Perspectives on Community's Knowledge, Attitudes and Practices about Indoor Residual Spraying in Kabale District

BY

Wandawa Patrick PP

MASTER OF PUBLIC HEALTH

SEPTEMBER, 2011

Perspectives on Community's Knowledge, Attitudes and Practices about Indoor Residual Spraying in Kabale District

BY

Wandawa Patrick PP

2004/HD20/2143U

wandawapatrick@yahoo.com 0772402249

Supervisors

MR.MICHAEL ORYEMA-LALOBO

DR.HARRIET KIVUMBI

DISSERTATION SUBMITTED TO SCHOOL OF GRADUATE STUDIES IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF A DEGREE OF MASTER OF PUBLIC HEALTH OF MAKERERE UNIVERSITY

SEPTEMBER, 2011

DECLARATION

I hereby declare that, to the best of my knowledge, this dissertation is my own original work and has never been submitted to this university or any other institution of learning for academic award, publication or any other purpose. I therefore, submit it for the award of a degree of Master of Public Health of Makerere University.

AUTHOR

SGN.....DATE.....23/11/2011.....

Wandawa Patrick P.P

SUPERVISORS

SIGNATURE..... DATE.....23/11/2011.....

Mr. Michael Oryema-Lalobo
Makerere University School of Public Health

SIGNATURE..... DATE.....24/11/2011.....

Dr.Harriet Kivumbi
Makerere University School of Public Health

ACKNOWLEDGEMENTS

This dissertation is a product of wide consultation and support from renowned personalities without whom it would have been difficult to produce this piece**.** I therefore wish to send my sincere appreciation and acknowledge the invaluable contribution made by the following people:

The lecturers at Makerere University School of Public Health (MUSPH) who facilitated my learning in various ways. Special thanks go to my dear supervisors; Mr Michael Oryema-Lalobo, Dr. Kivumbi Harriet and Dr.George Pariyo who tirelessly supported me and gave me all the necessary technical guidance right from proposal development to dissertation level. Out of MUSPH I wish to thank one of my mentors, Mr. Leonard Wamakote, a lecturer at Busitema University. He is a renowned statistician and computer expert who helped me understand and adopt statistical and other rare computer packages used in my study.

I wish to thank the management of Uganda Red Cross Society for allowing me time off whenever need arose to attend to this course and sometimes used society resources for purposes of accomplishing the requirements of the course, including using her field programme areas as study areas for my research. Additionally, I wish to commend Dr.Tom Ogwal who was my immediate supervisor at my place of work and also offered to guide me as mentor in my whole course of study without asking for any form of extra facilitation to execute this mentoring role.

I must thank my wife and children who gave me a go-ahead to pursue this course to its logical conclusion. They tolerated my absence while I was a way in the field to collect data for this study and accepted to forego some of the home privileges that I was not able to provide due to competing needs resulting from this course.

I would also like to extend my sincere gratitude to the entire District Health team and local government officials of Kabale district for allowing me conduct this study in their district and above all, the invaluable support they gave me during field level data collection for the study.

I also wish to thank my research team members and respondents who participated in this study, either by collecting accurate information or making sincere responses that made it possible for me to write this book.

TABLE OF CONTENTS

DECLARATION **3**
DEDICATION ..... ERROR! BOOKMARK NOT DEFINED.
ACKNOWLEDGEMENTS **4**
TABLE OF CONTENTS **5**
LIST OF TABLES AND FIGURES **8**
LIST OF ACRONYMS AND ABBREVIATIONS **9**
DEFINITION OF TERMS **12**
ABSTRACT **13**
CHAPTER ONE **14**
1.0 INTRODUCTION AND BACKGROUND **14**
1.1 INTRODUCTION 14
1.2 BACKGROUND 15
CHAPTER TWO **16**
2.0 LITERATURE REVIEW **16**
2.1 STATUS OF IRS-RELATED LITERATURE ON GLOBAL AND LOCAL SCENE 16
2.2 IRS KNOWLEDGE-RELATED LITERATURE REVIEW 17
2.3 IRS ATTITUDE-RELATED LITERATURE REVIEW 18
2.4 IRS PRACTICE-RELATED LITERATURE REVIEW 19
2. 5 GENERAL REMARKS ABOUT IRS KAP RELATED LITERATURE 20
CHAPTER THREE **22**
3.0 PROBLEM STATEMENT, STUDY JUSTIFICATION, CONCEPTUAL FRAMEWORK AND RESEARCH QUESTIONS **22**
3.1 STATEMENT OF THE PROBLEM 22
3.2 JUSTIFICATION 23
3.3 CONCEPTUAL FRAMEWORK 23
3.3.1 Narrative description *23*
3.3.2 Diagrammatic representation of conceptual frame work *25*
CHAPTER FOUR **27**
4.0 STUDY OBJECTIVES **27**
4.1 OVERALL OBJECTIVE 27

