease burden. Lead poisoning is due to excessive lead exposure to the human body. In Zambia, Kabwe is one of the most affected towns due to its previous mining activities. Studies done by ZCCM-IH and others show that currently, 35 per cent of Kabwe’s population or 13,952 households in Katondo, Railways, Chowa, Kasanda and Makululu are exposed to high levels of lead with a median soil concentration of above 500mg/kg, 48 per cent of child bearing age women were exposed to lead poisoning. This prompted ZCCM-IH to conduct sensitization. However, health institutional data has continued to show a high number of children being diagnosed with lead poisoning. Therefore the study attempted to answer the research question whether women of child-bearing age in Kabwe’s high lead residential exposure areas know the precautionary measures against Lead poisoning in their homes. Women who were able to answer/list at least eight types of lead poisoning preventive measures were considered knowledgeable.

The purpose of the study was to assess the extent of knowledge of precautionary measures among women of child-bearing age who stay in high lead poisoning exposure residential areas in Kabwe because of their triple roles they play in the prevention of lead poisoning in homes.

The study surveyed 430 households using structured interview schedule in high lead endemic residential areas of Makululu, Chowa and Kasanda. Makululu and Kasanda had two Focus Group Discussions each. The sample included women aged 13-49 years old. Quantitative data was analyzed using SPSS computer software package. The Chi-square (χ²) test was used to test for significant associations between independent and dependent variables (p-value < 0.05).

The results revealed that knowledge level of precautionary measures among women of child-bearing age was low at 40.9% (p-value = 0.0055) despite staying in high lead poisoning exposure residential areas and having heard of lead poisoning. This may explain why the number of children being diagnosed with lead poisoning is still high despite the sensitization and people are still constructing houses even in highly contaminated areas.

It is recommended that the government through Zambia Environmental Management Agency and other stakeholders should come up with new policies to combat lead poisoning exposure and also ways of creating awareness so that lead poisoning can be prevented in endemic areas. Ministry of Mines and Energy should come up with policies to discourage people from scavenging old mine site for scrap metal and mineral ores. Kabwe Municipal Council should stop giving out plots in high lead exposure areas. Ministry of Community and Development Mother and Child Health at district level should support community health activities in Lead poisoning prevention.
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**ACRONYMS**

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<th>Description</th>
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<td>B-Pb</td>
<td>Blood lead</td>
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<tr>
<td>CEP</td>
<td>Copper belt Environmental Project</td>
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<td>CSO</td>
<td>Central Statistics Office</td>
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<tr>
<td>dL</td>
<td>Decilitre</td>
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<td>ECZ</td>
<td>Environmental Council of Zambia</td>
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<tr>
<td>HBM</td>
<td>Health Belief Model</td>
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<tr>
<td>KAPB</td>
<td>Knowledge, Attitudes, Practice and Behaviour</td>
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<tr>
<td>KDCMO</td>
<td>Kabwe District Community Medical Office</td>
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<tr>
<td>Kg</td>
<td>Kilogram</td>
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<tr>
<td>Km</td>
<td>Kilometre</td>
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<td>KSDS</td>
<td>Kabwe Scoping and Design Survey</td>
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<td>LTSG</td>
<td>Lead Treatment Support Group</td>
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<td>Pb</td>
<td>Lead</td>
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<td>PM</td>
<td>Particulate Matter</td>
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<td>US EPA</td>
<td>United States Environmental Protection Agency</td>
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<td>WHO</td>
<td>World Health Organisation</td>
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<td>ZCCM-IH</td>
<td>Zambia Consolidated Coppermines – Investment Holding Plc.</td>
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ABSTRACT

Lead poisoning contributes 0.9 per cent of developing countries’ disease burden. Lead poisoning is due to excessive lead exposure to the human body. In Zambia, Kabwe is one of the most affected towns due to its previous mining activities. Studies done by ZCCM-IH and others show that currently, 35 per cent of Kabwe’s population or 13,952 households in Katondo, Railways, Chowa, Kasanda and Makululu are exposed to high levels of lead with a median soil concentration of above 500mg/kg, 48 per cent of child bearing age women were exposed to lead poisoning. This prompted ZCCM-IH to conduct sensitization. However, health institutional data has continued to show a high number of children being diagnosed with lead poisoning. Therefore the study attempted to answer the research question whether women of child-bearing age in Kabwe’s high lead residential exposure areas know the precautionary measures against Lead poisoning in their homes. Women who were able to answer/list at least eight types of lead poisoning preventive measures were considered knowledgeable.

The purpose of the study was to assess the extent of knowledge of precautionary measures among women of child-bearing age who stay in high lead poisoning exposure residential areas in Kabwe because of their triple roles they play in the prevention of lead poisoning in homes.

The study surveyed 430 households using structured interview schedule in high lead endemic residential areas of Makululu, Chowa and Kasanda. Makululu and Kasanda had two Focus Group Discussions each. The sample included women aged 13-49 years old. Quantitative data was analyzed using SPSS computer software package. The Chi-square ($\chi^2$) test was used to test for significant associations between independent and dependent variables (p-value < 0.05).

The results revealed that knowledge level of precautionary measures among women of child-bearing age was low at 40.9% (p-value = 0.0055) despite staying in high lead poisoning exposure residential areas and having heard of lead poisoning. This may explain why the number of children being diagnosed with lead poisoning is still high despite the sensitization and people are still constructing houses even in highly contaminated areas.

It is recommended that the government through Zambia Environmental Management Agency and other stakeholders should come up with new policies to combat lead poisoning exposure and also ways of creating awareness so that lead poisoning can be prevented in endemic areas. Ministry of Mines and Energy should come up with policies to discourage people from scavenging old mine site for scrap metal and mineral ores. Kabwe Municipal Council should stop giving out plots in high lead exposure areas. Ministry of Community and Development Mother and Child Health at district level should support community health activities in Lead poisoning prevention.
CHAPTER ONE

INTRODUCTION

Background

Young children and pregnant women are more prone to lead poisoning than others (Wang et al., 1997; Fewthrell et al., 2003; Gardella, 2001; WHO, 2000). The lead poisoning side effects are more severe in these people than others due to their bodies that are either growing or have babies in their wombs that are still growing. Children by nature tend to play in dirty surrounding and as they play put in their mouths dirty objects like toys, old leaded paint flakes or fingers. The children, therefore, tend to be exposed to lead contamination most of the time in residential areas that had high lead contamination. Some pregnant women eat soil that may be contaminated with lead hence endangering the life of their unborn children since lead passes through the placenta in the ratio of 1:1 (Wong et al., 2004). It is even worse for women of child-bearing age who work in lead contaminated working environment without protective wear or taking precautionary measures (Baker and Landrigan, 1997).

A child-bearing age woman is pivotal in the lead poisoning mitigation and prevention in the home because of her triple roles of child bearing, child rearing and domestic working. Child-bearing age women are the ones that conceive and kept the pregnancy until birth or abortion. The knowledge, attitude and behaviour of these women has a profound effect on the unborn child in their wombs. What these women eat, drink, inhale, and do affect the unborn child in the womb especially when they stay in high lead poisoning exposure residential area. Excessive lead exposure may determine the outcome of the pregnancy like low birth weight of the baby (Han et al., 2000). Another role is child rearing that plays a very vital role in upbringing of
children in homes. The role determines how children’s attitude, knowledge and behaviour develop in the home. How children play, what they eat, and play with depends on mainly from what they have learnt at home. Lastly, domestic work encompassed most of the activities in the home like cooking, cleaning the surroundings, bathing children, washing of vegetable and fruits, and many more of such nature. The triple roles of women of child-bearing age makes them the right target for the focus of the study to assess their knowledge of precautionary measures and practice in high lead poisoning exposure residential areas.

Globally, lead in water, air, and soil contributes as much as 0.9 per cent of the disease burden in developing countries (Kjellstrom et al., 2009; WHO, 2002). Lead being one of the early metals used by people for a long time and also widely distributed in the earth’s crust was not without its side effects to the people who used and mined it (Kessel and O’connor, 2001; Warren, 2000). However, when lead exposure is localised its effects can even be worse. Studies show between 1979 and 1998, 200 lead poisoning related deaths were recorded in the United States (Kaufmann et al., 2003). Lead toxicity was first recognised as early as 2000BC. Nicander of Colophon wrote of lead –induced anaemia and colic in 250BC (Needleman, 2004). Child-bearing age women played a vital role in lead mitigation and prevention in homes at that time as they do this time. Currently, in larger cities of China, South Asia and Africa, 20% to 78% of children have elevated blood lead levels (Zimmermann et al., 2006).

Studies in other countries as well suggest that childhood lead poisoning is an urban health problem throughout the African continent (Nriagu et al., 2004). Recent prevalence studies showed that over 90% of children in urban and rural communities
of Cape Province, South Africa had blood levels equal or greater than 10micrograms/dl (Nriagu et al., 1992).

In Zambia, Kabwe town was a lead-zinc mining and processing town from 1902 to 1994. The town is located in Central Province of Zambia and lies 140km north of Lusaka. Kabwe shares boundaries with Chibombo and Kapiri Mposhi Districts. The town has an area of 1,577km² and a current population of 202,360 with a density of 129 persons /km² and a growth of 1.4 per cent (CSO, 2012). Child-bearing age women number 53,423 of the population. Currently, 35 per cent of Kabwe’s population or 13,952 households in Katondo, Railways, Kasanda, Chowa and Makululu are exposed to high levels of lead (ZCCM-IH, 2005). Institutional data showed that among 1,339 blood samples collected from children in 2007, 76% had blood levels that required treatment (above 65microgram/dl) or food supplement (20 -65microgram/dl). In 2008, 63% of 2,425 children’s blood samples required treatment or food supplement (Kabwe District Health Management Team Report on ICM, 2009).

