



# **UNIVERSITY OF ZAMBIA**

## **SCHOOL OF MEDICINE**

A Knowledge, Attitude and Practice Survey  
on Indoor Residual Spraying (IRS) in Linda  
compound

By  
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A dissertation submitted to the University of Zambia in  
partial fulfilment for the Master's Degree in Public  
Health (MPH).

## Declaration

This dissertation is the original work of Linda Malulu. has been prepared in accordance with the guidelines of the MPH dissertation of the University of Zambia. This dissertation has not been submitted elsewhere for a degree at this University or any other university.

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## Approval of Admission of Dissertation

This dissertation by Linda Malulu is in partial fulfilment of the requirements for the award of the Master of Public Health degree (MPH) by the University of Zambia, Lusaka.

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## **Dedication**

To my son Charles Chabala Chiwele, Junior; I hope you learn from me the value of education as I have learnt from my own mother.

## **Acknowledgements**

I would like to acknowledge my respondents in Linda compound who were cooperative and interested in the study as well as the Neighbourhood Health Committee, whose valuable input and insights made this study what it is.

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## **Abstract**

There are wide gaps in empirical and perceptual baseline data and information on obtaining knowledge, attitudes and practices with respect to Indoor Residual Spraying (IRS). The main objective of this study was to assess the levels of Knowledge, Attitude and Practice that Linda residents towards Indoor Residual Spraying.

A descriptive cross-sectional study was carried out in Linda compound. A multi-stage sampling method was used to select households for the study and a purposive availability sampling method was used to constitute focus group discussions with members of the Neighbourhood Health Committee.

A total of 387 respondents took part in the study. The levels of knowledge on malaria and IRS were 84.2% and 80.9%, respectively. However, the level of IRS utilisation was 57.8%. The common reasons given for not having a house spray were: not available at home (36.8%) and did not want the house to be sprayed (27.6%). Further results show that 41.1% of the respondents were not happy when the house was sprayed; 58.9% did not like the IRS strategy; 94.6% were concerned with the smell of the chemical used in IRS; 88.6% were concerned that the chemical was bad for children; and 96.1% were concerned that IRS causes walls to be dirty.

Age and knowledge of IRS were independently associated with acceptability of IRS. On each birthday, respondents were 3% more likely to accept IRS. Compared to respondents who had no knowledge of IRS, those who had knowledge were 77% more likely to accept IRS. In conclusion, the level of IRS utilisation was low. To dispel various misconceptions and myths regarding IRS and indigenous methods of Malaria prevention, health care providers need to disseminate information about what IRS actually does.

## CHAPTER ONE- BACKGROUND

### 1.0 Introduction

Malaria has been one of the most potent scourges of mankind from time immemorial, and it remains, with AIDS and tuberculosis, one of the three major communicable diseases (Lewison and Srivastava, 2008). The disease is prevalent in about 100 countries and around 2400 million people are at risk (Kager, 2002) and continues to place an unacceptable burden on the most vulnerable populations in sub-Saharan Africa, where around 90% of all malaria-related mortality is observed (Deressa et al, 2007). Malaria accounts for about 1 million deaths in Africa annually and has slowed economic growth in African countries by up to 1.3% per year (The Abuja declaration, 2000). As in most Sub-Saharan Africa, malaria is a Public Health problem of greater dimensions unlike those seen anywhere else in the world today. The magnitude of malaria in Africa is affected by a variety of factors, none of which addressed alone is likely to effect a solution. It is further compounded by the generally poor social and economic conditions in sub-Saharan Africa. Approximately, 80 percent of malaria cases and 90 to 95 percent of malaria-related deaths in the world are estimated to be in Africa. In some areas of Sub-Saharan Africa people receive 200 to 300 infective bites per year. In addition, at least 300 to 500 million malaria episodes are treated annually in sub-Saharan Africa. The disease afflicts pregnant women, young children and migratory populations particularly severely because of their low or non-existent immunity to the disease ([www.aaas.org](http://www.aaas.org)).

Malaria is endemic in the whole of Zambia and is the leading cause of morbidity and mortality. Prior to 1970, the prevalence of malaria in urban areas in Zambia was kept to a minimum due to an effective prevention and control program. Malaria incidence rates in Zambia have nearly tripled the past 24 years (1976 – 2000). In 1976 the incidence rate was 121.5 cases per 1000 population

per year; by 1999 the incidence rate had increased to                    per 1000 per year (Anon, 2000).

Malaria prevention entails the use of drugs (prophylaxis) and other transmission prevention tools such as Insecticide-Treated Nets (ITNs) and Indoor-Residual Spraying (IRS) amongst others. Again, socio-economic research has contributed immensely to our understanding of what populations do to prevent malaria before it strikes and how prevention tools and strategies developed through the biomedical sciences, under controlled conditions, fare at community level (Mwenesi, 2005). One of the primary vector control interventions for reducing malaria transmission is indoor residual spraying, whereby long-acting chemical insecticides are sprayed on the walls and roofs of all structures in a determined area to kill the mosquitoes that land and rest there. World Health Organization's Global Malaria Programme recommends IRS as one of three interventions that must be scaled up by countries to achieve the Millennium Development Goals for malaria by 2015 (World Health Organization, 2006). As with other disease vector control programmes, a high level of community acceptance is required for effective implementation of IRS; in order to have a significant impact on malaria transmission, widespread household coverage is required (>80% of premises within the target area) (WHO, 2006). This requires householders to cooperate with spraying personnel by being present on the designated day and removing some household contents outside.

In order to effectively control malaria, the Ministry Health through the National Malaria Control Centre (NMCC) embarked on a national Indoor Residual Spraying (IRS) program. This program was developed from the proven Roll-out model of IRS on the Copperbelt province by the Konkola Copper Mining Company which was started in 2000.

IRS as an essential intervention — covering the walls inside homes with insecticide that kills and repels mosquitoes is one of the most effective

interventions against malaria and one of the primary malaria prevention strategies in Zambia, along with insecticide-treated nets (ITNs). IRS is currently being expanded to 36 districts in Zambia, with a focus on urban and peri-urban areas. The country has already exceeded its goal of having at least 85% of people in these targeted areas sleeping in sprayed structures by the end of 2008. In 2008, nearly 900,000 households were sprayed covering an estimated population of 3.5 million people (2008 NMIS Report).

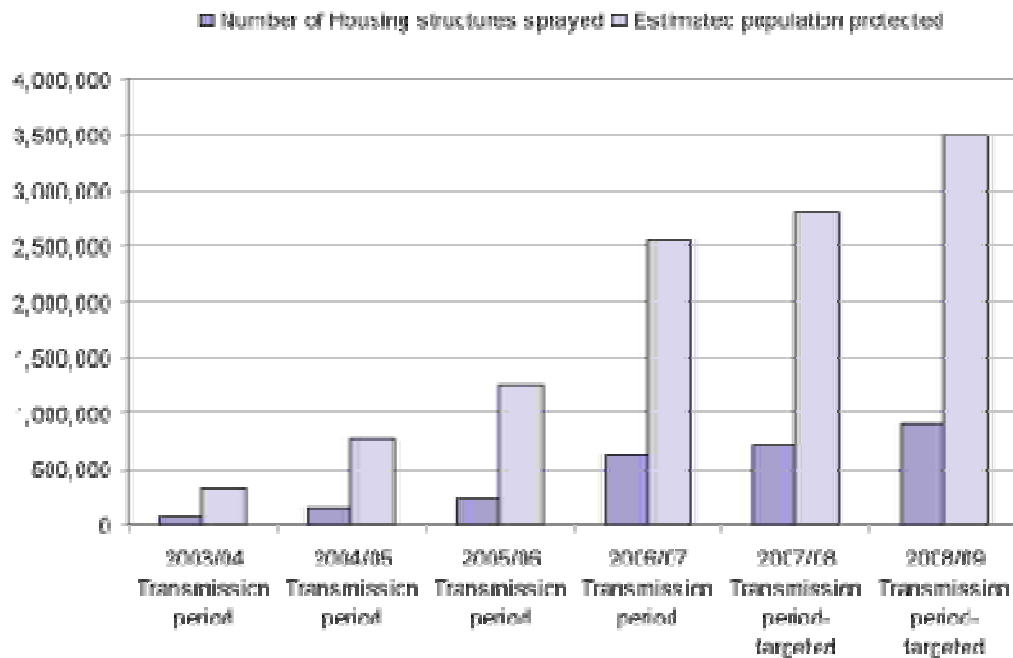


Figure 1: Indoor Residual House Spraying (IRS) from 2003-2009

Figure 1 above shows the Indoor Residual Spraying household coverage from 2003 to 2009. From the diagram, it can be seen that as the years progressed, more households were sprayed thus protecting more people from the malaria vector. In 2003/2004, only 300,000 people got such protection as compared to the 2008/2009 spray season during which an estimated 3.5 million people were protected through IRS (Zambia NMIS Report, 2008). The insecticides used in the IRS program are Icon, O2, Fendona and K-Othrine for use on walls of both

modern houses with cement plaster and paint and rural with mud or pole/grass walled homes (Phiri, 2009).

### **1.1 Problem Statement**

Linda compound, the area earmarked for this study, has a population of 21,996. According to facility-based data at Mt. Makulu Health Centre, which services Linda compound, malaria has proved to be a problem. Annually, the area reports an average of 1057 under-5 cases of malaria and 1007 cases for those aged 5 and above (Mt. Makulu Health Centre). This data is for the period 2007-2009. The above figures also show that malaria has continued to be a problem even though the area has received two rounds of spraying starting in 2007 and again in 2008. Thus this study presents people's knowledge, attitudes and practices on malaria prevention with reference to use of IRS.