4.2 SPECIFIC OBJECTIVES 27

CHAPTER FIVE 28

5.0 METHODOLOGY 28

5.1 STUDY AREA 28

5.2 STUDY DESIGN 28

5.3 STUDY POPULATION 28

5.4 SAMPLE SIZE 29

5.5 SAMPLING PROCEDURE 29

5.6 INCLUSION CRITERIA 30

5.7 EXCLUSION CRITERIA 31

STUDY VARIABLES 31

5.8.1 Dependent variables 31
5.8.2 Independent variable 31

5.9 DATA COLLECTION PROCEDURES 32

5.9.1 Research team 32
5.9.2 Retrospective records review 32
5.9.3 Primary data collection 32

5.10 DATA MANAGEMENT AND ANALYSIS 33

5.11 QUALITY ASSURANCE 35

5.12 ETHICAL CONSIDERATIONS 36

5.13 STUDY LIMITATIONS 36

5.14 STRUCTURE OF THE RESEARCH REPORT AND DISSEMINATION OF RESULTS 37

CHAPTER SIX 38

6.0 RESULTS 38

6.1 BACKGROUND INFORMATION ABOUT RESPONDENTS 38

6.2 LEVEL OF KNOWLEDGE OF THE COMMUNITY MEMBERS AND SPRAY OPERATORS ON IRS 40

6.2.1 Knowledge of household interview respondents. 40
6.2.2 Factors associated with knowledge level of respondents 42
6.2.2 Knowledge of the spray operators related IRS 46

6.3 ATTITUDE OF COMMUNITY MEMBERS TOWARDS IRS 47

6.3.1 General Attitude of Respondents 47
6.3.2 Factors associated with respondent attitudes 49
6.4.1 Practice of the community members 53
6.3.2 Factors associated with IRS related practices 55
6.4.2 Practice of the spray operators related to IRS 58

CHAPTER SEVEN **60**
7.0 DISCUSSION **60**
7.1 KNOWLEDGE OF THE COMMUNITY MEMBERS AND SPRAY OPERATORS ON IRS 60
7.3 PRACTICE OF THE COMMUNITY MEMBERS AND SPRAY OPERATORS RELATED TO IRS 63
CHAPTER EIGHT **67**
8.0 CONCLUSIONS AND RECOMMENDATIONS **67**
8.1 CONCLUSIONS 67
8.1.1 Knowledge about IRS *67*
8.1.2 Community attitude towards IRS *67*
8.1.3 IRS related practices *67*
8.2 RECOMMENDATIONS 68
REFERENCES **69**
APPENDICES **72**
APPENDIX 1: MAP OF UGANDA SHOWING LOCATION OF KABALE DISTRICT 72
APPENDIX 2: MAP OF KABALE DISTRICT SHOWING LOCATION OF IRS STUDY SUB COUNTIES 73
APPENDIX 3: QUESTIONNAIRE FOR HOUSEHOLD INTERVIEWS 74
APPENDIX 4: QUESTIONNAIRE FOR KEY INFORMANT (KI) INTERVIEWS 81
APPENDIX 5: INTERVIEW SCHEDULE FOR FOCUS GROUP DISCUSSION (FGD) 84
APPENDIX 6: TABLE OF RANDOM NUMBERS 86
APPENDIX 7: PATTERN OF MALARIA OCCURRENCE IN KABALE DISTRICT DURING THE PERIOD 2002 – 2008 87

LIST OF TABLES AND FIGURES

TABLE/FIG.NOS	TABLE/FIGURE TITLES	PAGE NOS.
FIGURE 1	DIAGRAMMATIC REPRESENTATION OF CONCEPTUAL FRAME WORK	28
TABLE 6.1	SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS BY SUB COUNTIES	42
TABLE 6.2	KNOWLEDGE RELATED RESPONSES ABOUT IRS	44
TABLE 6.3	ASSOCIATION BETWEEN RESPONDENTS' KNOWLEDGE ABOUT IRS WITH THEIR KEY INDEPENDENT VARIABLES.	47
TABLE 6.4	ASSOCIATION BETWEEN KNOWLEDGE LEVEL AND SEX WHILE CONTROLLING FOR AGE GROUP AND EDUCATIONAL LEVEL	48
TABLE 6.5	KNOWLEDGE OF SPRAY OPERATORS ASSESSED ACCORDING TO THE KEY KNOWLEDGE AREAS	49
TABLE 6.6	RESPONDENTS' ATTITUDES TOWARDS IRS	51
TABLE 6.7	ASSOCIATION OF RESPONDENTS' ATTITUDE WITH THE KEY INDEPENDENT VARIABLE	53
TABLE 6.8	ATTITUDE VS KNOWLEDGE LEVEL ACROSS OTHER KEY VARIABLES	55
TABLE 6.9	IRS RELATED PRACTICES EXECUTED BY RESPONDENTS	56
TABLE 6.10	ASSOCIATION OF RESPONDENTS' IRS RELATED PRACTICES WITH THE KEY INDEPENDENT VARIABLES	59
TABLE 6.11	ASSOCIATION OF PRACTICE WITH KNOWLEDGE WHILE CONTROLLING FOR OTHER VARIABLES	61
TABLE 6.12	ASSOCIATION OF PRACTICE WITH ATTITUDE WHILE CONTROLLING FOR OTHER VARIABLES	63
TABLE 6.13	GAPS IN SPRAY OPERATORS' IRS RELATED ACTIONS	65