Before the closure of the mines in 1994, mining was one of the major industry in Central Province that employed 2 % of the people in employment in the province in 1990 compared to 0.3 % by the year 2000 due to closure of Kabwe mines (Central Statistics Office, 2004). The worst affected was Kabwe town after the closure of the mines. During the same period the unemployment rates had doubled in Kabwe District from 14.8 % in 1990 to 28.7 % in 2000(CSO, 2004). The official closure of the mines had caused two major problems namely high unemployment levels resulting into high poverty levels and some retrenched former miners resorted to scavenging that resulted into some of the contamination of the environment.
However, due to weak law enforcement by the government, illegal mining is still going on since 1994.

The lead-zinc deposits at Kabwe were discovered in 1902, and were originally named Broken Hill after the deposits in Australia (ZCCM-IH, 2006). The mine site, occupies approximately 3 km², is located south of the town, to the east of the Great North Road from Lusaka. There was a lead ore smelting plant within the mine site (ZCCM-IH, 2003). The planned mine townships/settlements of Chowa and Kasanda are located to the North East and North West of the mine respectively. These settlements were planned to supply labour to the mines. Therefore, they were located very near to the mining activities. However, the old and inefficient lead mining and processing technology used at that time meant that more lead was released in the air, water, and soil. Anyangwe and others (2006) have argued that mining in towns like Kabwe had contributed to some environmental contamination of underground water and foodstuff like garden vegetables that contained relatively high lead, cadmium and zinc levels exceeding Codex food safety thresholds. The potential risk to the environment (soil, water and air) in Kabwe may affect the attainment of the Millennium Development Goal 7 that deals with environmental sustainability and target 10 that is concerned with reducing by half the population without sustainable access to safe drinking water and basic sanitation by 2015 (Millennium Development Goals Progress Report/Zambia/ 2013,2013). In fact, the mining sector until 1990 in Zambia had been mining and processing lead for almost a century without any statutory environmental pollution control regulation. During this period no proper environmental pollution control regulations were in place. The first Environmental Protection and Pollution Control Act NO.12 was enacted in 1990 (Laws of Zambia,
This law established a national regulatory body, the Environmental Council of Zambia (ECZ) now Zambia Environmental Management Agency (ZEMA).

Kabwe Central and the residential areas of Highridge and Luangwa were characterized by low housing densities relative to the mine townships. These townships were also close to the mines but not as close as the mine townships.

The unplanned settlements mushroomed adjacent to the mine townships to supply cheap labour to the mines and mine compounds as house servants, handy men and other unskilled jobs. The unplanned settlements, unfortunately, such as Makululu, Magandanyama near the lead tailings to the north and west of Kasanda, and that of Katondo and Waya are along the artery of the Main Canal that is the Kabwe Mine’s principal drainage system to the east of Chowa Township, make up the worst affected population (ZCCM-IH, 2006).

The social structure which is well represented and organized at the community level is the health service structure. Therefore, the population is organized according to a health centre catchment area. Some of the people who have settled in these compounds were former miners who were retrenched. Most of the worst affected people exposed to lead fall under the catchment areas of Makululu Health Centre, Chowa Health Centre, and Kasanda Health Centre. Makululu is unplanned settlement with the largest population exposed to lead. Kasanda Health Centre catchment area has planned former mine township Kasanda near the old mines and unplanned settlements like Magandanyama near mine dump site. Magandanyama settlement has both the highest concentration of soil lead(Pb) of 3008mg /Kg and atmospheric lead concentration of more than 0.5 microgram/m³(ZCCM-IH,2006).The construction of houses in Magandanyama is still going on even closer to the lead dump site than
before. Chowa Health Centre catchment area caters for Chowa, a former mine township, and two unplanned settlements of Waya and part of Katondo where Kabwe Mine principal surface drainage system passes to the east.

The result of having no legislation of environmental pollution control, old and inefficient lead processing technology is a high level of lead contamination in Kabwe. Kabwe soil contamination survey was performed by testing 0-10 cm depth of soil samples from approximately 1,000 locations in the area. The results of the Kabwe survey indicated that the soil over a substantial area was highly contaminated with lead. Kabwe as a whole, the area in which soil lead concentration exceeded the United States soil intervention threshold of 400mg/kg was approximately 40km² (United States EPA, 1994; Wixson and Davies, 1993). However, when a less strict threshold of 1000mg/kg was applied the area affected would be 21km². The soil of 1000mg/kg warranted cleaning up (ZCCM-IH, 2006). The survey revealed that the median concentration of soil lead in Kasanda compound was 3008mg/kg, Magandanyama 1613mg/kg, Chowa 1233mg/kg, Mutwi wansofu 1148mg/kg, Makululu 870mg/kg and Luangwa 507mg/kg all surpassed levels generally regarded as acceptable in international authorities with respect to residential areas (ZCCM-IH, 2006).

The soil lead contamination in Kabwe is attributed not only to the dominant fallout trend from the atmospheric contaminated plume especially west of the mines, and scavenging mine waste but also the axis of the Main Canal as a conduit for discharging water pumped from Kabwe underground mine workings. The other major factor of lead exposure was the dust inhalation among Kabwe residents due to
poor seasonal vegetation especially during the dry season. Particulate matter (PM10) were sufficiently small to reach the aveoli when they are inhaled. The highest concentration of dust particles where found in Kasanda atmospheric lead concentration (>0.5microgram/m³) that fell with distance from the mines (ZCCM-IH, 2003).

Seepages from the tailings were also known to contaminate the underground water and surface water. About 36 per cent of water samples collected from unfiltered samples of shallow ground water exceeded the WHO and US EPA threshold of 0.01mg/l of lead in Kabwe(ZCCM-IH, 2006). Dried tailings due to their high lead concentration as a result of the rudimentary old technology produced dust that was highly contaminated.

**Problem Statement**

Kabwe district has 13,952 households or 35 per cent of its 202,360 population residing in lead poisoning endemic areas (CSO, 2012, see Appendix I page 63). These residential areas has more than 500mg of soil lead concentration per kilogram of its topsoil (ZCCM-IH, 2006). Therefore, the people in these areas are exposed to high lead poisoning residential area of which 22 per cent are women of child-bearing age (ZCCM-IH, 2005; KDHO, 2009). The endemic areas are Chowa, Makululu, Railways, Katondo, and Kasanda Health Centre Catchment areas. Lead poisoning is one of the effects experienced by child-bearing age women and children who are exposed to excessive lead in their homes. There are many medical conditions associated with elevated blood lead levels (> 10µg/dl) in child bearing age women and children such as painless wrist drop, body weakness, anaemia, reduced cognitive
abilities, intestinal colic, loss of appetite, joint and muscular pains, constipation, persistent headaches (Park, 2009). However, that was not the subject of the survey. The interest of the survey was to assess to what extent the knowledge of the precautionary measures among women of child-bearing age in high lead endemic residential areas in Kabwe affected their residence because there are areas in Kabwe where is minimal lead exposure or no lead exposure. A survey of 2,500 residents was conducted by Copperbelt Environment Project in 2006 and it showed that 73 per cent of the sampled communities had relative geomean lead blood levels of above 10 microgram/dl among children between 0-7 years. The sampled communities had also 67 per cent of the children aged between 8-16 years with relative geomean lead blood levels of above 10 microgram/dl. Among women of child-bearing age 48 per cent of the sampled communities had relative geomean lead blood levels of above 10 microgram/dl (ZCCM-IH, 2006). However, even the so called relative safe communities that made up 27 per cent had relative geomean blood lead levels of 9.1 microgram/dl.

Lead poisoning had many adverse effects on children and pregnant women. High blood lead levels in a woman of child-bearing age had a great risk of transmitting lead to her foetus because lead crosses the placenta in the ratio of one to one. Lead crosses the placenta throughout gestation (Wong et al., 1992; Garella, 2001). The half life of lead was 30 to 60 days in blood and 20-30 years in bones (Gardella, 2001; ZCCM-IH, 2006). That prompted the Zambia Consolidated Copper Mines Investment Holdings to sponsor the Kabwe survey to carry out massive sensitization campaigns in the communities about the prevention of lead poisoning. However, the commencement and continued house construction in highly contaminated soils in Magandanyama and other surrounding places that had above 38 microgram/dl of
relative geomean blood lead levels among its community prompted the study. No study had been conducted to find out whether women of child-bearing age in high lead poisoning exposure residential areas knew and were carrying out the precautionary measures in their homes. The research sought to assess the knowledge levels in these lead endemic residential areas.
**Problem analysis framework**
The diagram shows the problem analysis framework indicating knowledge as a key determinate of lead poisoning precautionary measures

![Problem Analysis Diagram]

**Figure 1: Problem Analysis Diagram: Relationship link between factors and high blood lead (Pb) levels among women of child-bearing age and children**

Figure 1 shows how inadequate knowledge on lead precautionary measures may be influenced by attitudes, cultural beliefs, behaviour, educational level, and ignorance.
The study targeted women of child-bearing age because of their triple roles of child bearing, child rearing and domestic working.

The quality of the triple roles of women of child-bearing age with regards to their knowledge of precautionary measures is affected by educational status, parity, length of stay, source of health information, personal perception, subjective norm, occupation and the power to make a decision.

The knowledge level of lead poisoning exposure precautionary measures may be influenced by the educational level of a woman of child-bearing age. The more educated a woman, the less the child mortality rate in the family. Therefore, educated women tend to be more health conscious than the less educated women. This assertion is supported by a Zambian census of 2000 that states the lowest child mortality rate (CMR) was observed among women who had attained tertiary level of schooling while the highest child mortality was observed among mothers who had never attended school, 75 deaths per 1000 children compared to 25 deaths per 1000 children respectively (CSO, 2004).

The age of a woman of child-bearing age may influence her knowledge level of lead poisoning precautionary measures because older women tend to have more experience than younger women due to many years they had lived and these may influence their decision making process(Woods, 2006). Old women may have come into contact with somebody who had suffered from the adverse effects of lead poisoning like a child, friend or relative. Old women have been exposed to many health messages that may include messages on prevention of lead poisoning.