Linda Township is located in an intermediate- to high-risk malaria area and the incidences of malaria are said to be very high according to staff at Linda Health centre. There are claims by the residents and staff at Linda Health Centre that one of the contributing factors to high incidence of malaria could be linked to the lack of knowledge on malaria and its prevention, negative attitudes and practices that residents have towards the IRS program. In summary, there are wide gaps in empirical and perceptual baseline data and information on the obtaining Knowledge, Attitudes and Practices with respect to IRS and Malaria in Linda compound.

### **1.2 Research Questions**

1. To what extent does the level of knowledge, attitudes and practices that Linda residents have contribute to accepting IRS?
2. What concerns do Linda residents have towards IRS?

### **1.3 Objectives**

The main objective of this study was to assess the levels of Knowledge, Attitude and Practice that Linda residents have towards Indoor Residual Spraying.

### **1.4 Specific Objectives**

1. To determine levels of knowledge on malaria prevention;
2. To determine levels of knowledge on IRS;
3. To assess levels of utilisation of IRS;
4. To assess attitudes of Linda residents towards IRS; and
5. To determine the concerns that Linda residents have towards IRS.

## **CHAPTER TWO- LITERATURE REVIEW**

### **2.0 Introduction**

This chapter reviews the literature related to malaria and IRS. The chapter starts by looking at research done on the likelihood that knowledge has a positive impact on malaria prevention. It goes further to look at research done on knowledge levels and its impact on the use of IRS. Lastly, the chapter reviews literature on research done on levels of utilisation of IRS in areas where the strategy has been implemented. The literature was built around searches of papers that were identified within the SCI (CD-ROM version) by means of a filter, developed by Andres de Francisco and Stephen Lipworth, on the basis of selected title words; details are given in Lewison et al. (2002). Further than this, literature search was done through an electronic search on keywords published only in peer reviewed articles in databases where the University of Zambia subscribes. Particular note was taken of references that were frequently cited in bibliographies.

### **2.1 Knowledge Levels and Malaria Prevention**

According to the Health Belief Model, a person will take a health-related action if that person feels that a negative health condition can be avoided successfully, and if that person can perceive the benefits. Research conducted by Aygepong and Manderson (1999) showed that households in Accra were engaged in mosquito prevention regardless of whether they had correct knowledge about transmission. The term "nuisance avoidance" was used to describe this behaviour. The research further revealed that although health education may be an important component, the toxic irritant in the saliva of the mosquito may be the only stimulus needed for people to modify their behaviour.

Given that humans desire to sleep peacefully and not be bitten, it is worth examining factors that determine the use of mosquito-avoidance measures. At the household level important factors may include house type, household wealth, household density, and house location. Safe water access, the existence of engineered water delivery and drainage systems, the presence or absence of mosquitoes, and topography may also be important. In parallel with Manderson and Aygepong's work in Ghana, who found that knowledge of malaria was not a necessary prerequisite for mosquito-avoidance behaviour, Macintyre et al also found that many inhabitants are actively trying to avoid being bitten, even if knowledge of how malaria is transmitted is incorrect or lacking. Despite this, the level of education within Kisumu households was an important predictor of whether the household used multiple methods of protection or whether everyone in the house slept under a net (Macintyre et al, 2002).

According to this study, virtually every household sampled report using some form of protection. However, the data did not suggest that individuals were knowledgeable about vector-borne parasite transmission or necessarily acting to prevent malaria. It was simply that individuals were avoiding nuisance mosquito contact. In this situation, people did not want to be bitten, irrespective of their knowledge of the transmission mechanism. Health educators, working on mosquito-prevention programs, should be able to build on these activities.

If the poorer households, motivated by the similar urge for a peaceful night's sleep as their richer counterparts, insisted on paying out of pocket for the relatively more expensive protective methods, then it is easy to see that just the act of attempting to prevent mosquitoes from biting may be helping to keep these households improve their well-being as well as their health status.

## **2.2 Knowledge Levels and the use of Indoor Residual Spraying**

In 1995, Rodriguez et al conducted research in Southern Mexico on Knowledge and Beliefs about malaria transmission and practices for vector control. When knowledge about the reason for spraying was investigated, 64 percent of the villagers associated it with a reduction of mosquitoes inside houses but only 3 percent related insecticide indoor spraying with prevention of malaria transmission. Sixty to 87 percent of villagers from any schooling group recognized that the spraying reduced mosquito numbers. Neither of the two more literate groups acknowledged the benefits of spraying malaria prevention. No significant differences were detected in the responses among schooling groups in the logistic regression analysis adjusted by sex but women, regardless of their education level, reported less often that spraying diminished indoor mosquitoes or malaria occurrence. In the same research, 98 percent agreed with IRS and 2 percent answered negatively. Among the reasons given for refusing spraying were that the insecticide killed their livestock, stained the walls, or was ineffective. Also, some people reported having physical impediments to remove the furniture out of the house. More than 30 percent indicated that they would prefer their houses sprayed every two months, 29 percent preferred it at six-month intervals, as is customary with DDT, and 23 percent preferred spraying every three months (Rodriguez et al, 1995).

From the above results, it is clear that villagers seldom have any appreciation of malaria control per se. Nevertheless, the acceptability of the spraying, in terms of house-spraying coverage, was sufficient to prevent human-vector contact and to control malaria in the region. Malaria control based on indoor house spraying heavily depends on this acceptance. In India, vector control is still based on DDT indoor spraying, but the coverage is poor as the general opinion of the people does not favour this intervention (Sampath et al, 1998). On the other hand, in Sri Lanka, high acceptance levels of Malathion resulted in more than 90 percent of sprayed houses (Konradsen et al, 1999). The acceptability of spraying is linked

to whether householders perceive residual spraying as beneficial. In this study, none of the interviewees regarded spraying as detrimental, and 98 percent agreed with it.

In summary, although malaria knowledge in the coastal region of Chiapas was poor, knowing the benefit of indoor residual spraying is associated with a reduction of mosquitoes and other pests in the houses, and most of the villagers agreed with this control measure. People in the communities apply their own preventive measures to avoid mosquito bites and the use of bed nets is widespread, which makes bed nets a viable alternative for malaria control. The participation of women from these communities in the application of the measures was important. These results indicate the need for educational programs aimed at the induction of community participation for malaria control. These programs should be directed at increasing the awareness of the community about the participation of mosquitoes on malaria transmission and the different strategies devised to abate mosquito abundance and deter human-vector contact. The participation of women in malaria control activities within households should be taken into account in these educational programs (Rodriguez et al, 1995).

### **2.3 Levels of Utilization of Indoor Residual Spraying**

Throughout Africa, National Malaria Control Programs have recently embarked on emphasizing vector control as an essential component (WHO, 2004). Most programs are using IRS and/or ITNs. When optimally employed these vector control measures can reduce malaria parasite transmission by 90 percent or more and can correspondingly reduce malaria incidence, malaria prevalence, high parasite density, and clinical malaria (Beier et al 2008).

A recent report by Chanda et al (2008) describes a comprehensive and highly successful Integrated Vector Management (IVM) program that has been

implemented by the Zambian National Malaria Control Program. Over a relatively short time period, this program has expanded coverage vector control interventions and leveraged additional resources to build national capacity to the point where they have successfully reduced malaria-related morbidity and mortality. In many respects, the successful implementation of IVM and integrated malaria control in Zambia serves as a prominent success story for all of Africa.

Earlier studies in Zambia have shown that IRS with DDT reduced annual malaria prevalence from 74 percent to less than 1 percent in 1979 over a two-year period in Konkola Copper Mine in Zambia (Tren & Bates, 2004). The study revealed that in Copperbelt Province, 180 villages were sprayed with insecticide in 1979 and parasite rate ranged from 2.4 percent to 6.2 percent (NMCC, 1999).

IRS is most appropriate for areas of unstable transmission (i.e., areas in which transmission is highly seasonal or epidemic prone) because only one application is needed per year and can be timed to just before the start of the rainy season. Such areas could include Southern Africa and Zambia in particular ([www.globalhealthlearning.org](http://www.globalhealthlearning.org)).

Despite its initial widespread use and contribution to the success of malaria eradication and control efforts, in recent years, the use of IRS has declined globally (WHO, 2006). This is due in part to lack of government commitment and financing to sustain these efforts over the long term and to concerns about insecticide resistance and community acceptance. However, another important factor has been the general disapproval of DDT use, due to fears of its harmful effects on the environment and on human health, fears which are unjustified when DDT is used appropriately for IRS. In the past, DDT was widely used in agriculture and domestic hygiene, leading to massive release of the compound into the environment.

Scientific evidence of IRS efficacy in reducing or interrupting malaria transmission in different epidemiological settings has been available since the 1940s and

1950s (MacDonald, 1957). Numerous studies have shown that IRS has substantially reduced infant and child mortality. This evidence formed the rationale for introduction of IRS as a primary intervention for malaria control and eradication. Evidence over several decades has confirmed the effectiveness of IRS in reducing levels of infection and incidence of malaria. For example, the malaria incidence was reduced by 90% or more in major parts of tropical Asia and Southern America during the eradication programme through a combination of IRS and other measures (WHO, 2006).

In Africa, malaria eradication pilot projects were initiated from the 1950s to the 1970s in Benin, Burkina Faso, Burundi, Cameroon, Kenya, Liberia, Madagascar, Nigeria, Rwanda, Senegal, Uganda and the United Republic of Tanzania. These projects demonstrated that malaria was highly responsive to control by IRS with significant reduction of Anopheline vector mosquitoes and malaria, although in most cases, transmission could not be interrupted (Kouznetsov, 1977). However, with a few exceptions, IRS was not taken to scale in large parts of sub-Saharan Africa (WHO, 2006).

The application of IRS consistently over time in large areas has altered the vector distribution and subsequently the epidemiological pattern of malaria in Botswana, Namibia, South Africa, Swaziland and Zimbabwe. The major vector, *Anopheles funestus*, has been eliminated or reduced to negligible levels. Where present, the other major vector, *Anopheles gambiae* s.s., which rests and bites mostly indoors, was also well-controlled. Another vector, *Anopheles arabiensis*, which does not rest indoors as much as *Anopheles gambiae*, is less affected by IRS, even at high coverage levels, and is responsible for low levels of transmission and seasonal increases and outbreaks (SAMC, 2000).