The number of children a woman has delivered (given birth to) has some effects on her knowledge on how to take care of herself or her children because in most cases
different children have different health needs. Therefore, women with many children
tend to be more experienced in child bearing and child rearing than women with no children. They may have attended many antenatal health services where lead poisoning lessons were taught. Some women when they are pregnant tend to have a habit of eating soil (geophagia) that puts them at greater risk of lead poisoning than those that do not eat soil. In these areas edible soil is readily available at the market place and sold at a minimal price although it is highly contaminated with lead (Pb).

Women who have lived long in high lead poisoning residential areas were expected to be more knowledgeable of the lead precautionary measures than women who have just come to this area. This is because they may experience some of the adverse effects of lead poisoning themselves or their children if they stay in an area for more than 30 days without taking precautionary measures due to accumulation of lead in their blood and bones because the half life of lead was 30 to 60 days in blood and 20-30 years in bones (Wong et al., 2004).

The type of work a woman of child-bearing age was doing has some effects on her knowledge of the precautionary measures. Women who worked in mining related areas tend to be more knowledgeable about the lead precautionary measures than those who did not work in mining related areas. Women who worked in mining related activities were more exposed to lead poisoning at work place than others. Marketers were the main target for lead poisoning messages especially those who sold vegetables and edible soil. Therefore; they were expected to be more knowledgeable.

The power to decide had a profound effect on the knowledge level of a woman of child-bearing age since she had to make an informed decision. Women who made
decisions in their families tended to be more knowledgeable in issues of health than those who depended on parents or spouses (Likwa, 2005). Wilkinson and Marmot (2003) say that health suffers when people have little opportunity to use their skills and have low decision making authority. A poor decision by these women could cost the life of somebody; therefore, they were forced to make an informed decision.

Women who perceived to be at risk or susceptible to lead poisoning exposure may want to know more on how they could avoid lead poisoning especially if they believed that it could be a life threatening condition and that they could benefit from it if they could avoid it in their homes than those women who thought that it was not a health problem.

Expectation from significant others such as parents, spouses or perceived social pressure may have a profound effects on what a woman wants to know in her life in order not be looked down by her peers or relatives (Ajzen and Fishbein, 1980). The perceived pressure may force a woman to know more about lead precautionary measures than the woman who was not under perceived pressure from significant others.

Lastly, reliable and credible source of health information need not be over emphasized because people tend to believe messages from credible sources. Valedeez and Bamberger (2000) argue that those individuals with whom the greatest number of people communicate and most frequently are indeed the preferred sources of information and are often recognized as leaders in their field. In this case health personnel. Health messages from health facilities or health personnel are considered to be more credible than from lay people because of the number of years health personnel have been trained in that field.
Research Questions

1. Do child-bearing age women in Kabwe’s high lead residential exposure areas know the precautionary measures against Lead poisoning in their homes?

2. What is the relationship between the levels of knowledge about lead exposure among women of child-bearing age in Kabwe and the number of precautionary measures taken in homes?

Formulation of Objectives

The study sought to assess the extent of knowledge among child-bearing age women of the precautionary measures against lead poisoning in high lead poisoning exposure residential areas.

Specific Objectives

Specifically, the study had the following objectives:

1. To establish whether the knowledge level of lead poisoning precautionary measures influences the residence of child-bearing age women in high lead poisoning exposure residential area.

2. To determine whether education level of a child-bearing age woman influences the knowledge of the precautionary measures against lead poisoning

3. To determine whether the source of information on lead poisoning among child bearing women influences knowledge of the precautionary measures.

4. To describe perceptions of precautionary measures against lead poisoning among child-bearing age women
Significance of the Study

The purpose of this study was to assess the extent of knowledge of precautionary measures against lead poisoning among child-bearing age women in high lead poisoning exposure residential areas. This research is significant because it has a bearing on policy formulation and has an impact on the health of the residence in lead endemic areas of Kabwe.
CHAPTER TWO

LITERATURE REVIEW

Literature Review

Lead is one of the early metals that have been used by people for a long time because it is widely distributed in the earth’s crust (Kessel and O’Connor, 2001; Warren, 2000). Its characteristics of being malleable, low melting point, no smell and taste and not easily dissolvable in water in its pure metallic state gave it an advantage over other metals. Therefore, for many centuries lead has been mined and used by people. However, its use has not being without its health side effects. Lead in water, air, and soil may contribute as much as 0.9 per cent of the disease in developing countries (Kjellstrom et al., 2006; WHO, 2002). However, when lead exposure is localised its effects can even be worse. Lead toxicity was first recognised as early as 2000BC. Nicander of Colophon wrote of lead –induced anaemia and colic in 250BC (Needleman, 2004).

Research has proved that young children and pregnant women are more prone to lead poisoning than others (Wang et al., 1997; Fewthrell et al., 2003; WHO, 2002). The side effects of lead poisoning are more severe in these people. A child-bearing age woman is pivotal in the lead poisoning mitigation and prevention in the home because of her triple roles of child bearing, child rearing and domestic working.

Manay et al. (2008) argue that the main sources of lead contamination in Uruguay like any developing country result from metallurgical industries, lead-acid batteries processing, lead wire and pipe factories, metal foundries, metal recyclers, lead water
pipes in old houses, scrap and smelter solid wastes. However, non- occupational lead exposure generally results from living in or near current or former manufacturing areas or improper handling of lead-containing materials or solid wastes. Leaded petrol used in vehicles was one of the major causes of lead poisoning before the introduction of unleaded fuel especially along the main high way in children and women of child-bearing age.

A survey of blood lead levels among young Johannesburg school children in South Africa revealed that maternal educational status, the presence of smokers in the home, and living in an informal dwelling were associated with elevated blood lead levels (Mathee et al., 2002). In Nigeria, Nriagu et al. (1997) found the prevalence of elevated blood lead levels among children age 5 years in Kaduna higher than other children and it was attributed to playing longer in contaminated outdoor environments, living in a house on a tarred road, and family owning a car.

The lead poisoning mitigating and prevention ways expected from child-bearing age women in the high lead poisoning exposure residential areas strategies include among others the following :-

- Keep the children away from the contaminants;
- Remove /replace contaminated soil;
- Till soil to bury ‘dilute’ concentration;
- Plant vegetation cover;
- Paving the walkways;
- Housekeeping including damp dusting and mopping the floor;
- Nutritional intervention;
- Hand washing;
- Blood lead level testing; and
- Soil amendments (phosphates)

Apart from the above mentioned, the woman should at least mention some cause or effects of lead poisoning. However theoretically, it is assumed that the determinants of certain behaviour and practices of residents in a target area depend on the underlying principles based on the Health Belief Model (HBM). According to Stretcher and Rosenstock (1997) HBM posits that if a woman is to perform a particular act such as avoiding lead exposure in the home, she has to believe that she is at risk of lead poisoning that could affect her personally rather than other people or society as a whole (See Appendix J). She should feel that lead poisoning was a serious health problem that could lead to death or other serious outcomes, if no action was taken. She should also believe that lead poisoning could be prevented in that the taking of action would prevent the lead poisoning and that the benefits of taking action would outweigh the disadvantages (Hubley, 1993). A woman may believe that she or her young child could get lead poisoning and that this would have serious consequences. However, she may not believe that lead poisoning could be prevented by following the preventive lead exposure measures in the home. The measures include the avoiding of total home exposure to lead such as:-

- Household hazards like old leaded paints, toys and other articles;
- House dust;
- Outdoor pollution;
- Using contaminated water;
- Eating contaminated vegetables;
- Outdoor walkway dust;
- Personal and family activities that expose them to lead; and
- Indoor air such as leaded fuel fumes.

This is because lead poisoning may occur in three ways such as:-

- Inhalation of fumes and dust of lead or its compounds;
- Ingestation in food or drink, through contaminated hands; and
- Skin contaminations of organic compounds of lead especially tetraethyl lead.

Inorganic lead cannot be absorbed through the skin (Park, 2009).

Although the Health Belief Model may provide the importance of perceived seriousness, susceptibility and preventability of lead poisoning, it does not consider social pressure from others such as family or community and ignores the enabling factors. Therefore, it is important to include social pressure and the enabling factors in the study. Ajzen and Fishbein suggested that the term attitude should be used for a person’s judgement of behaviour good or bad and worth carrying out. This judgement will depend on the beliefs held about the consequences of performing the behaviour. They argue that whether or not a woman forms an intention to perform behaviour will also depend on the overall pressure from those around her, the subjective norm and the enabling factors (Ajzen and Fishbein, 1980; Hubley, 1993).

Therefore, the perceived risks, perceived benefits, beliefs and perceived enabling factors in the prevention of lead poisoning will influence the behaviour and attitudes of a child-bearing age woman staying in high lead poisoning exposure residential area in Kabwe. One of the enabling factors may be decision making on family expenditure on health services. In Zambia, husbands make 50 per cent of the women’s financial decision on family expenditure. Among those who own decision
as ‘self’ showed 33.8 per cent while those with joint decisions, but empowered to make were few at 7.5 per cent (Likwa, 2005). However, Zambian women have the power to make household decisions and are most likely to have control over daily household purchases, while husbands have a final say over making larger household purchases (CSO, 2009). The women’s control over daily household purchases is significant in terms of undertaking lead precautionary measures in a home.

**Operation definitions**

**Woman of child-bearing age** – any woman between the age of 13 and 49 years inclusive, who stays in a high lead poisoning exposure area

**Exposure**- Proximity and /or contact with a source of a disease agent in such a manner that effective transmission of the agent or harmful effects of the agent may occur (Last, 1995).

**High lead poisoning exposure area** - residential areas where the median soil lead concentration was exceeding 500mg/kg in the Kabwe survey (ZCCM-IH, 2006).