Scientific evidence therefore indicates that IRS is effective to control malaria transmission and thus reduce the related burden of morbidity and mortality as long as most premises (houses, animal shelters) (e.g. > 80 percent) within

targeted communities are treated. Furthermore, studies confirm that IRS is cost-effective, although developments such as insecticide resistance could change the cost-effectiveness over time (Hanson et al, 2004). Thus, countries should maintain IRS in their malaria control strategies, where indicated, until further information, including locally-generated data, is available and can be used to fine-tune national interventions and better guide resource allocation.

Feasibility, sustainability, and acceptability are important considerations when implementation of IRS is considered, because it:

- Is resource and labour intensive, with costs borne entirely by the public sector and donors
- Requires a strong infrastructure for procurement, importation, and delivery of insecticides, and training and supervision of spray teams
- Is resisted by some communities because of privacy concerns (i.e., spray teams entering houses), staining of walls from the spraying, and a bad smell from some insecticides

## CHAPTER THREE- STUDY DESIGN AND METHODOLOGY

### 3.0 Study Setting

This study was undertaken between April and May 2010 in Linda Township within the outskirts of Kafue district. Linda Township is 9 km off Kafue Road and has an area of 16 km<sup>2</sup>. The population according to Mt. Makulu Health Centre stood at 3 666 households divided into 12 wards. Most the residents are farm labourers with a few residents working in Lusaka and Chilanga. Most houses are made of mud and a few are of blocks. Malaria is the leading cause of morbidity and mortality in the township and the major transmission occurs from December through May and the minor transmission from June to November. Linda compound benefited from the IRS program in the last rainy season. The township has one health centre, though some residents travel as far as Chilanga which is 7 kilometres away, to seek help.

### 3.2 Study Methodology

A cross sectional quantitative and qualitative study was chosen. In this study, the combination or mixed-method was concretely operationalized at the technique level, or the shop floor, of research: that is, at the level of sampling, data collection, and data analysis. A mixed approach was chosen so that the researcher could capture various dimensions of a target phenomenon (Greene et al., 1989: 259) on IRS and malaria which one method may not do. As Wolfer (1993) proposed, different aspects of reality lend themselves to different methods of inquiry. In addition, this type of research study was chosen to help the researcher answer the two research questions that focus on what was going on at only one point in time. Since this is not an intervention based study, where variables need to be manipulated, a cross sectional study was considered to be appropriate when the researcher will not harm or endanger the lives of the

respondents (Polit and Hungler, 1999:193). In addition, descriptive designs tend to be cross sectional in nature particularly when the researcher intends to identify problems in current practice or behaviours (Burns and Grove, 2001:248).

### **3.3 Sampling design**

A multistage stratified random sampling method was used for the study. In the first stage, the researcher divided the 3 666 households across the 12 wards as strata to draw disproportionately households. A household was defined as a person with his/her spouse, unmarried children and related or unrelated persons, who live together and constitute one unit. The minimum sample size of households for this Cross Sectional Study from each stratum was calculated using Statcalc, EpiInfo 2000 package. Since we do not know the level of knowledge, it was assumed that  $p = 50\% \pm 5\%$  and considering population size of 3666, using Statcalc in EpiInfo, the required sample size was therefore  $n = 348$ . Adjusting for a 90% response rate as advised by Kish and Leslie (1965), the sample size was estimated to be as follows:  $n = 348/0.9 = 387$  (of 3,666 households).

### **3.4 Data Collection Process and Ethical Issues**

This study was cleared by the Ethical Committee of the University of Zambia and written consent obtained from all respondents. Questionnaires had no marks of identification to guarantee privacy and anonymity. Questionnaires and interviews were conducted within all homesteads of each selected home. The researcher collected basic demographic data and information. Questionnaires were translated into Nyanja and piloted in Kafue to identify ambiguities in translation and inconsistencies in question interpretation according to local vernacular.

The head of a household or any adult aged 18 and above was interviewed. Only one person per household was interviewed. The inclusion criterion was that all respondents needed to be Linda residents who must have been residing there for the last 12 months.

### **3.4.1 Administering the Questionnaire**

Since the study was spanning a wide area, it was not possible for the researcher to be in all the places at once and complete the study in record time. The structured questionnaire was administered by five trained field workers who knew Linda very well and they happened to be Community Health Workers. Prior to this, a three-day training workshop was planned consisting of two days classroom teaching and one day of practice. At the end of the three days, there was a classroom debriefing of the research assistants' experiences and difficulties. The buildup of classroom teaching, researcher's field teaching and practice interviews in the field, followed by general discussion, were crucial to the motivation of the research assistants and the success of the study. The purpose of the training was to orient the research assistants to the problems of malaria and use of IRS; to specify the survey objectives; the importance of the data to be collected; the importance of the research assistants and researcher; the appropriate interviewing techniques; to ensure a full understanding of the life of Linda residents.

### **3.4.2 Conducting Focus Group Discussions**

Four focus group discussions (FGDs); two with males and the other two with female discussants. The first two FGDs were conducted with members of the Neighbourhood Health Committee and the other two with residents of Linda compound. Ten discussants for each group were enlisted using availability

purposive sampling technique. In this study, FGDs were used to get data which could not be obtained from the survey structured questionnaire.

The researcher was the focus group moderator. The role of the focus group moderator was to facilitate discussion. The moderator encouraged the participation of everyone and sought to limit the domination of discussion by a few discussants. The moderator from time to time gave prompting questions ("probes") to elicit expansion on interesting subtopics (Kitzinger, 1995; Barbour and Kitzinger, 1998; Krueger and Cassey, 2000)., such as "What could you say about what people like about?" "Tell me more about that," "Keep talking," or "Can someone summarize what we've been saying about IRS?"

### **3.5 Data Analysis**

Since this study collected both quantitative and qualitative data, each set of data was analysed based on the consistent logic and the steps are described below.

#### **3.5.1 Quantitative Data Analysis**

Quantitative data were double entered and verified using Access 2000 (Microsoft Corp., USA). Analysis of frequencies was undertaken using combinations of Epi-Info Version 6.04d (Centres for Disease Control, USA), MS-Excel 2000, MS-Access 2000 (Microsoft Corp., USA), and SPSS version 14.0 for Windows (SPSS Inc., USA). The main thrust of the analysis was to derive descriptive statistics.

The researcher set to apply mathematical techniques for organizing and summarizing sets of numerical and categorical data. Utilizing Chi square statistical measures and exploratory as well as descriptive analyses the researcher made computations following the research objectives as headers. Measures of central tendency and variability were then in turn computed to describe the average of an entire set of scores, Gall, et al (1996).

### 3.5.2 Qualitative Data Analysis

Qualitative interview data was analysed using N\*VIVO version 2.2 package a computer software package designed by Qualitative Research and Solutions (Q.S.R.1986; Fraser, 1999). N Vivo software was used for the following analytic procedures:

- Storing discussion transcripts
- Creating categories through computer-assisted coding.
- Moving and linking data as higher order themes emerge.
- Creating basic hierarchical models of codes.

The process of data analysis was choreographed and informed by Miles and Huberman (1994). Discussions in the FGDs were both audio recorded and jotted down. Within the 24 hours following FGDs, audio tapes transcribed. The mass of words generated by interviews or observational data needed to be described and summarised. This required the researcher to seek relationships between various themes that had been identified, and this required the researcher to transcribe the data and to relate behaviour or ideas to biographical characteristics of respondents such as age or sex. Prior to transcription of audiotapes, in order to devolve recorded data into textual data, the researcher listened to the tapes several times in order to capture a holistic picture of the social actors' experiences or stories about malaria and IRS. Once the transcription was done, the researcher then had two types of textual data to deal with, namely (i) the verbatim transcript and (ii) the researcher's journal. The process of analysing textual data started with efforts to understand the text as a whole and continued by developing a consistent approach to apprehend the essential features of the texts and to account for the data. This called for being submerged into the data by reading the texts several times and part-by-part interpretation of key thoughts throughout each text to try to elucidate the general meaning of units or substantive statements that really said something. From these interpretations, meaning units and codes were then developed.

General categories (or themes) were first developed from the data, which were then broken down into more explicit codes. To do this, line-by-line analysis of transcripts was used to develop codes, which were then built up into categories/themes. Analysis of qualitative data followed the below listed:

1. Familiarisation with the data through review, reading, listening etc.
2. Transcription of tape recorded material.
3. Organisation and indexing of data for easy retrieval and identification.
4. Anonymising of sensitive data.
5. Coding (may be called indexing).
6. Identification of themes.
7. Re-coding.
8. Development of provisional categories.
9. Exploration of relationships between categories.
10. Refinement of themes and categories.
11. Selecting excerpts from original data if appropriate (e.g. quotes from interviews).

## CHAPTER FOUR- RESEARCH FINDINGS

### 4.1 Characteristics of the respondents and perceived malaria patients

Data was collected from 387 households. Respondents in this study were the heads of households or any adult aged 18 and above. Most respondents the researcher found at home were female n=264 (68.2%), married n= 208 (53.7%), single n= 110 (28.4%), widowed n= 39 (10.1%) and n=30 ) were divorced. The surveyed households were relatively of large size a mean number of occupants being 5. These households had not lived in their house longer than the mean time of 3 years (tables 4.1.1).

Table 4.1.1 Key Demographic Variables

<i>Variable</i>	<i>N</i>	<i>%</i>
<b>Sex</b>		
Male	123	31.8
Female	264	68.2
		100%
<b>Marital Status</b>		
Single	110	28.4
Married	208	53.7
Divorced	30	7.8
Widowed	39	10.1
		100%

### 4.2 Knowledge Domain

In the cross-sectional survey, majority of the respondents (76%) reported that they knew what Indoor Residual Spraying was whereas 24% said they did not (figure 4.2.1).

Figure 4.2.1 Knowledge about IRS

When the respondents who stated that they knew about IRS were asked what specifically IRS was about, a higher proportion (80.9%) said it was spraying for mosquitoes and malaria prevention. On the other hand, 19.1% either did not know what IRS was or said IRS was meant to spray for rats and cockroaches (Table 4.2.2).

Table 4.2.2 What is Actually Known about IRS

	Frequency	Percent
It is spraying for rats and cockroaches	9	2.3
It is spraying for mosquitoes	144	37.2
It is spraying for malaria prevention	169	43.7
I do not know	65	16.8
Total	387	100.0

When the residents were asked what they knew about malaria, n= 326 (84.2%) and n= 42 (10.9%) stated that it was a feverish illness and a paltry of them n= 12

(3.1%) did not know whereas others linked malaria to local myths like eating unripe sugar cane n= 4 (15) and drinking unsafe water n= 3 (0.8%) (Table 4.2.3).

Table 4.2.3 Understanding what Malaria is

	Frequency	Percent
A feverish illness	42	10.9
A disease caused by mosquitoes	326	84.2
A disease caused by drinking unsafe water	3	.8
A disease caused by eating unripe sugar cane	4	1.0
Don't know	12	3.1
<b>Total</b>	<b>387</b>	<b>100.0</b>

When the respondents were asked about malaria control prevention strategies, most of them were able to state that malaria could be prevented by chemo prophylaxis, using IRS and ITN. Few incorrectly linked malaria prevention to drinking safe water (Table 4.2.4).

Table 4.2.4 Level of knowledge about Preventive Strategy for Malaria

<i>Level of knowledge about Preventive Strategy for Malaria</i>	Yes		No	
	<i>n</i>	%	<i>n</i>	%
Can you prevent malaria by chemo prophylaxis?	379	97.9	8	2.1
Can you prevent malaria by using IRS?	282	72.9	105	27.1
Can you prevent malaria by using ITNs?	348	89.9	39	10.1
Can you prevent malaria by eating unripe sugar cane?	8	2.1	379	97.9
Can you prevent malaria by drinking unsafe water?	6	1.6	381	98.4
Can all of the above be used to prevent malaria?	20	5.2	367	94.8

A higher proportion of the respondents seemed to know IRS “don’ts” and stated that painting, washing, cleaning and replastering the walls were not necessary precautions to take after your house had been sprayed (Table 4.2.5).

Table 4.2.5 Knowledge of precautions following IRS use in a house

<b>Level of knowledge of Necessary precautions following IRS use in a house</b>	Yes		No	
	<i>n</i>	%	<i>n</i>	%
Is painting the walls one of the necessary precautions to take after your house has been sprayed?	37	9.6	350	90.4
Is washing the walls one of the necessary precautions to take after your house has been sprayed?	125	32.3	262	67.7
Is cleaning the walls one of the necessary precautions to take after your house has been sprayed?	42	10.9	345	89.1
Is replastering the walls one of the necessary precautions to take after your house has been sprayed?	353	91.2	34	8.8

It was noted that a higher proportion of the respondents knew that IRS had benefits like killing mosquitoes  $n= 249$  (64.3%) as compared to those who did not know  $n= 138$  (35.7%). It is not surprising in this community that even after wider IRS campaigns,  $n= 34$  (8.8%) still linked IRS to cockroach eradication (Table 4.2.6).

Table 4.2.6 Knowledge of Benefits Following IRS Use in a House

<b>Level of knowledge of benefits following IRS use in a house</b>	Yes		No	
	<i>n</i>	%	<i>n</i>	%
Is killing of mosquitoes one of the benefits of Indoor Residual Spraying?	249	64.3	138	35.7
Is malaria prevention one of the benefits of Indoor Residual Spraying?	97	24.1	290	74.9
Is killing of cockroaches one of the benefits of Indoor Residual Spraying?	34	8.8	353	91.2

### 4.3 Spraying of Houses

In this study, just over half of the households had their homes sprayed in the last 12 months,  $n= 224$  (57.9%) as compared to 42.1% that were not (Figure 4.4.1).

Figure 4.3.1 Profile of houses sprayed in the last 12 months N= 387

#### Reasons for Not Having Houses Sprayed

When the 163 respondents who had their houses unsprayed were asked for the reasons behind their homes not being sprayed, it was surprising to note that within this figure, n= 60 (36.8%) were not available at home the times when spraying was being done, n= 45 (27.6%) did not want their houses to be sprayed, n= 30 (18.4%) claimed sprayers had not gone to their homes to spray, n= 26 (16.0%) did not know why their house was not sprayed and n= 2 (1.2%) did not prepare rooms for spraying (Figure 4.3.2).

Figure 4.3.2 Reasons for not spraying the house in the last 12 months N= 166

Other than these reasons, spraying was not done because of logistical problems and lack of proper information. The excerpts from the group discussions provide lived experiences.

Last spraying season, people in my zone complained that the sprayers did not come. Even my house was not sprayed because they did not come. In Bonaventure, it is not known who went there but the people there complained that they were told to pay K10,000 if they wanted their houses sprayed. Many people didn't have money so they missed out on the spraying.

We accepted our homes to be sprayed but in some places they did not reach. Also they were saying the chemical was not enough so that is a sign of poor planning. In addition, they said they were given only a few days and so when those days were over, they stopped spraying.

Our homes were not sprayed because the people they brought to do it were not conversant with the area and so they were skipping some areas

Lack of information is a challenge. People are not given the right information. People think that medicine is also for killing cockroaches and bed bugs. It is for killing mosquitoes. So these insects come out of hiding but do not die and people assume the chemical is not strong enough. They refuse their homes to be sprayed. So the problem is lack of accurate information.

As for me, I will not accept in future. This time I agreed for my house to be sprayed because I liked the way it was done the other spraying season. We stayed free of mosquitoes in the house for about 6 months. That was good. But the sprayers that came the last season did not do a good job. I don't know if they mixed too much water with the chemical because just after they left, the mosquitoes went into the house. People in my area were coming to me to complain that their houses were full of mosquitoes even after the spraying. That was not good.

In my section, we refused. We were told to remove the furniture but they did not come the first day. Their excuse was that the sprayers did not have the plastics to cover the furniture when spraying. The second day people removed their furniture again and again the sprayers gave the same excuse. On the third day, the same happened but the sprayers did not come. On the fourth day when they came, people refused to remove their furniture. It was reported at the health centre and we were questioned but we explained what had transpired. I feel the sprayers should prepare everything before they ask us to tell people to prepare their homes.

### 4.3 Attitude Domain

When the respondents were asked about their attitudes towards IRS, there was a general trend that showed that generally respondents had a negative stance towards IRS (Table 4.3.1).

Table 4.3.1 Attitudes towards IRS

<i>Variable of Interest</i>	<b>Yes</b>		<b>No</b>	
	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>
Were you happy when your house was sprayed? (N= 224)	159	41.1	65	15.5
Do you like the IRS strategy (N= 387)	160	41.1	207	58.9
Do you have any concerns about IRS? (N= 387)	360	93	17	7
Concerned with the smell of IRS	366	94.6	21	5.4
Concerned that the chemicals are bad for babies(N= 387)	343	88.6	44	11.4
Concerned that IRS induces a rash (N= 387)	224	57.9	163	42.1
Concerned that IRS causes walls to be dirty (N= 387)	375	96.1	12	3.1

### 4.4 Pattern of Spraying and Concerns

The mean interval of spraying from the time the study started and within the last 12 months was 4 months previously (SD = 3.7). The modal interval was 6

months. However, the majority of the residents  $n = 159$  (41.1%) were happy when their houses were sprayed as compared to  $n = 65$  (15.5%) who were not. Out of the 224 whose houses were sprayed, a greater number of households  $n = 212$  (96.5%) were sprayed by the Ministry of Health than the local authority  $n = 9$  (4.0%). A global look at the sample shows that a greater number  $n = 228$  (58.9%) of the residents do not like the IRS strategy at all. They stated that IRS is not a significant strategy in reducing vector density. Apart from this, the residents had varying types of concerns with the majority  $n = 366$  (94.6%) stating so and a minority  $n = 21$  (5.4%) stating no concerns. Smell, making the walls of their houses dirty, IRS chemicals being bad for babies and IRS inducing a rash were very serious concerns.

Below are the concerns raised by the Neighbourhood Health Committee:

Someone called me into her house to show me the way the chemical had messed her walls. The sprayers had used a blackish chemical that left dark dirty lines on the walls. She had to start washing the walls to make them clean again. We don't know what chemical that was because what we know is the white chemical. I felt bad as a community health worker. From that time, others also refused to have their houses sprayed for fear of their walls being messed.

In my house and in my area, the chemical was all water. I was called into some people's houses to see what 'our' people had done. People complained that the sprayers were spraying water instead of chemical. The floors were covered with water.

Those that sprayed the other season did a good job. Even my TV still has some residue that I have failed to wash off. We even used to sleep without a mosquito net. But last season's spraying was poorly done.

#### **4.5 Practice Domain**

About 85% of the respondents in this study did something to prevent malaria. It was surprising that most of the residents in the study did not use malaria prophylaxis  $n = 233$  (65.8%) as compared to  $n = 164$  (42.4%) who did. Fewer people than expected  $n = 60$  (15.5%) slept under a mosquito net while  $n = 327$  (84.5%) did not. A greater number of the respondents  $n = 212$  (54.8%) did not use

any insecticide sprays as compared to n= 175 (45.2%) who did. Nearly all respondents n= 360 (93.0%) did not privately procure IRS services and all respondents did not spray their surrounding but tried to expel mosquitoes using burnt leaves n= 148 (38.2%) as shown in table 4.5.1.