**Knowledge** – ability of the interviewee to list or mention at least eight ways of preventing lead exposure in homes

**Precautionary measures** – Preventive ways of avoiding lead come into contact with people

**Lead**- a very corrosion-resistant, dense, ductile and malleable blue-grey metal that melts at 327ºc and boils at 1620ºc with a symbol **Pb**

**Lead poisoning**- medical conditions as a result of excessive lead exposure to the human body
Tailings – residual slurry of ground up ore that remains after minerals been largely extracted

10 microgram/dl - the threshold of blood lead used by WHO and other regulators in Europe and the USA for the protection of human health.

µg/dl - Microgram/decilitre

Endemic – unusual prevalence of lead poisoning in a geographic area.

Young Children – children under the age of 5 years

Elderly People – Adults above the age of 65 years.

Household member- members who live together in a single room or group of rooms or use the same kitchen or cookery pot (Valedez and Bamberger, 2000).
CHAPTER THREE

METHODOLOGY

Conceptual Framework

The description below shows the dependent and independent variables in relation to their operational indicators. The dependent variable is a measure of the problem under study and the independent variables describe the factors assumed to cause or influence the problem. The relationship between the dependent and independent variables is as described below and Table 1 shows variable identification and relationship.

Relationship between the following independent variables and knowledge level of lead poisoning exposure precautionary measures (dependent variable)

Level of education

The knowledge level of lead poisoning exposure precautionary measures may be influenced by the educational level of a woman of child-bearing age. The more educated a woman, the less the child mortality rate in the family. Therefore, educated women tend to be more health conscious than the less educated women. This assertion is supported by a Zambian census of 2000 that states the lowest child mortality rate (CMR) was observed among women who had attained tertiary level of schooling while the highest child mortality was observed among mothers who had never attended school, 25 deaths per 1000 children compared to 75 deaths per 1000 children in less educated women respectively (CSO, 2004).
**Occupation of woman of child-bearing age**

The occupation of a child-bearing age woman may influence her knowledge level of lead poisoning precautionary measures. Women who work in the mines or mine related activities may have more knowledge about the lead poisoning precautionary measures than those who do not work in the mines due to their nature of work and work orientation.

**Source of information**

The perceived reliability of the source of information may affect the knowledge level of child-bearing age woman. Health experts or health facilities may be considered as a more reliable source of health information than other sources.

**Personal perceptions**

The perception of a child-bearing age woman may influence her knowledge level with regards to the perceived severity of lead poisoning exposure, perceived susceptibility (risk) of herself, her young children and others, perceived beneficial effects to herself, her young children and others. She may also respond according to the expected norm from her husband, friend, parents and significant others.
Variable identification and relationship

Table 1: Variable and Operational indicators

<table>
<thead>
<tr>
<th>Sno</th>
<th>Variable</th>
<th>Operational Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Dependent Variable</strong></td>
<td>Proportion of women able to list/answer correctly at least 8 types of preventive measures of lead poisoning exposure in relation to:-</td>
</tr>
</tbody>
</table>
|     | Level of precautionary lead poisoning measures knowledge rated into adequate and inadequate | - Household hazards; old leaded paints;  
- toys;  
- House dust;  
- Outdoor pollution  
- Using contaminated domestic water  
- Eating contaminated vegetables  
- Personal and family lead exposure activities like dirty hands  
- Indoor air such as leaded fuel fumes |
|     | **Independent Variables** | |
| 1.  | Demographic characteristics | |
|     | A) Age | Age at last birth day as indicated |
|     | b) Marital status | Married; Single; Divorced; Widowed |
|     | c) Education status | Never been to school; Primary; Secondary; tertiary |
|     | d) Parity | Number of live children as stated |
|     | e) Occupation | Employed; Unemployed; Housewife; Business |
| 2.  | Decision making | Type of decision making in relation to Self decision; Husband’s decision; Both partners decision |
| 3.  | Source of information on lead poisoning | Friend; Health providers; Spouse; teachers; Radio; Television, Newspapers |
| 4.  | Risk perception(Susceptibility) | Self; Young children; Others |
| 5.  | Perceptions of positive and negative variation to lead poisoning | Reversible damage; Irreversible damage; Death Social pressure from: Husband ; Friend Parents; Others, specify Traditional norms |
| 6.  | Duration of stay in high lead poisoning exposure area | Short – less than 30 days  
Long -30days and more |
Study Design

It was a cross sectional study design applying both quantitative and qualitative methods.

Quantitative Design and Methods

This study conducted a household survey in high level lead poisoning exposure residential areas of Kabwe. The survey collected information on the levels of knowledge on the precautionary measures, characteristics, perceptions, sources of lead information among women of child-bearing age who stay in high lead poisoning exposure areas.

Study Sample

The study sample was drawn from known high lead poisoning exposure residential areas based on the previous researches done. The catchment areas of Chowa, Kasanda and Makululu Health Centres are the most affected areas in Kabwe. The sample was drawn from one area that had predominately unplanned settlement and the other that had planned settlement. The former was Makululu Health Centre and the latter were Chowa and Kasanda Health Centre. These areas were prioritized because of higher chances of finding child-bearing age women who were exposed to lead poisoning. The target population were child-bearing age women.

Sample Size Determination

Data were collected using two instruments; a structured interview schedule and Focus Group Discussion Guides. Furthermore, the instruments were pretested prior to data collection. Sample size was determined by the formula;

\[ N = \frac{(Z^2pq)}{d^2} \]
Where \( (p) \) is estimated level of knowledge in women 13-49 in Kabwe, \( (d) \) is desired width of confidence interval, \( (z) \) is the confidence level, and \( (q) \) is 100-\( p \).

Therefore, \( P = 50 \) per cent, \( d = 5 \) per cent, \( z = 95 \) per cent, \( q = 100 - p \)

\[
N = \frac{Z^2pq}{d^2}
\]

\[
= \frac{1.96^2(100-p)p}{d^2}
\]

\[
= \frac{3.84(100-50)50}{5^2}
\]

\[
= 3.84(2500)/25
\]

\[
= 384
\]

Adjusting for an expected response rate of 90 per cent, then the required minimum sample size is:-

\[
384/0.90 = 426.7 \text{ respondents}
\]

Nearest number 430 respondents
Makululu Health Centre catchment area has the highest number of households among the three most exposed to lead health centre catchment areas of Makululu, Chowa and Kasanda. Makululu has three times the number of households compared to each of the other two.

Table 2: Sample size proportional contribution of lead endemic households by health centre catchment areas

<table>
<thead>
<tr>
<th>SNO.</th>
<th>Health Centre Catchment area</th>
<th>Household numbers</th>
<th>Percentage</th>
<th>Sample size contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chowa</td>
<td>2,356</td>
<td>20</td>
<td>86</td>
</tr>
<tr>
<td>2</td>
<td>Kasanda</td>
<td>2,100</td>
<td>20</td>
<td>86</td>
</tr>
<tr>
<td>3</td>
<td>Makululu</td>
<td>7,736</td>
<td>60</td>
<td>258</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td>12,192</td>
<td>100</td>
<td>430</td>
</tr>
</tbody>
</table>

Therefore, Kasanda, Chowa and Makululu contributed 86, 86, and 258 child-bearing age women respectively towards the sample size of 430.

The above formulation gave 384 as the minimum required sample size. However, the study proposed to interview 430 persons which is more than the minimum for the results given that only 90% will respond so as to be statistically significant.


**Sampling Methods**

Non-probability procedure was used in the selection of health centre catchment areas with high lead poisoning exposure areas purposively. Makululu health centre catchment area has the largest population exposed. Kasanda health centre catchment area caters for former mine township Kasanda near the old mines and Magandanyama near mine dump site; this catchment area has both the highest concentration of soil lead (Pb) and atmospheric lead concentration. People are still extending their settlement in Magandanyama even closer to the lead dump site than before. Chowa health centre catchment area caters for Chowa, a former mine township, and two unplanned settlements of Waya and part of Katondo where Kabwe mine principal surface drainage system passes to the east.

**Sampling of study areas**

The study was conducted in Kabwe district as the district is known to have high lead poisoning exposure because of the past lead mining activities. Kabwe district has a population of 202,360 with 39,862 households of which 13,952 households are exposed to lead (CSO, 2012). The district has 44,520 child-bearing age women of which 18,951 are exposed to lead. Based on the results of the survey conducted by ZCCM-IH of 2006 that showed that certain areas of Kabwe were highly contaminated with lead surpassing the threshold of 400mg /kg (ZCCM-IH). Therefore, the health centres with the catchment areas that had high lead contamination were purposely selected in order to assess the knowledge of lead precautionary measures among women in the households. Makululu, Katondo, Chowa, Kasanda, and Railway Surgery health centre catchment areas are affected.
with lead exposure. A total of 13,952 households are exposed to lead. However, Makululu, Kasanda, and Chowa with 7,736; 2,356; and 2,100 households respectively were the most affected (Kabwe Health District Office, 2009; CSO, 2012).

**Sampling of Households**

The sample for this study was selected using systematic random sampling of households in each catchment area. This sampling procedure is reasonably easier to implement in times when there is no listing of households, especially for planned settlements where households are serially numbered. Whereas this might pose a challenge to implement in unplanned settlement like Makululu, the challenge was overcome by dividing households into sections from which households were randomly selected. The sections were made with the local Neighbourhood Health Committees (NHCs) who knew the area properly. The study population included households with women 13 to 49 years old that reside in high lead poisoning exposure residential areas in Kabwe.

**Sampling of Respondents**

Probability sampling procedure was used in the selection of women to ensure that every woman was chosen on the basis of chance. Systematic sampling, which is the selection at regular intervals, was used to select the respondents. A household was a sampling unit. Households with child-bearing age woman were selected randomly at an interval of every third household with eligible participant starting from the health centre.