Table 4.5.1 Preventive Practices

<b>Variable of Interest</b>	<b>Yes</b>		<b>No</b>	
	<b>n</b>	<b>%</b>	<b>N</b>	<b>%</b>
Malaria prophylaxis	164	42.4	233	65.8
Sleep in mosquito net	60	15.5	327	84.5
IRS	27	6.9	360	93
Spraying surrounding environment	0	0	387	100
Burn leaves in the house	148	38.2	239	61.8
Insecticide sprays inside the house	175	45.2	212	54.8

Beyond these practices, focus group discussions revealed other preventive practices:

We try to prevent malaria by sleeping in a mosquito net, spraying chemicals, burning mosquito coils and covering holes with stagnant water. Burning sisal bags also chases mosquitoes.

It was learnt from the neighbourhood health committee that it joins the program of the health centre by taking part in activities concerning malaria. The committee admits that there are challenges in doing so. The excerpt below attests.

During the spraying program, we go round telling people on the spraying program and its importance. The problem is that the spraying is not done properly. And some people do not get their houses sprayed. The Government should fulfil their promises. We are living in communities where some people cannot afford to live in plastered houses. The sprayers sometimes refuse to spray the walls of unplastered houses because what they have is not the appropriate chemical.

## 4.6 Practices After Spraying

Generally all rooms in the 224 houses were sprayed. Within the sample, only n= 52 houses (13.4%) had a room where an expectant mother slept sprayed (figure 4.6.1).

Figure 4.6.1 Rooms of a pregnant woman that were sprayed

When the 224 respondents who had accepted their homes to be sprayed were asked about their actual experiences in terms of difficulties they had with IRS, a greater number of them had misgivings. They agreed that in future they would not cooperate because they wanted to avoid irritation from IRS. They further claimed that IRS was affecting their babies, family members and making the walls of their houses dirty (Table 4.6.1).

Table 4.6.1 Reasons for Actions

<b>Variable of Interest</b>	<b>Yes</b>		<b>No</b>	
	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
Avoiding irritation	196	89	25	11
Afraid baby might be affected	195	88	26	12
Family member reacted to the chemical	186	84	35	16
The walls were dirty	189	86	36	14

These reasons indeed compelled the residents not to cooperate in future and the concerns below buttress the survey results.

IRS is good but some people refuse because they say they cannot keep their walls dirty for 6 months. Others refuse because at some point they were told to remove their furniture and they did but the sprayers did not show up. We wonder whether the chemical has no consequences because that chemical stays on the wall for 6 months. It is not that people that breathe the chemical for 6 months can also get affected?

Places with stagnant water are not sprayed. Moreover some people refuse because they are well to do and do not want to have a stranger enter their house. You see, the sprayers wear protective clothing but the woman cleaning the floor afterwards does so without protective clothing and so they get sick.

Babies get skin irritation. Also, women get nasal problems because they are the ones that clean the chemical from the floor. That is why they are now refusing so that they do not get sick again.

Some sprayers are careless and spray all over the house thereby messing furniture.

They only involve us when they want us to carry out work for free. But when it comes to activities that involve money, then they bring their own people. We also want to be involved and get some incentives sometimes. They should be using community health workers for this spraying.

#### 4.7 Knowledge, Attitude and Practice Associations with IRS

In this study, the decision in the household to have a home sprayed or not was occasioned by attitude and practice factors. In this study, the findings indicate that there was no significant association between sex of the respondent and the house sprayed in the last 12 months (Table 4.7.1).

Table 4.7.1 Association of Sex and Acceptability of IRS in the last 12 months?

	No	Yes	Total	<i>Asymp. Sig. (2-sided)</i>
Male	54	69	123	0.784
Female	112	152	264	
Total	166	221	387	

### Attitude Associations

In the attitudes domain, there were significant findings suggesting the existence of associations between the chemical giving a skin rash as well as making the walls dirty and accepting IRS (Table 4.7.2).

**Table 4.7.2 Associations of Attitudes and Acceptability of IRS in the last 12 months**

	House being sprayed in the last 12 months			<b>Asymp. Sig. (2-sided)</b>
		No	Yes	
The chemical is bad for babies?	No	63	9	0.153
	Yes	91	6	
The chemical smells	No	15	59	0.489
	Yes	19	82	
The chemical gives a skin rash	No	52	20	<0.001
	Yes	90	7	
Makes walls of the house dirty	No	43	29	0.001
	Yes	80	17	

### Practice Associations

In the practice domains, there were no factors significantly associated with a house being sprayed (Table 4.7.3).

**Table 4.7.3 Associations of Practices and the house sprayed in the last 12 months**

	House being sprayed in the last 12 months			<b>Asymp. Sig. (2-sided)</b>
		No	Yes	
The walls were dirty	No	2	0	0.291
	Yes	28	16	
Afraid that the baby would be affected	No	0	2	0.205
	Yes	20	24	
Family member affected by the chemical	No	2	0	0.578
	Yes	42	2	

### Knowledge Associations

In the knowledge domain, knowledge on IRS and preventing malaria was significantly associated with being sprayed (Table 4.7.4).

Table 4.7.4 Association of knowledge and a house sprayed in the last 12 months?

	House being sprayed in the last 12 months				<b>Asymp. Sig. (2-sided)</b>
		No	Yes	Do not know	
IRS and preventing malaria	Yes	108	30	28	<0.001
	No	186	19	16	

Table 4.7.5 Factors significantly associated with acceptance of IRS in a multivariate analysis

<b>Factor</b>	<b>Odds Ratio (95% Confidence Interval)</b>
Age	1.03 (1.01, 1.05)
<b>Knowledge of IRS</b>	
Yes	1.77 (1.38, 2.27)
No	1

Table 4.7.5 shows factors associated with acceptance of IRS. On each birthday attained, respondents were 3% more likely to accept IRS. Compared to respondents who had no knowledge of IRS, those who had knowledge were 77% more likely to accept IRS.

When respondents were interviewed about their detailed positions on the use of IRS, they indicated their displeasures and situations when it would be possible to accept its use. The following excerpts will help readers in appreciating the concerns:

“The people of Linda are very difficult. To just accept a thing like the spray, you are joking. Acceptance of this spraying in this township is founded to some extent on a sense of group-based citizenship.

In spite of doubts about its benefits, some accept spraying as part of their duty as a good citizen; others to ensure they can access other state-administered services such as health care.

Residents here do not just accept things because perceived efficacy or physical effects of the spraying process. There are factors like political and socio-cultural issues and rights. You cannot just be allowed to enter a house and do your business. There are issues of privacy.

In my section, many people refused to have their homes sprayed. So the health centre asked us to sensitize the people. We were actually moving with them from door to door trying to convince people let the sprayers into their houses. This is because we know the people. They say they bring bed bugs. But we would tell them that the bed bugs are already there in the house. They only come out of hiding when they smell the irritating smell of the chemical. When we move around with them like that, they don't even give us some of their food like milk and bread. We do it on empty stomachs.

We would like them to come and do the spraying of our houses today. We do not refuse anything; whatever the government will need to do we accept. But you see they have to take care of our concerns. The chemicals make our homes dirty afterwards.

Eeeeh, does it mean that if the government comes here with some medicine and say that I want to pour it on you; you are going to accept it without a fight? If it will cause my child to be sick, I am not going to accept it.

Oh yes, for me spraying is good. You mean the residents? That I cannot say.”

#### **4.8 Recommendations or Manner of Addressing Concerns**

Withstanding the concerns which the residents had for IRS chemicals, most of the respondents had options and these ranged from selecting chemicals that do not make walls dirty, spraying outside and changing chemicals altogether with some opting to abandon the IRS program. There were mixed recommendations among the residents with a few insisting on abandoning the IRS program, some insisting that it be done once a year. Majority of the respondents did not want IRS to be a community based activity to be implemented by members of the community and yet the neighbourhood health committee felt on the contrary.

However, most of the respondents preferred that spraying should be done on surrounding environment and that all areas should be sprayed at the same time so that mosquitoes are eliminated (table 4.8.1).

Table 4.8.1 Manner of Addressing IRS Concerns

<i>Variable of Interest</i>	<i>Yes</i>		<i>No</i>		<i>Abandon IRS</i>	
	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>	<i>n</i>	<i>%</i>
Change the chemical	237	61.2	43	11.1	107	27.6
Spray outside	305	78.8	82	21.2	-	-
Use chemicals that do not make walls dirty?	373	96.4	14	3.6	-	-
Spraying after one year	183	47.3	193	49.9	11	2.8
It should be implemented at community level by community members	33	8.5	354	91.5	-	-
Spraying should be done on surrounding environment?	316	81.7	20	5.2	51	13.2
All areas should be sprayed at the same time so that mosquitoes are eliminated	384	73.4	42	10.9	61	15.8

Other than these methods of addressing concerns, the neighbourhood health committee had this to say:

“As a neighbourhood committee, we have seen that people in this area do not like IRS. We are told to tell people to remove furniture in the homes. And also to remove food from the house. The walls must be free. They give us time to go through the houses and tell them. However, some people complain of flu and skin rashes. Especially those that do not wait for the recommended 2 hours to elapse.

There are ways to solve some of the problems you know. Look! We are the ones that are known by the people in the communities. So when it comes to spraying, why can't they let us do the work? Some people do not trust strangers into their homes fearing for the lives of their children or suspecting that they are thieves. But if they use we are known, that cannot be a problem.”

## **CHAPTER FIVE- DISCUSSION AND CONCLUSION**

This last chapter is composed of the discussion of the findings and the conclusion of the study. This chapter first presents the findings as guided by the objectives. This is followed by the discussion of the findings in to situate them in the wider research context relating with existing literature as far much as possible. A conclusion is then presented. This chapter winds up on the limitations of the study since these play an important role in making suggestions for future research and recommendations.

### **5.1 What This Study Shows**

This study examined two research questions and these are:

1. To what extent does the level of KAPs that Linda residents have contribute to accepting IRS?
2. What concerns do Linda residents have towards IRS?

The answers to these research questions are as follows:

In reference to research question number one “To what extent does the level of knowledge and attitudes that Linda residents have contributed to accepting IRS?” In this study, the decision in the household to a home sprayed or not was occasioned by attitude and knowledge factors. I knowledge and attitude variables were unrelated to practice or accepting IRS.

With regard to the research question “What concerns do Linda residents have towards IRS?”

A global look at the sample shows that a greater proportion of the residents do not like the IRS strategy at all. This is because IRS was not a significant

strategy in reducing vector density. The most serious concerns were smell, making the walls of their houses dirty and that the IRS chemicals were bad for their babies.

With regards to the key research objectives, the following findings are noted:

***To determine levels of knowledge on malaria prevention;***

The respondents in this study knew what Indoor Residual Spraying was except a smaller population that had incorrect knowledge about the IRS said IRS was about spraying for rats and cockroaches.

***To determine levels of knowledge on IRS;***

The respondents in this study knew the IRS “don’ts” after spraying and particularly that painting, washing, cleaning and replastering the walls were not necessary precautions to take after a house had been sprayed.

A significant proportion of respondents knew that Indoor Residual Spraying kills mosquitoes and that this was a factor in malaria prevention. It is not surprising in this semi-literate community that even after wider IRS campaigns some had incorrect knowledge linking IRS to cockroach eradication.

In summary, the knowledge levels of IRS program, its strategies and malaria were high in this community.

***To assess levels of utilisation of IRS***

Just over half of the households had their homes sprayed in the last 12 months. There was a general trend that showed that about 75% of the respondents had negative attitudes towards IRS.

### ***To assess attitudes of Linda residents towards IRS***

Out of the population N= 387 that was sampled, generally all rooms in the 221 houses were sprayed. Though this was the case, globally, Linda residents both those who had their homes sprayed and those who did not, had negative attitudes towards IRS. For instance, when the 166 respondents who had their houses unsprayed were asked for the reasons behind their homes not being sprayed, it was surprising to note that some claimed they were not available at home the times when spraying was being done and yet three rounds of spraying were organised in one week for homes that were marked as unsprayed. Some of the residents did not just want their houses to be sprayed, whereas others did not prepare rooms for spraying. It was also shocking to note that some claimed sprayers had not come.

What seemed to confirm these negative attitudes were concerns that the residents had. The most serious concerns were: (i) Avoiding irritation (ii) the pungent smell of the chemicals made family members to react to the chemicals (iii) making the walls of the houses dirty and (iv) it was strongly held that the chemicals were bad for their babies.

## **5.2 Discussion**

This study tends to show that IRS, which is one of the primary vector control interventions for reducing malaria transmission has not been well marketed and that Linda residents have not been called to participate as equal partners. Whatever efforts the World Health Organization has made towards the Global Malaria Programme may not be realised by the Za Community in Linda in the quest to achieve the Millennium Development Goals for malaria by 2015 (World Health Organization, 2006). As with other disease vector control programmes, a high level of community acceptance is required for effective implementation of IRS; in order to have a significant impact on

malaria transmission, widespread household coverage is required (>80% of premises within the target area) (WHO, 2006) and yet the coverage for Linda was a mere 58%. Indeed this scenario requires householders to cooperate with spraying personnel by being present on the designated day and removing some household contents outside.

The public health literature on vector control and community perceptions has long recognised the need for community participation in vector control programmes (Gubler and Clark, 1994, 1996; Klein et al., 1995; Lloyd et al., 1994; Manderson, 1992; Winch et al., 1992). Exploring the forms such participation can take, Winch et al. (1992) have argued that “community participation can be effective if changes are made in the way participation is defined, and if there is increased commitment on the part of local governments to addressing community concerns” (Winch et al., 1992: 348).

A number of public health studies including this one (see Bermejo et al., 1993; Rosenbaum, et al., 1995; Toledo et al., 2008) have indicated that communities do not readily accept IRS because of serious concerns related to (i) Avoiding irritation (ii) the pungent smell of the chemicals made family members to react to the chemicals, (iii) making the walls of the houses dirty and (iv) it was strongly held that the chemicals were bad for their babies.

Reflecting the above events in Linda compound, there seems to be a similar trend in the design of IRS programmes with other programmes elsewhere. Unlike the IRS program in Zambia, few studies have specifically evaluated the acceptability of IRS for malaria control to individual and communities, or considered in depth the role of human and cultural factors in the success or failure of programmes. Two notable exceptions are Govere et al. (2000) and Rodriguez et al. 2006), both of which used survey methods to ask about specific factors taken to be the key determinants of acceptability. In South Africa, Govere et al. used a structured KAP (knowledge, attitudes and

practices) questionnaire, asking amongst other things about satisfaction with spraying personnel, washing and re-plastering after spraying and perceived effects. Rodriguez's study in Mexico focused on side effects and started from the premise that "spraying coverage depends on whether householders perceive the intervention as beneficial, in terms of how effective the insecticide is against mosquitoes and other nuisance insects, as well as the number and intensity of unwanted side effects" (Rodriguez, et al., 2006: 318). Although both studies found IRS compliance acceptably worrying findings, such as the fact that only 1.9% of respondents associated the spraying with malaria transmission prevention were not explored (Rodriguez, et al., 2006). This raises questions as to the nature of the perceived benefits that have been associated with IRS acceptability to date and the adequacy of the current approach, which is to ask about the physical effects (both positive and negative) of spraying.

One other matter worth discussing is the role of social economic status in contribution to attitudes and IRS practices. Though this study had no social economic variables integrated in the study, Linda residents seem to be influenced in a significant way. There is no other possible explanation that can be given for the low use rates of malaria prophylaxis, use of a mosquito net and insecticide sprays. The neglect of the socio-cultural context of malaria control is not limited to IRS as an intervention, but is a hallmark of public health approaches to malaria. Although there are notable examples of culturally compelling interventions like the use of burnt leaves (see for example Panter-Brick et al., 2006), historically, public health approaches have tended to focus on the parasite and the mosquito as a vector, and to see solutions in technological rather than human social economic terms (Opiyo, et al., 2007; Packard, 2007).

There are lessons to learn from this study. A strategy that has not been currently considered for increasing access to IRS at both community and

household level. The second lesson is that the IRS program is not doing well in Linda looking at the target (58%) which is lower than the WHO 80% set target. Therefore, there is need for some radical measures. However, the study underlines the need to:

1. Provide at least community sensitisation strategies that involve the people using localised indigenous means.
2. Though geography and staff adequacy were not factors for the elicited IRS utilisation, there is need to reduce apathy to IRS in remote areas like Linda compound and improve geographic access to IRS by indeed training community health workers which strategies the locals are ambivalent to. This is because many strategies including home spraying at a personal level need to be promoted. The recommendation for such is arising following the resolution of the African Heads of State meeting in Abuja (Abuja, 2000; HO, 2000), Nigeria on Roll Back Malaria. This is an important act for malaria-endemic areas like Linda compound. This will lower malaria mortality and morbidity.

### **5.3 Study Limitations**

Noting that there is no research without limitations, this study has its own limitations too. The limitations arise from the methodologies that were adopted for this study and the nature of the setting. These limitations play an important role in interpreting study findings and making suggestions for future research. The limitations are due to the exploratory nature of the research, respondents were not asked specifically about their relationships with local authorities and health centre staff or how their sense of civic duty had impacted on their acceptance of IRS. Furthermore, it was not planned in this study to discuss with the fieldworkers who conducted IRS to ascertain some of the concerns presented by the respondents in this study.

The second limitation is related to the research design that was applied in this study and this is the use of induction and abduction in the approach to the inquiry. According to Blaikie (2000), the use of induction and abduction do not allow the researcher to test any hypothesis and not even to use theory in guiding the inquiry. In addition, it is not possible for a researcher to explain causes and effects which are generated by qualitative data sets. In spite of the fact that the two strategies were used and enabled the researcher to collect quantitative data without testing any hypothesis, lack of tested hypothesis does not give greater explanatory power between IRS utilisation and knowledge as well as attitudes. However, the strategy makes the research credible because the findings are drawn from a large sample.

#### **5.4 Strengths**

In spite of the limitations, this study has notable strengths and these are drawn from the following standpoints:

1. The study has provided room for readers to appreciate the constraints of the IRS program from the points of view of the beneficiaries.
2. To the research fraternity, the data adds gaps in knowledge and practices where they were missing and particularly by highlighting that IRS is below the set targets in Linda compound and that participatory approaches are not used in the IRS program.
3. The methodology that has been used in this study could be applied in other settings.

#### **5.5 Conclusion**

The utilisation of IRS in Linda compound is remarkably low. Acceptance of IRS in this population is founded to some extent on a sense of group-based citizenship, resulting from lack of informed choice and decision making. In spite of doubts about the benefits of IRS, some accept IRS as part of their duty as a good

citizen. Acceptability is not limited to perceived efficacy or physical effects of the spraying process but relates to broader political and socio-cultural issues such as citizenship, identity, and rights. As plans for malaria eradication are formulated, it is important to recognise the centrality of socio-economic, political and cultural influences that shape the human dimension of malaria and its control. While much attention is given to the parasite, the vector and technologies to conquer these, much less resolve is spent in understanding human behaviours and ideologies that ultimately determine the success or failure of programmes. In the short term, more attention needs to be placed on providing people with information about how IRS works; in the longer term, a move towards sustainable vector control through community participation and empowerment.

We have seen that a considerable proportion of the people in the study area were indifferent to the IRS strategies. There are indeed marked misconceptions and myths about the benefits of IRS and the justification for the use of indigenous means of preventing malaria.