The first respondent was selected randomly by simple lottery method from list of households around the health centre. Then a one in three systematic random
sampling technique was used to select households in the health centre catchment area. The oldest child-bearing age woman present when the researcher visited in the household was asked to participate in the study. The researcher then interviewed all women that met the inclusion criteria in the selected catchment areas. The method was chosen to give equal chance to all child-bearing age women in the high lead poisoning exposure residential areas to participate in the study thereby eliminating biases.

Once the interviewer completes the interview, she proceeded to the next systematically selected households based on the sampling interval until the required number households and individuals per catchment area are attained. In the event that no one was home at the selected household, the interviewer returned two more times later in the day to attempt to survey that household. If there was still no one available, the interviewer selected a replacement.

**Eligibility Criteria**

**Inclusion criteria**

The sample units included all women from 13 years to 49 years old in high lead residential areas households and willing to participate in the study. These women were interviewed for 20 minutes in Chowa, Katondo and Makululu.

**Exclusion criteria**

The sample excluded all women not in the age group 13 to 49 years in the households. Women that were not willing to participate did not form part of the sample. Women who did not stay in the high lead residential area for more than one month were also excluded.
Selection of Quantitative Data Collectors

The Health Centre in Charges for Makululu, Chowa and Kasanda were requested to call for a meeting with the Health Centre Committee Chairpersons. During the meeting the Principal Investigator (PI) informed the HCC chairpersons and the Health Centre in Charges that he was looking for research assistants from their catchment areas with minimum qualification of being females with grade 9 certificates, and residents of any of the three health centre catchments. The proposed selected research assistants were to be interviewed and undergo training before the final research assistants were picked.

Training of Data Collectors

This study used interviewers, note-takers, and transcribers to collect the data, take notes and translate the data. The data collectors or interviewers were oriented in data collection techniques including interviewing skills, consent procedures and other relevant information and skills.

The data collection team was recruited based on the competence in the language of the area where the data collection was planned to be conducted. All data collection team members were child-bearing age women.

Quantitative Data Collection Techniques and Tools

Structured interview schedule was used to collect the data in this study. The structured interview schedule as indicated in Appendix C was administrated using both open and closed ended questions. The structured interview schedules were used to collect individual data at household level. The number of households selected also represented the number of individuals to be interviewed. In total, 430 individuals participated in the household survey. The interview schedule was appropriate for it
allows us to bring out information about knowledge of precautionary measures among child-bearing age women in high lead poisoning exposure areas in Kabwe. This instrument allowed women that could not read and write to participate in the study therefore reducing biasness. The instrument was in Bemba and English. The instrument was divided into two sections. Section A sourced information on socio-demographic characteristics of respondents; Section B obtained information on Knowledge of lead precautionary measures among women.

**Interviews**

Participants were recruited from households within the sampled high lead poisoning exposure areas by trained interviewers and recruiter. Random selection was employed to avoid interviewing participants who share the same behaviour patterns.

Each interview was conducted by one interviewer for the household survey. All study materials were translated into Bemba. The interviews were conducted in the respondents preferred language.

**Quantitative Data Processing and Analysis**

Raw data was checked for completeness and accuracy and then entered manually into the computer. All data was coded. It was processed and analyzed using SPSS. Descriptive statistics and application of chi-square ($\chi^2$) test was used to determine the significant associations in the research. After quantitative data had been entered, a thorough data cleaning and validation process proceeded. Afterwards data were exported into the Statistical Package for Social Sciences which was used for analysis. This software has the ability to handle more complex tables and advanced statistics.
Qualitative Design and Methods

This part of the study used Focus Group Discussions (FDGs) to explore the study topic. This method of study was suitable for exploring perceptions, beliefs, practices, and generally for identification of enabling factors and barriers to acquiring knowledge on the precautionary measures in high lead exposure residential areas. The FGDs used open ended questions to allow the study participants share in-depth and personal information pertaining to lead poisoning exposure in the residential areas. There were two FGDs conducted in each of the two selected health centre catchment areas in Makululu and Kasanda. The FGDs were conducted among women who were residents of respective catchment areas most of whom were working as community health volunteers, or had stayed there for many years and were opinion leaders. The FGDs were conducted using a Focus Group Discussion Guidelines with open ended questions as indicted in Appendix B.

Qualitative Sample

The study depended on the qualitative data to assess the content and scope of the knowledge, source of lead information and perceptions on lead poisoning exposure among child-bearing age women in residential areas. Focus Group Discussions (FGDs) were used to collect qualitative data.

Selection of Focus Group Discussion Areas

Four FGDs were conducted: two at Makululu Health Centre in a catchment area that is predominately unplanned settlement with informal housing structures while the other two was at Kasanda Health Centre a catchment area that has predominately planned settlement with formal housing structures. The reason behind this was that both planned and unplanned settlements should be represented in the study.
Makululu was purposely selected because it was the largest unplanned settlement affected by lead poisoning while Kasanda was randomly selected between Chowa and Kasanda Health Centre catchment areas.

**Selection of Focus Group Discussion participants**

The health centre in charge was requested to call for a meeting with the Health Centre Committee (HCC) Chairperson before the selection of FDG participants. A criterion as indicated in the appendix D was given to the health centre in charge together with HCC chairperson.

**Qualitative Data Collection Techniques and Tools**

**Interviews**

Health Centre Committee members were called upon to facilitate the recruitment and organization of FGD participants. For the FGDs, each discussion was conducted by three persons: one moderator, one note taker, and another in charge of logistics. The moderator led the discussion and ensured that all questions were covered in the FGD Guide. The note–taker ensured that notes were taken in case a cassette recorder was faulty. The logistics person ensured that there were enough paper and note books for the note-taker. This person was not only responsible for making sure that the cassette recorder was working properly before the discussion began but also ensured that refreshment were provided on time during the discussion. All study materials were translated into Bemba.

In addition, Focus Group discussions were conducted to draw out in depth information on the topic and validate qualitative data. Two Focus group discussions were held each comprising ten eligible women from each catchment area.
Qualitative Data Processing and Analysis

All interviews were transcribed in verbatim, in the language of the respondents. The transcription of data and data collection was conducted simultaneously. A cassette recorder was used to record the data and upon completing the interview, the audio data were given to the transcribers for transcription.

Transcribed texts were translated into English by experienced and trained person. All translated texts were complete and not summaries of the transcribed original language text. All translations kept the intent of the original statement, while writing in correct English. The translator ensured that the translations were consistent across all texts.

For qualitative data, once transcribing of recordings was complete, themes were developed and the data were organised into logically connected ideas.

Team composition

The data collection team was composed of the moderator, a note-taker and a logistics person. These notes were used to provide more immediate access to the FGD data in order to begin determining emerging themes, identifying new questions to be incorporated into the discussion guide.

The data collection team was supervised by the Principal Investigator who conducted field observations, spot checks and participated in the interviews to provide feedback and also ensure that logistics and procedures were adhered to.

Quality Control Procedures

Quality assurance and control was at several levels:
Adequate orientation of field staff to ensure they were knowledgeable regarding the administration of the structured interview schedules

Use of recorders to ensure information captured was verified

Attention was paid to proper handling and protection of data and consent forms and appropriate management of the participants

After each day of field work, the Principal Investigator (PI) scrutinised all interview schedules and audio recordings to ensure that information was properly captured

**Pre – Test of Research Tools**

A pre-test was done in Kawama Health Centre catchment area after training three research assistants (Female community health volunteers). This catchment area is not included in the study. Five per cent (24) of the study population was interviewed. This was important for the researcher to evaluate and refine the methodology and questions. It also helped in the determination of the length of time it was taking to administer the entire instrument. It helped the investigator test the instrument’s completeness, clarity and accuracy.

**Data Management**

This study ensured that it managed the data based on standard data management principles and ethics.

Quantitative data

Once the household interviews were complete, the data were filed in box files with labels that indicated catchment area as identifiers of those interview schedules before data analysis.
Qualitative data

All interviews were transcribed in verbatim, in the language of the respondents. The transcription of data and data collection was conducted simultaneously. A cassette recorder was used to record the data and upon completing the interview, the audio data were given to the transcribers for transcription.

Transcribed texts were translated into English by experienced and trained person. All translated texts were complete and not summaries of the transcribed original language text. All translations kept the intent of the original statement, while writing in correct English. The translator ensured that the translations were consistent across all texts.

Ethical Considerations

Ethics Review: This study protocol was submitted to the Research Ethics Committee (REC) as required by the Graduate Studies Committee of the University of Zambia. The interview schedule and consent forms were appended to the protocol submitted and were reviewed by the REC. Permission to conducted the study was obtained from the Permanent Secretary, Ministry of Health and the District Community Medical Officer, Kabwe District Medical Office. This was meant to recognize all the concerned authorities and gained their cooperation.

a. Informed consent Procedures:

Prior to the commencement of the interview the interviewer guided the respondent through the consent process using the consent form for interview. Only after the respondent consented for the interview was the interview conducted. Informed consent was obtained from each of the respondents in a household.
The information given as part of the informed consent was aimed at ensuring that the potential respondent understood the nature of the research, its purpose and the procedures involved, the potential risks, inconveniences or discomfort and the extent to which the information collected in the study might benefit the individual and her community at large. The respondents were also informed of their right to refuse participation or to withdraw from the study at any time without affecting their right to services.

b. **Special Considerations for Legal Minors:**

The legal age of consent in Zambia is 18 years of age. This study was recruiting respondents starting from the age of 13 years. Since the respondents aged 13 are legal minors, consent for them to participate in the study was obtained from their parents or guardians. The parental consent was followed by assent from the minor before the interview was conducted.

c. **Ethics Training of investigators and study team:** Once the study was approved, the principal Investigator oriented study staff on key issues of ethics especially confidentiality and informed consent. The orientation also included the overall purpose and objectives of the study as well as the methodology.

d. **Procedures to Ensure Confidentiality:** To ensure confidentiality and anonymity of the respondents, no person identifiers were recorded on the interview schedule instead number codes were used. In addition, all collected data would only be accessible to those one the research team. After completing the study forms, each research assistant was required to submit the forms to the PI for quality checks and after which, all the forms were collected by the PI and filed in box files.
e. **Compensation:** Respondents who participated in the quantitative survey did not receive any participation fee or any form of compensation.

**Strengths and Limitations of the study**

**Strengths**

The selection of planned and unplanned Kabwe settlements increased the representativeness of the study since there are some differences of the standard of living between these two groups and possibly the access of mass media by location of persons in Kabwe.

**Limitations**

This study has suffered from the following limitations:-

a. Self-reporting of behaviour is a general limitation of behavioural surveys. It depends on the respondents’ ability to recall events and hence may not always be accurate. The respondent may give the interviewer during interviews what socially desirable answers hence reducing the accuracy of the data.

b. Household surveys only include people who regularly reside in homes. This means that people living on streets, at market places or employed women working during day time are not included in the survey. Therefore, household members that are frequent travellers stand a high chance of being missed by the survey team. To limit the number of absentees, an individual randomly selected for interview, was considered absent after three call back visits. Each call back visit and outcomes were recorded.

c. Refusal of participation: while refusal is the ethical rights of participants, this study endeavoured to anticipate and address any barriers to acceptance of
participation. It recruited only women as research assistants or data collectors and most of them were Community Health Volunteers working in that catchment area.

d. Non inclusive of men in the study because only the views of women were heard
CHAPTER FOUR

RESULTS

Section A: Quantitative Data

Description of sample

Figure 2: Household Distribution of 430 sampled in high lead exposed residential areas

From figure 2, it can be noted that the majority of the women resided in Makululu (55%). Chowa had 22% of the respondents whilst Kasanda had 23%.
Demographic characteristic Age

Figure 3: Age group

Figure 3 shows that 65% of the women interviewed were still youths in the age group 15-34 years and 32% were above 35 years. Women below 15 years were only 3%. 
Marital status

Figure 4: Marital status of the sample

Figure 4 shows that 64% of the respondents were married and 21% were single. Very few were widowed or divorced at 10% and 5% respectively.
Education

Figure 5 shows that the majority of the women had formal education up to primary level (51%) and those that went up to secondary (36%). About 7% of respondents reported as never been to school, while college education was only with 6% of the women.

Occupation

Figure 6: Occupation
Most of the respondents were housewives (37%) or business women (33%). Some of the women were employed in formal employment (13%) and 17% were dependents, school children or unmarried young women staying with parents.

**Level of Knowledge**

**Table 3: Level of Knowledge by heard about lead poisoning**

<table>
<thead>
<tr>
<th>Has heard of lead poisoning</th>
<th>Knowledgeable about lead poisoning precautionary measures</th>
<th>Total</th>
<th>$\chi^2$=7.71, df=1, P-Value 0.0055</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>176(40.9%)</td>
<td>207(48.1%)</td>
<td>383(89.1%)</td>
</tr>
<tr>
<td>No</td>
<td>11(2.6%)</td>
<td>36(8.4%)</td>
<td>47(10.9%)</td>
</tr>
<tr>
<td>Total</td>
<td>187</td>
<td>243</td>
<td>430</td>
</tr>
</tbody>
</table>

Table 3 shows that knowledge level of precautionary measures among child-bearing age women was low at 48.1% despite staying in high lead poisoning exposure residential areas and having heard of lead poisoning. This is consistent with a study in Hamburg where people with high Blood Lead Level were not aware that the water they were drinking was the cause of lead poisoning (Fertmann et al., 2004). There was a significant association between observed and expected frequencies for those who heard about lead poisoning and being knowledgeable about lead precautionary measures ($\chi^2$=7.71, df=1, P-Value 0.0055, very statistically significant).
Educational level

Table 4: Knowledge by Education level

<table>
<thead>
<tr>
<th>Formally educated</th>
<th>Knowledgeable about lead poisoning precautionary measures</th>
<th>Total</th>
<th>$\chi^2=3.9, \text{ df}=1, \text{ P-Value } 0.0483$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>180(42%)</td>
<td>221(51%)</td>
<td>401(93%)</td>
</tr>
<tr>
<td>No</td>
<td>7(2%)</td>
<td>22(5%)</td>
<td>29(7%)</td>
</tr>
<tr>
<td>Total</td>
<td>187</td>
<td>243</td>
<td>430</td>
</tr>
</tbody>
</table>

Table 4 shows that 93% of the respondents had at least a formal education although only 42% were knowledgeable about lead poisoning precautionary measures. This is similar to the study done by Central Statistics Office (CSO) that showed that educated women had reduced child mortality compared to uneducated women (CSO, 2009). There is some association between observed and expected frequencies for formal education and being knowledgeable about lead poisoning precautionary measures ($\chi^2=3.9, \text{ df}=1, \text{ P-Value } 0.0483$, statistically significant).

Residence.

Table 5: Level of Knowledge by residence

<table>
<thead>
<tr>
<th>Planned settlement(Formal house structures)</th>
<th>Knowledgeable about lead poisoning precautionary measures</th>
<th>Total</th>
<th>$\chi^2=4.3, \text{ df}=1, \text{ P-Value } 0.0381$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>70(16%)</td>
<td>68(16%)</td>
<td>138(32%)</td>
</tr>
<tr>
<td>No</td>
<td>117(27%)</td>
<td>175(41%)</td>
<td>292(68%)</td>
</tr>
<tr>
<td>Total</td>
<td>187</td>
<td>243</td>
<td>430</td>
</tr>
</tbody>
</table>
Table 5, shows that 68% of the respondents were from unplanned settlement while 32% were from planned settlements. 41% of the respondents in the informal house structures were not knowledgeable about lead poisoning precautionary measures compared to 16% of those in the formal house structures. However, there was significant association between residence and knowledge level about lead poisoning precautionary measures ($\chi^2=4.3$, df=1, P–Value 0.0381, statistically significant).

**Source of Information**

**Table 6: Level of knowledge by source of information**

<table>
<thead>
<tr>
<th>Formal source of information</th>
<th>Knowledgeable about lead poisoning precautionary measures</th>
<th>Total</th>
<th>$\chi^2=0.41$, df=1, P-Value 0.5220</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes (47%)</td>
<td>131(47%)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No (44%)</td>
<td>149(44%)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>280(46%)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>340(54%)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>620</td>
<td></td>
</tr>
</tbody>
</table>

Table 6 shows that slightly more than half (56%) of the women of child-bearing age were getting information from non-established source and those from established sources were 46%. Some women had more than one source of information. According to the survey which was carried out shows that most of the women get information about lead poisoning from their spouses or self, which makes the information not reliable (figure 6). Valadez and Bamberger (2000) argue that reliable information should be gotten from established sources like Heath Workers and Libraries. There was not a significant association between source of information and being knowledgeable about lead poisoning precautionary measures ($\chi^2=0.41$, df=1, P-Value 0.5220, not statistically significant).

**Perceptions**
Table 7: Common Perceptions on Lead Poisoning

Table 7: Perception of lead poisoning a problem vs knowledge level

<table>
<thead>
<tr>
<th>lead poisoning a serious problem</th>
<th>Knowledgeable about lead poisoning precautionary measures</th>
<th>Total</th>
<th>$\chi^2=0.0174, df=1, p$-value=0.8951, not statistically significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>yes</td>
<td>yes</td>
<td>176 (46%)</td>
<td>185(48.3%)</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>11(2.9%)</td>
<td>11(2.9%)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>187</td>
<td>196</td>
</tr>
</tbody>
</table>

Table 7 shows that 94.3% of the respondents felt that lead poisoning was a serious problem ($\chi^2=0.0174, df=1, p$ value=0.8951, not statistically significant). One of the women interviewed said ‘four of my children out of nine were on lead treatment at the clinic’.
Table 8: perception of home as source of lead poisoning vs knowledge level

<table>
<thead>
<tr>
<th>Getting lead poisoning in a home possible</th>
<th>Knowledgeable about lead poisoning precautionary measures</th>
<th>Total</th>
<th>( \chi^2 ) = 0.288, df = 1, p-value = 0.9622, not statistically significant</th>
</tr>
</thead>
</table>
| Yes                                    | Yes (47.3%)                                            | 176(47.3%) | [
| No                                     | No (36.3%)                                             | 156(36.3%) | [
| Total                                  | 199                                                   | 173               | 372(100%)                                      |

Table 8 shows that 89.2% of the respondents felt that it was possible to be exposed to lead poisoning in a home although their knowledge level was low (\( \chi^2 = 0.288, \) df = 1, p value = 0.9622, not statistically significant).
Table 9: Perception of lead poisoning as true information vs knowledge level

<table>
<thead>
<tr>
<th>Lead poisoning Information true</th>
<th>Knowledgeable about lead poisoning precautionary measures</th>
<th>Total</th>
<th>( \chi^2 = 1.5093, df = 1, p\text{-}value = 0.6802, \text{not statistically significant} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>176 (40.1%)</td>
<td>203 (47.2%)</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>19 (4.4%)</td>
<td>32 (7.4%)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>187</td>
<td>196</td>
</tr>
</tbody>
</table>

Table 9 shows that 88.1% of the respondents felt that the lead poisoning information was true despite having low knowledge level (\( \chi^2 = 1.5093, df = 1, p\text{-}value = 0.6802, \text{not statistically significant} \)).

Table 10: Perceptions on Lead Poisoning Exposure

<table>
<thead>
<tr>
<th>QUESTIONS</th>
<th>RESPONSES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Self</td>
</tr>
<tr>
<td>In your opinion, who benefits most when lead Exposure is avoided in a home?</td>
<td>130 (34.9%)</td>
</tr>
<tr>
<td>Who do you think lead poisoning can affect most?</td>
<td>24 (6.3%)</td>
</tr>
</tbody>
</table>

Table 10 shows that 89.7% of the respondents are of the view that those most affected by lead poisoning are young children while 59.8% felt that the young children benefit most from lack of exposure to lead poisoning.
Figure 7: Influencers

Figure 7 shows that most respondents were influenced by their husbands while friends influenced the least of the respondents. It can be noted that about 70.1% of the influence comes from husbands and self influence.