There is room for change and the following are recommended:

To dispel various misconceptions and myths regarding IRS and indigenous methods of Malaria prevention, health care providers need to disseminate information about what IRS actually does. Propagation of messages regarding the effectiveness of IRS in killing mosquitoes is in essence preventing mosquito bites and thereby halts malaria infection. In a culturally appropriate way it is necessary to enhance the awareness of the people about the actual cause of malaria.

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# APPENDICES

*Appendix 1: Work plan*

WEEKS ?	1	2	3	4	5	6	7
ACTIVITY ?							
Presentation of final proposal to Presentation Forum							
Address comments from Presentation Forum							
Submission to Ethics Committee							
Pre-testing Questionnaire							
Finalisation and perfection of Questionnaire							
Data Collection							
Data Analysis and Interpretation of results							
Report Writing							
Submission of Dissertation							

Appendix 2: Budget

SN	ACTIVITY	UNIT COST	FREQ	NO	TOTAL ZMK
<b>Data Collection And Report Preparation</b>					
1	Print Proposal and final report	180,000	1	3	540,000
2	Box Pens and Pencils	30,000	1	2	60,000
3	Print Questionnaires	10,000	400	1	4,000,000
4	Data Collectors' Lunch	30,000	5	10	1,500,000
5	Data Collectors' Transport	30,000	5	10	1,500,000
6	Data collectors' Fees	50,000	5	10	2,500,000
7	Supervisor's Fees	100,000	5	1	500,000
8	Researcher's Transport and Lunch	110,000	5	1	550,000
9	Data Entry Clerk	2,000,000	2	1	4,000,000
10	Statistician	2,000,000	1	1	2,000,000
11	Research Supervisor's Fees	1,000,000	1	2	2,000,000
<b>SUB TOTAL</b>					<b>19,150,000</b>
<b>Data Collection Training</b>					
1	Stationery (Notepads, Pens)	10,000	15	1	150,000
2	Transport refund	30,000	15	1	360,000
3	Lunch and Teas	60,000	15	1	900,000
4	Hire of Venue	500,000	1	1	500,000
<b>SUB TOTAL</b>					<b>1,910,000</b>
<b>GRAND TOTAL</b>					<b>21,060,000</b>

*Appendix 3: Written Consent Form*

Greetings! My name is ..... I have been asked to take part in the study entitled “Knowledge, Attitude and Practice Survey on Indoor Residual Spraying in Linda Compound” by the Researcher, Linda Malulu, a student of Master’s in Public Health at the University of Zambia. I would like to ask you some questions. During the interview, you will be asked to give information on how your household is affected by mosquitoes and malaria. Further, you will be asked about the Indoor Residual Spraying activity that the Ministry of Health has been carrying out in this area. The findings of the study will be given to Ministry of Health and can contribute to future malaria intervention activities in this area. Would you like to take part in the study?

I agree that the investigator has thoroughly explained to me about the study procedures and that I was given a chance to think about it and ask questions. Information about me will be kept confidential. I do not agree that it should be used by anyone except the researcher and her supervisor. I agree that information about the study may be put in the computer. By signing this document, I have had a chance to think about the study and I agree to take part in the study by reasons given above.

Signed: \_\_\_\_\_  
Respondent’s Signature  
Or Thumbprint

Date: \_\_\_\_\_

Signed: \_\_\_\_\_  
Impartial Witness (If required)

Date: \_\_\_\_\_

Signed: \_\_\_\_\_  
Signature of the Investigator

Date: \_\_\_\_\_

### GAWO 3: PEPALA YOLEMBAPO KUVOMELEZA

Moni! Zina langa ndine ..... Napempewa kupezekamo mu nchito yokala ndi mutu wakuti “Kuziwa, Malingalilo ndiponso kuyesa kuwona nchito yopompela mankwala mu manyumba ku komboni ya Linda” ndi wa nchito yofufuza, Linda Malulu, mwana wa sukulu mu Master’s in Public Health ku University of Zambia. Ningafune kuku funsani mafunso. Pa ntawi ya kufunsa, m mpewa kufotokoza za m’mene banja lanu lankalila na uzuzu ndi maleliya. Kuonjezela apo, muzafunsiwa pa nchito yopompela mankwala mu manyumba ime yakala ikuchitiwa naba Ministry of Health mu dela ili. Zimene zizaziwika mu nchito yofufuza iyi zizapelekedwa ku Ministry of Health ndipo zingatandize musogolo. Pa nchito zogwebana ndi maleliya mu dela ili. Kodi mungafune kupezekamo mu nchito iyi?

Ni vomeleza kuti wa nchito yofufuza afotokoza momveka wa ine ponena za malamulo a nchito imeneyi ndikuti napasidwa mpata woiganizila ndi kufunsa mafunso. Nkani zonena pa ine zizasungwa mwachisinsi. iloleza kuti zisebenzesewe ndi wina aliyense kusiyapo wa nchito yofufuza ndi womuyanganila. Ndiloleza kuti nkani zonena za nchito iyi ziikiwe mu kompyuta. Posaina pepala ili, ninali na mpata woganizilapo pa nchito iyi ndipo nivomela kupezekamo pa zifukwa zimene zanenedwa pamwamba apa.

Kusaina: \_\_\_\_\_  
Siginecha ya wopezekamo  
Kapena kufwatika chikumo

Deti: \_\_\_\_\_

Kusaina: \_\_\_\_\_  
\_\_\_\_\_  
Mboni yoima payeka  
(Ngati kuli kofunika)

Deti:

Kusaina: \_\_\_\_\_  
Siginecha ya wanchito yofufuza

Deti: \_\_\_\_\_

*Appendix 4: Household Questionnaire*

THE UNIVERSITY OF ZAMBIA  
SCHOOL OF MEDICINE  
DEPARTMENT OF COMMUNITY MEDICINE

TOPIC: A KNOWLEDGE, ATTITUDE AND PRACTICE SURVEY ON  
INDOOR RESIDUAL SPRAYING (IRS) IN LINDA COMPOUND

SERIAL NUMBER: .....

DATE: .....

PLACE OF INTERVIEW: .....

NAME OF INTERVIEWER: .....

INSTRUCTIONS FOR THE INTERVIEWERS:

1. Introduce yourself to the respondent and explain the purpose of the interview.
2. Do not write the respondent's name on the interview schedule to ensure anonymity.
3. Get written consent from the respondents before the interview.
4. Tick and complete responses in appropriate spaces provided.
5. All information provided by respondents should be kept in strict confidence.
6. Allow respondents to ask questions at the end of the interview.

**PART 1**

**SECTION A: DEMOGRAPHIC DATA**

1. Sex

1. Male	2. Female

2. Age last birthday \_\_\_\_\_

3. Marital Status

1. Single	2. Married	3. Divorced	4. Widowed

4. No. of children \_\_\_\_\_

5. How many people live in your house? \_\_\_\_\_

6. How long have you been living in your house?

1. 12 months	2. 18 months	3. 24 months	4. Above 24 months

**PART 2**

**SECTION B: KNOWLEDGE (TICK ALL THAT APPLY)**

7. Do you know about Indoor Residual Spraying?

1. Yes                      2. No                      3. Don't know

8. What do you know about Indoor Residual Spraying?

1. It is spraying for rats and cockroaches  
2. It is spraying for mosquitoes  
3. It is spraying for malaria prevention  
9. What do you understand by malaria?

1. A feverish illness
2. A disease caused by mosquitoes
3. A disease caused by drinking unsafe water
4. A disease caused by eating unripe sugar cane
5. Don't know

10. What causes malaria?

1. Mosquitoes
2. Untreated water
3. Unripe sugar cane
4. Don't know

11. How can malaria be prevented?

1. Malaria prophylaxis
2. IRS
3. Mosquito nets
4. All three above
5. Not eating unripe sugarcane
6. Not drinking unsafe water

12. What are the necessary precautions to take after your house has been sprayed?

1. Do not paint the walls
2. Do not wash the walls
3. Do not clean the walls
4. Do not re-plaster the walls
5. Don't know

13. What are the benefits of Indoor Residual Spraying

1. Kills mosquitoes
2. Kills cockroaches
3. Prevents malaria
4. Don't know

### **SECTION C: ATTITUDE**

14. Was your house sprayed in the last 12 months?

1.  Yes  2. No

15. If No to Q14, Why was your house not sprayed?

1. Was not available
2. Did not want house to be sprayed
3. Did not prepare rooms for spraying
4. Sprayers did not come
5. Don't know

16. If Yes to Q14, When was your house last sprayed for malaria prevention?

\_\_\_\_\_ months.

17. Who sprayed your house?

1. City Council
2. MoH Sprayers
- C. Private Company

18. Were you happy when your house was sprayed?

1. Yes
2. No
3. I had reservations

19. Do you like the IRS strategy?

1. Yes
2. No
3. Not sure

20. Do you have any concerns about IRS?

1. Yes
2. No

21. If yes to Q19, what concerns do you have about IRS?

1. The chemical smells
2. The chemical is bad for babies
3. The chemical gives skin rash
4. It makes the walls dirty

22. How would you like your concerns to be addressed?

1. Change the chemical
2. Spray outside
3. Use chemical that does not make walls dirty

23. What recommendations do you have for the IRS strategy?

1. It should be done more than once a year
2. It should be implemented at community level by community members
3. Spraying should be done on surrounding environments
4. All areas should be sprayed at the same time so that mosquitoes are eliminated

24. Do you think IRS reduces vector density (the number of mosquitoes)?

1. Yes          2. No          3. A Bit          4. For a while then they come again

#### **SECTION D: PRACTICE**

25. In what ways do you prevent yourself from getting malaria?

1. Malaria prophylaxis
2. Sleep in mosquito net
3. IRS
4. Spraying surrounding environment
5. Burn leaves in the house
6. Insecticide sprays inside the house

26. How does your household protect itself from malaria?

1. Malaria prophylaxis
2. Sleep in mosquito net
3. IRS
4. Spraying surrounding environment
5. Burn leaves in the house
6. Insecticide sprays inside the house

27. Were the walls of the rooms in which you sleep sprayed?

1. Yes          2. No          3. Don't Know

28. Have you cleaned, washed, re-plastered or repainted your inner house walls since the spraying activity?

- A. Yes          B. No

29. If Yes to Q28, which rooms were those?

1. Room where baby(ies)/children sleep
2. Sitting room
3. Parent's bedroom
4. Pregnant woman's bedroom

30. What were the reasons for this action?

1. Avoiding irritation

2. Afraid baby might be affected
3. Family member reacted to the chemical
4. The walls were dirty
5. It had been planned regardless of the spraying

THE END  
THANK YOU FOR TAKING PART IN THIS STUDY.