Section B: Qualitative Data

The study depended on qualitative data to assess the content and scope of knowledge of precautionary measures among child-bearing age women in high lead poisoning exposure residential areas in Kabwe. Focus group discussions (FGD) were used to collect qualitative data. The members of the FGD were women between the age of 25 and 49 years; some of them were in Lead Poisoning Treatment Support Group (LTSG) or Neighbourhood Health Committees. The selection of the age grouping was so because those above 35 years were only two. Thus, only one age group seemed appropriate for the members of the FGD. Two focus group discussions were held each in catchment area comprising ten women eligible for the study. The discussions were held at Makululu and Kasanda Health Centres. The total number of participants in each FGD was ten.
Table 11: Focus Group Discussion Responses in Kasanda

<table>
<thead>
<tr>
<th>FGD Catchment Area</th>
<th>Cause of Lead Poisoning</th>
<th>Risk Exposure</th>
<th>Precaution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kasanda</td>
<td>Eating of soil by pregnant women. One woman testified that “pregnant women buy soil for eating from the market at 50ngwee.”</td>
<td>Pregnant women and unborn children.</td>
<td>Women should stop eating soil.</td>
</tr>
</tbody>
</table>

Children playing in the soil – one member of the FGD said “my child is on lead treatment after being found in class five. After treatment, my child is in class three.”

Children

- Children should be bathed before bed.
- Children should not be playing in soil.

Men who work in illegal mines – one woman said “lead is a mineral which was mined at kabwe mine plant before it was closed. My husband used to work for the mine, so every year he used to undergo tests for blood level. Sometimes, when my husband fell sick, the company would give him another job while on treatment.”

The whole family

Stop illegal mining.

Stone crushing - a woman said “my husband crushes stones for selling to builders.”

The whole family.

Stone crushing should be done in non lead contaminated areas.

Table 11 highlights the focus group discussions conducted at Kasanda. From the discussion, it was inferred that the participants were quiet knowledgeable and that
lead poisoning is problem. Some of the participants testified having relatives diagnosed with lead poisoning.

<table>
<thead>
<tr>
<th>FGD Catchment Area</th>
<th>Cause of Lead Poisoning</th>
<th>Risk Exposure</th>
<th>Precaution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makululu</td>
<td>Plastering houses with yellow soil – a woman said “some women use the yellow soil found in Magandanyama (lead contaminated area) to plaster their houses so the houses can look nice.”</td>
<td>The whole family.</td>
<td>Plastering should not be done with contaminated soil.</td>
</tr>
<tr>
<td></td>
<td>Selling of contaminated soil – “my neighbour sells soil at the market”</td>
<td>The buyer and seller</td>
<td>Ban selling of contaminated soil at the market.</td>
</tr>
<tr>
<td></td>
<td>Planting grass around the house using lead contaminated soil – a woman testified that “my neighbour planted grass around the house using soil from Magandanyama. When inspectors came they found that the soil contained lead.”</td>
<td>The whole family</td>
<td>Soil from Magandanyama should not be used as manure for planting grass. One of the members of the FGD mentioned that “we get information from the local radio station and information centres supported by ZCCM-IH.”</td>
</tr>
</tbody>
</table>

Table 12: Focus Group Discussion Responses in Makululu
Table 12 summarizes the views of the FGD participants. Most of the views were similar to those expressed at Kasanda (Table 11). However, it was noted in Makululu that the participants accessed information on lead poisoning from local radio stations and information centres supported by ZCCM-IH.

**Comparisons of the Focus Group Discussions at Kasanda (Table11) and Makululu (Table 12)**

- Both groups had mentioned that lead poisoning was a health problem in their catchment area. In the Kasanda group one woman said ‘my child is on lead treatment after being found in class five. After treatment, my child is in class three’ and in Makululu a woman said ‘my neighbour planted grass around the house using soil from Mugandanyama. When inspectors came they found that the soil was contaminated with lead.’

- Generally both groups felt the whole family was at risk of lead poisoning although pregnant women and children were at more risk.

- Both groups mentioned that selling and buying of soil at the market was common especially by pregnant women

- Both groups mentioned that people should take precautionary measures against lead poisoning.
CHAPTER FIVE

DISCUSSION OF THE FINDINGS

Socio–demographic profile of Respondents

It is very important to know the socio-demographic characteristic of the respondents because it helps to assess the representativeness of the sample. This may have a bearing on how the study participants responded to the questions on lead poisoning.

The study revealed that out of the 430 respondents interviewed, the majority (65%) fell in the age group 15-34 years and the least was below 15 years at 3%. This may be reflective of the Zambia’s social demography that shows that the majority of the population is young (CSO, 2012). The 15-34 age group is sexually active and the most productive meaning the triple roles of the women is most prominent; they are domestic workers, child minders, and child bearers. Therefore, the findings of the study is likely to have a significant bearing on the prevention of lead poisoning in homes. Most of the respondents were involved in selling at the market and keeping children at home. At the market, some respondents were selling vegetables that may have been grown in lead contaminated soils even mere soil from old mining area that some pregnant women were fond of eating in homes. The majority of the respondents had their own homes and, therefore, were decision makers in the homes about lead poisoning precautionary measures. Only 12 respondents were below 15 years old and they were included so that the same age groups that were included during the lead poisoning prevalence studies conducted by ZCCM-IH were also captured for the knowledge levels (ZCCM-IH, 2005). 63.7% of the respondents were married and 21.4% were single which is reflective of figure 7 that shows the
majority of the respondents were influenced by their spouses or self on lead poisoning. Very few were widowed or divorced at 9.8% and 5.1% respectively.

The survey revealed that 68% of the respondents were from unplanned settlement while 32% were from planned settlements. 41% of the respondents in unplanned settlement were not knowledgeable about lead poisoning precautionary measures compared to 16% of the respondents in planned settlement. However, there was significant association between residence and knowledge level about lead poisoning precautionary measures ($\chi^2=4.3$, df=1, p–value = 0.0381, statistically significant). This could be attributed to few number of established sensitizations points that were being conducted in the communities by Lead Treatment Support Groups and other health promoters in Makululu and Kasanda. (see table 5).

**Findings**

The study sought to assess the extent of knowledge among child-bearing age women of the precautionary measures against Lead poisoning in high lead poisoning exposure residential areas. The research had four objectives. The following is the discussion of the objectives and how the research has met them.

**Objective 1**

To establish whether the knowledge level of lead poisoning precautionary measures influences the residence of child-bearing age women in high lead poisoning exposure residential area.

Based on the results of this survey, it appears that knowledge level of precautionary measures among women of child-bearing age was low at 40.9% (see table 3) despite staying in high lead poisoning exposure residential areas and 89.1% of the respondents having heard of lead poisoning. There was a significant association
between observed and expected frequencies for those who heard about lead poisoning and being knowledgeable about lead precautionary measures. ($\chi^2=7.71, df=1$, p-value 0.0055 very significant association). This is supported by the FGDs that were conducted in Makalulu and Kasanda. Almost all of those that took part in the discussions had at least a child or relative or neighbour who was suffering from lead poisoning. This may confirm the earlier study done by ZCCM IH that indicated that 48 % of Kabwe’s population was exposed to lead poisoning (ZCCM IH, 2005). A similar study was conducted in Germany by Fertmann et al. that showed that the Germans in Hamburg were not aware of the lead exposure in drinking water despite having high levels of blood lead concentrations (Fertmann et al., 2004). One mother said that ‘when she is pregnant she likes eating soils.’ It was also revealed that many people in the area where not aware about lead poisoning precautionary measures except those who had someone who is suffering from lead poisoning or had joined a Lead Poisoning Treatment Support Group. The FGDs also revealed that some of the men in Makululu, due to lack of formal employment, were involved in crushing stones for sale in the old mining plant; these crushed stones are used for building houses in the surrounding areas.

From the evidence of this research, the residents in the lead endemic areas are not knowledgeable about the lead precautionary measures.

**Objective 2**

To determine whether education level of a child-bearing age woman influences the knowledge of the precautionary measures against lead poisoning

The majority of the women had formal education up to primary level (51.1%) and secondary (36.5%). Very few respondents reported as never been to school (6.7%).
College education was also very low among the women (5.6%). Therefore at least 93.3% had some kind of formal education, education among child-bearing age women is said to have some protective effects to their infants (CSO, 2004). From table 7, there was some association between observed and expected frequencies for formal education and being knowledgeable about lead poisoning precautionary measures ($\chi^2=3.9, df=1, P\text{-Value } 0.048$), meaning that the data was statistically significant. Therefore, it can be concluded that educational level of a child-bearing age woman is associated with knowledge of the precautionary measures against lead poisoning.

**Objective 3**

To determine whether the source of information on lead poisoning among child-bearing age women influences knowledge of the precautionary measures

It was discovered during the survey that, although Makululu, Kasanda and Chowa had some established information centres (sources), more than half of the women of child-bearing age women were getting information from non-established source like spouses, friends and neighbours. According to Valedez and Bamberger (2000) these preferred information sources by child-bearage women in these sites are unreliable. Some women had more than one source of information. There was no significant association between source of information and being knowledgeable about lead poisoning precautionary measures ($\chi^2=0.41, df=1, p\text{-value } 0.5220, \text{no significant association}$). It can therefore be concluded that, much as the information on lead poisoning is available in established centres like libraries and health centres, child-bearing age women were getting information from non-established source like spouses, friends and neighbours.
Objective 4

To describe perceptions of precautionary measures against lead poisoning among child-bearing age women

The child-bearing age women’s perceptions of precautionary measures among the knowledgeable respondents against lead poisoning in Kabwe’s high lead exposure residential areas showed that most of the respondents thought the information about lead poisoning they were receiving was true. 86.5% of the respondents thought lead poisoning can be gotten from home. 89.1% of respondents thought children were most affected since they like eating soil. Almost all (94.3%) of the respondents felt it was a serious problem. Needleman (2008) confirms that the knowledge of lead toxicity has been known for many years among the people who are exposed (Needleman, 2008). More than half (59.8%) of respondents felt children benefited most from avoidance of lead poisoning. 70.1% of respondents thought husband and self were the most influential in avoiding lead poisoning exposure in a home. This is supported by the FGDs findings that revealed that most information about lead poisoning was gotten from non-established information sources such as spouses, friends, and neighbours.
CHAPTER SIX
CONCLUSION AND RECOMMENDATION

Conclusion
The study was conducted to assess the extent of knowledge of precautionary measures among child-bearing age women in high lead exposure residential areas in Kabwe. Using both qualitative and quantitative techniques, this study revealed a number of key issues that should be addressed in the sensitization of the communities that stay in high lead residential areas of Kabwe.

About 65% of the respondents in this survey were still youths in the women of child-bearing age. Those who were married were 63.7%. Therefore, most of these women were either having young children or pregnant who needed knowledge on precautionary measures in lead poisoning. As young women they play a key role in child bearing, child rearing and domestic work. However, the women’s knowledge on lead poisoning precautionary measures was only 40.9% in the respondents. This revealed a significantly low level of knowledge in lead precautionary measures. The low level of knowledge may explain why there is high number of children and child bearing age women with high blood lead levels in the population. It may also explain why people are building houses in the highly lead contaminated areas. Some of the residents in the lead endemic areas are involved in the selling of contaminated soil, vegetables or crushed stones and sand.

The low knowledge level of the lead precautionary measures among women in high lead poisoning exposure residential areas may be attributed to not given enough information of lead poisoning prevention or getting information from non-
established sources such as friend and spouses that may not have accurate information. The low knowledge levels of child bearing age women about lead precautionary measures in endemic areas can be a danger to the households in the community because of lead exposure side effects including anaemia.

Although there was inadequate information on the prevention of lead poisoning in homes, 94.3% of the respondents believed that lead poisoning was a serious problem in Kabwe.

**Recommendations**

Based on the findings of this study, the following recommendations are made:-

1. It is recommended that the government through Zambia Environmental Management Agency and other stakeholders should come up with new policies to combat lead poisoning exposure and also ways of creating awareness so that lead poisoning can be prevented in endemic areas.

2. Ministry of Mines, Energy and Water Development should come up with policies to discourage people from scavenging old mine site for scrap metal and mineral ores.

3. Kabwe Municipal Council should stop giving out plots in high lead exposure areas without putting in place measures that prevent lead poisoning.

4. Ministry of Community and Development Mother and Child Health at district level should support community health activities in Lead poisoning prevention. The Kabwe District Community Medical Office should deliberately encourage health centres that have their catchment areas in high lead poisoning residential areas form and support lead poisoning prevention.
support groups using the community funds. This will alleviate the suffering of people living in high lead poisoning residential areas.

5. The health centres serving high lead poisoning residential areas should deliberately conduct monthly health promotion sessions on lead poisoning precautionary measures in Antenatal Care to capture women of child-bearing age.

6. Ministry of Community Development, Mother and Child Health at district level should support community health in lead poisoning prevention. In teaching lead prevention measures, emphasis should be placed on husbands and child bearing aged women as these posses a lot of influence.

7. Hold a stakeholders meeting in Kabwe to disseminate the research findings

8. Air programmes on lead poisoning prevention on the community radio station monthly

9. Hold focus group discussions in the affected communities on the best ways of preventing lead poisoning/ exposure in homes.
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**APPENDIX A**

**INTERVIEW SCHEDULE**

Interview schedule to assess the level of knowledge of lead exposure precautionary measures among women of child-bearing age in high lead poisoning exposure residential areas in Kabwe. Duration for interview 20 minutes.

**Instructions:** Tick or write as appropriate in the spaces provided

Serial Number  -------------------------------

<table>
<thead>
<tr>
<th>A</th>
<th>Respondent Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Age at last birth day</td>
</tr>
<tr>
<td></td>
<td>Residential Address</td>
</tr>
<tr>
<td></td>
<td>Type of house (observe) Formal/Informal house structure(Tick)</td>
</tr>
<tr>
<td></td>
<td>Parity: Number of living children</td>
</tr>
<tr>
<td></td>
<td>Number of dead children</td>
</tr>
<tr>
<td></td>
<td>Marital Status</td>
</tr>
<tr>
<td></td>
<td>Occupation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B</th>
<th>Interviewer Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Name of interviewer</td>
</tr>
<tr>
<td></td>
<td>Date of interview</td>
</tr>
</tbody>
</table>
Section A

Demographic characteristics

In what month and year were you born?

  Month-----------------------
  Year-----------------------

2. Are you married?       Yes-------
                          No-------

If not married, what is your marital status?

  a) Single----------------  b) Divorced -----------------
  c) Widowed ---------------  d) living together-----------------

4. What is your educational level?

  a) Never went to school ---------
  b) Primary  ------------------
  c) Secondary  ------------------
  d) College  ------------------

5. What do you do for a living?
6. If married, what does your spouse do for a living?

   a) Employed--------------------------   b) Just a housewife -----------------
   c) Business--------------------------   d) other, specify---------------------

7. How many cigarettes do you or your spouse smoke in a day? --------------

Section B

Lead Exposure

1. When did you start staying in this residential area? --------------

   Have you ever heard about lead poisoning? Yes--------
                     No--------

   Where did you get the information from?

   a) Radio-----------------------   b) Friend-----------------
   c) Health facility ----------   d) spouse---------
   e) Other, specify -----------

4. Do you think the information is true? Yes -------------
                       No -------------

5. Is lead poisoning a medical condition as a result of excessive lead exposure to the human body? Yes-----------
                                   No -----------

   Is it possible to get lead poisoning in a home? Yes----------
                                    No----------

   Whom do you think lead poisoning can affect most?

   a) Other people---------   b) Young children --------
c) Yourself

Give reasons why

Is lead poisoning a serious problem? Yes

No

Which one of the following helps people who stay in lead exposed homes avoid lead (Pb) poisoning? Tick the appropriate answer(s)

1. Washing hands with soap and clean water before eating, or after playing
2. Not eating soil
3. Smoking cigarettes
4. Stopping children from putting dirty hands, toys, grass, sticks into the mouth
5. Using carpets in homes
6. Washing vegetables and other food stuffs before cooking and eating
7. Feeding children on foods not rich in calcium, iron, vitamin c at least three times a day
8. Bathing children when the wake up from bed so that they look clean
<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>9</td>
<td>Keep children’s cloths and bedding clean and dust free at all times</td>
</tr>
<tr>
<td>10</td>
<td>Planting grass and shrubs around the yard</td>
</tr>
<tr>
<td>11</td>
<td>Washing hands with soap and clean water after meals</td>
</tr>
<tr>
<td>12</td>
<td>Frequent cleaning of the house</td>
</tr>
<tr>
<td>13</td>
<td>Doing physical exercises</td>
</tr>
<tr>
<td>14</td>
<td>Avoiding dust in the home</td>
</tr>
</tbody>
</table>

10. Who makes the decision in your home on how money will be spent?
   a) Yourself--------
   b) Husband alone----------
   c) Both of you but husband has final say--------
   d) Both of you but yourself has final say-------
   e) Other, specify-------------------

11. In your opinion, who benefits most when lead exposure is avoided in the home?
   a) Other people
   b) Yourself
   c) Young children
   Give reasons for your answer……………………………………………………………………

12. Who do you think expect you to avoid lead exposure in the home?
   a) Husband
   b) Friend
   c) Neighbours,
   d) Others, specify……………………………………………………………………
THANK YOU FOR YOUR TIME
APPENDIX B
Focus Group Discussion (F.G.D) Questions

Instruction
The Focus Group Discussion will take 40 minutes to discuss the following questions:

1. What is Lead poisoning?
2. What is lead exposure?
3. How do we prevent lead poisoning in our homes?
4. What is the perception of our community about lead poisoning especially among women of child-bearing age?
5. What is the source of information on lead poisoning?

We have come to the end of our discussion and I wish to thank you very much for your cooperation.

Criterion of Focus Group Discussion Members (F.G.D)

Ten FGD members with the following characteristics:-
1. Mature, knowledgeable about the health services
2. Member of health neighbourhood health committee
3. At least two should be able to read and write i.e. secretary and chairperson.
4. At least more than half should be women of child-bearing age
APPENDIX C

INFORMED CONSENT

TITLE: Assessment of knowledge of precautionary measures among child bearing age women in high lead exposure residential areas in Kabwe.

Introduction

You are hereby requested to take part in this research study because every child bearing woman is expected to carry out three very important roles of child bearing, child rearing and doing domestic work. Before you decide whether or not to take part in this study I would like to explain to you the purpose of this study and what is expected of you. If you agree to take part, you will be asked to sign or make a mark on this consent form in front of someone. Your participation in this study is entirely voluntary, you are under no obligation to participate.

Purpose of the Study

The study will assist to get information on the knowledge of precautionary measures among child bearing women in high lead exposure residential areas in Kabwe. It will help us to plan for health services in the district.

Confidentiality

All the information that you shall provide will be kept strictly confidential. You will be identified by code and no personal information will be released without your written permission.

Please Note

Your participation is entirely voluntary. You may decide to take part or withdraw from study at anytime.

Consent to join the Study

Name ........................................................................................................................................
Having been fully informed of what this study is all about do hereby agree to participate willingly.

Signed .......................................................... Date ..................................................

Witness (Name) .................................................. Signed ..............................
APPENDIX F
APPENDIX H
Appendix J: Health Belief Model

Figure 9

Appendix K: BEMBA CONSENT