GAWO 4: MAFUNSO YA BANJA

THE UNIVERSITY OF ZAMBIA  
SCHOOL OF MEDICINE  
DEPARTMENT OF COMMUNITY MEDICINE

MUTU WANKANI: KUZIWA, MALANGALILO NDIPONSO KUYESA KUWONA  
NCHITO YOPOMPELA MANKWALA MU MANYUMBA KU KOMBONI YA LINDA

NAMBA: \_\_\_\_\_

DETI: \_\_\_\_\_

MALO YAMAKAMBISANO: \_\_\_\_\_

ZINA LA WOFUNSA: \_\_\_\_\_

MALANGIZO KWA WOFUNSA:

1. Ziziwikiseni kwa muntu uyo ndipo fotokozani chifuno cha kukambisana.
2. Osalemba zina la muntu uyo pa mundandanda wa kukambisana kuti asaziwike.
3. Pakale kuvomela kwa kulemba kwa muntu uyo mukalibe kuyamba kukambisana.
4. Chongani ndi kusiliza mayanko pa malo oyenela opasidwa.
5. Nkani zonse zochokela kubantu ziyenela kusungwa mwa chisinsi.
6. Aloleni antu kufunsa mafunso pambuyo pokambisana.

MBALI 1

MDIME A: MAU PA MAKALIDWE YA ANTHU

PART 1

SECTION A: DEMOGRAPHIC DATA

31. Mwamuna kapena mukazi

1. Mwamuna	2. Mukazi

32. Zaka pasiku lobadwa lapita \_\_\_\_\_

33. Za ukwati

1. Wosakwatiwa	2. Wokwatiwa	3. Wpsuzuliwa	4. Wofedwa

34. Chiwelengelo cha ana \_\_\_\_\_

35. Ndi angati antu onkala munyumba mwanu? \_\_\_\_\_

36. Mwankali ntawi itali motani munyumba mwanu?

1. Miyezi 12	2. Miyezi 18	3. Miyezi 24	4. Kuposa miyezi 24

MBALI 2

NDIME B: KUZIIWA (Chonganiponse poyenela)

37. Kodi muziwa za kupompa mankwala mumanyumba?

1. Inde            2. Iyai            3. Sindiziwa

38. Muziwapo chain pakupompa mankwala munyumba?

1. Ni kupompela makoswe na nyandule  
2. Ni kupompela uzuzu  
3. Ni kupompela kuzichingiliza ku maleliya

39. Ni chain chimene muziwapo pa maleliya?

6. Ntenda yobwelesa mpepo mpepo  
7. Ntenda yobwelesewa na uzuzu  
8. Ntenda yobwelesa na kumwa mazi adoti  
9. Ntenda yobwelesewa na kudya musale wosakwima  
10. Siniziwa

40. Ni chain chimene chimapangisa maleliya?

1. Uzuzu

2. Mazi yosafakiwa mankwala
3. Musale wosakwima
4. Siniziwa

41. Kodi maleliya inga chinjiliziwe bwanji?

1. Mankwala ya maleliya
2. Kupompa mankwala mu nyumba
3. Ukonde wa uzuzu
4. Zonse zitatu pamwamba apa
5. Osadya musale wosakwima
6. Osamwa mazi adoti

42. Ni Ziti zochita zoyenela pambuyo pakuti nyumba yanu yapompewa mankwala?

1. Osapenta chipupa
2. Osasuka chipupa
3. Osayelesa chipupa
4. Osaikanso pulasita kuchipupa
5. Siniziwa

43. Ni bwino uti wa kupompela mankwala mu nyumba?

5. Kumapaya uzuzu
6. Kumapaya nyandule
7. Kumachingiliza maleliya
8. Siniziwa

#### NDIME C: ZA MAKALIDWE

44. Kodi nyumba yanu inapompewa mankwala miyezi 12 yapita?

1.  Inde  2. Iyai

45. Ngati yanko ni iyai kufunso 14, chifukwa cha chiani nyumba yanu sinapompewe?

6. Sini naliko
7. Sini nafune kuti ipompewe
8. Sini nakonzেকেlese zipinda kuti zipompewe
9. Opompa sibanabwele
10. Siniziwa

46. Ngati yanko ni inde kufunso 14, ni liti pamene nyumba inapompewa mankwala kaamba kochinjiliza maleliya?

Miyezi \_\_\_\_\_

47. Ndani anapompa nyumba yanu?

1. Ba City Council                      2. Opompa ba MoH                      C.                      Kampani  
yabantu chabe

48. Kodi munakondwela pamene nyumba yanu inapompewa?

1. Inde                      2. Iyai                      3. Ninali kukaikila

49. Kodi muchitidwe wa kupompa mankwala munyumba mu ukonda?

1. Inde                      2. Iyai                      3. Nili osasimikizila

50. Kodi muli na zodandaula zilizonse pa mankwala opompa munyumba?

1. Inde                      2. Iyai

51. Ngati yanko ni inde kufunso 19, ni zodandaula zotani zimene muli nazo pa mankwala opompa munyumba?

1. Munkwala ununka
2. Munkwala ni woipa kubana
3. Munkwala umaleta mpele pamubili
4. Umaipisa zipupa

52. Mungakonde kuti achitiwe bwanji madandaulo yanu aya?

1. Kuchinja mankwala
2. Kupompela panja
3. Kusebenzesa mankwala amene saipisa zipupa

53. Ni zabwino ziti zimene muli nazo pa muchitidwe wa IRS?

1. Iyenela kuchitiwa koposa kamozi pachaka
2. Iyenela kusebenzesewa mu makomboni ndi antu okalamo
3. Kupompa mankwala kuyenela kuchitiwa pa malo ozungulila
4. Madela onse ayenela kupompela kupompela mankwala pa ntawi imozi kotelo kuti uzuzu usilizwe

54. Kodi muganiza kuti kupompa mankwala mu nyumba kuchepesa kuchuluka kwa uzuzu?

1. Inde      2. Iyai      3. Pang'ono      4. Pa kantawi chabe ndipo uzuzu  
ubwelanso

NDIME D: KUCHITA

55. Ni njila ziti zimene mumazichinjiliza ku maleliya?

1. Mankwala a maleliya
2. Kugona mu ukonde
3. Kupompa mankwala munyumba
4. Kupompa mankwala pa malo ozungulila
5. Kushoka matepo mu nyumba
6. Kupompa mankwala opaya uzuzu mukati mu nyumba

56. Ndimotani m'mene banja lanu limazichinjiliza ku maleliya?

1. Mankwala a maleliya
2. Kugona mu ukonde
3. Kupompa mankwala munyumba
4. Kupompela mankwala pa malo ozungulila
5. Kushoka matepo mu nyumba
6. Kupompa mankwala opaya tudoyo mukati mu nyumba

57. Kodi zipinda mwamene mugona zina pompewa?

1. Inde      2. Iyai      3. Siniziwa

58. Kodi mwayelesapo kusuka, kuikanso pulatisita kapena kupentanso vipupa mukati mwa nyumba yanu kuyambila pamene nchito yopompa mankwala inayamba?

- A. Inde      B. Iyai

59. Ngati yanko ni inde kufunso 28, izo zinali zipinda ziti?

1. Chipinda kumene kanda/ana amagona
2. Chipinda chochezelamo
3. Chipinda cha makolo
4. Chipinda cha muzimai wa mimba

60. Chochitila zimenezi chinali chiani?

1. Kuyopa kunyaula
2. Kuyopa kuyambukisa mwana

3. Umozi pa banja anadwalisiwa na mankwala
4. Vipupa vinali na doti
5. Lingalilo ili linalipo kale pakalibe kupompewa mankwala

KWASILA  
ZIKOMO POPEZEKAMO MU NCHITO INO

*Appendix 5: Focus Group Discussion Guide*

1. What do you know about malaria prevention
2. How do you prevent malaria in your homes?
3. How do you prevent malaria as a community
4. How is that spraying done?
5. What is sprayed?
6. What is the purpose of that spraying?
7. Have your homes ever been sprayed?
8. How often are your homes sprayed in a year?
9. What are the benefits of spraying?
10. Do you have any concerns about the IRS, if so what are they?

## *Appendix 6: The Millennium Development Goals*

The Millennium Development Goals (MDGs) are eight goals to be achieved by 2015 that respond to the world's main development challenges. The MDGs are drawn from the actions and targets contained in the Millennium Declaration that was adopted by 189 nations and signed by 147 heads of state and governments during the UN Millennium Summit in September 2000.

The eight MDGs break down into 21 quantifiable targets that are measured by 60 indicators.

The 8 Goals are:

- Goal 1: Eradicate extreme hunger and poverty
- Goal 2: Achieve universal primary education
- Goal 3: Promote gender equality and empower women
- Goal 4: Reduce child mortality
- Goal 5: Improve maternal health
- Goal 6: Combat HIV/AIDS, malaria and other diseases
- Goal 7: Ensure environmental sustainability
- Goal 8: Develop a Global Partnership for Development

*Source: [www.undp.org](http://www.undp.org)*