List of Acronyms and Abbreviations

ACTs	Artemisinin Based Combination Therapies
AIDS	Acquired Immune Deficiency Syndrome
BCC	Behavioural Change Communication
CAO	Chief Administrative Officer
CDO	Community Development Officer
CHOGM	Commonwealth Heads of Government Meeting
CDD	Community Drug Distributors
CMD	Community Medicine Distributors
DDHS	District Director of Health Services
DDT	Dichlorodiphenyltrichloroethane
DF	Degree of Freedom
DHE	District Health Educator
DHO	District Health Officer
DHTs	District Health Teams
DVCO	District Vector Control Officer
EPI	Extended Programme for Immunisation
EXTOXNET	Extension Toxicology Network
FAO	Food Agricultural Organisation
FGD	Focus Group Discussion
HBMF	Home Based Management of Fever
HCH	HexachloroCycloHexane
HH	Household

HSSP	Health Sector Strategic Plan
ICON	Lambda-cyhalothrin
IPCS	International Programme on Chemical Safety.
IRS	Indoor Residual Spray
ITN	Insecticide Treated Nets
IUCN	International Union for the Conservation of Nature
KAP	Knowledge, Attitude and Practice.
KI	Key Informant.
LC	Local Council.
MACIS	Malaria And Childhood Illnesses Secretariat
MCP	Malaria Control Programme
MOH	Ministry Of Health
MP	Member of Parliament
MOLG	Ministry of Local Government
MPH	Masters of Public Health
MUSPH	Makerere University School of Public Health
NEMA	National Environmental Management Authority
NMCP	National Malaria Control Programme
PMI	Presidential Malaria Initiative
p-Value	Probability Value
RA	Research Assistants
RTI	Research Triangle Institute.
SPSS	Statistical Package for Social Scientists
SOPs	Standard Operating Procedures

TB	Tuberculosis
TBA	Traditional Birth Attendants
UPE	Universal Primary Education
URCS	Uganda Red Cross Society.
USAID	United States Agency for International Development.
USE	Universal Secondary Education
WHO	World Health Organization.
WHOPES	World Health Organization Pesticide Evaluation Scheme
WP	Wettable Powder

Definition of terms

Household	A group of people living in the same house compound or home sharing the same cooking place and having meals together.
Household head	The main decision maker and economic leader of a household
Indoor Residual Spraying	Application of persistent insecticide to the interior walls of houses to kill or repel malaria vectors with a view to control malaria.
Malaria Parasites	Pathogens of the genus *plasmodia* which are carried by malaria vectors which cause malaria disease. Four main types in Uganda are: *Plasmodium falciparum, Plasmodium vivax, Plasmodium ovale* and *Plasmodium malariae.*
Malaria vectors	Female anopheles mosquitoes, capable of transmitting malaria parasites from an infected host to a health person in the process of feeding on the blood meal. Two main types in Uganda are: *Anopheles gambiae* and *Anopheles funestus*
Mass IRS Campaign	Indoor Residual Spraying involving all the households in a district or country at the same time.
Persistent Insecticide	A chemical applied or sprayed on a surface and retained for a long time for purposes of killing or repelling malaria vectors or other vectors that alight on that surface.
Protective gear	Protective wear used by the spray operators to protect themselves against adverse effects of the spray insecticide. They include waterproof overalls, gumboots, face masks, goggles, gloves etc.
Spray Operators	People, temporarily employed from the local community to conduct IRS.
Spray teams	**S**pray operators are grouped, usually 3-5 people in a group called spray team, headed by a team leader

Abstract

Introduction: The World Health Organization recommends Indoor Residual Spraying (IRS) as one of the three primary means of malaria control. Two rounds of Mass IRS were conducted in Kabale district in 2006 and 2007 to address the frequent epidemics of malaria in the district. This study assessed community's Knowledge, Attitudes and Practices on IRS as a malaria control measure in Kabale, with a view to identify gaps and recommend remedial action.

Methodology: This was descriptive cross-sectional study, entailing both quantitative and qualitative methods. The study involved 210 respondents from randomly selected households from three purposively selected sub-counties in Kabale district. Focus Group Discussions and Key Informants were used to corroborate the information from the household interviews. The SPSS programme (version 16.0) was used to conduct logistic regression, univariate and multivariate analysis to establish possible associations between key variables. Qualitative data was summarized and analyzed using content analysis technique based on study issues.

Results: Most of the respondents were adequately knowledgeable and positive about IRS, but did not contribute substantially towards it. There were general fears among the respondents about the safety of the spray chemical used. Statistically significant associations existed between: IRS knowledge level and sex (AOR 4.29, 95% CI 1.37 – 13.41) , respondents' attitudes towards IRS and knowledge IRS adequacy (OR 36.6, 95% CI 16.1 – 83.3) and respondents' IRS Contributory practices and age (OR 2.09, 95% CI 1.10 – 4.0). Also significantly associated with contributory actions was house hold size. Households with more people were more likely to contribute towards IRS campaign than those with fewer people. Spray operators had inadequate skills related to mixing of the spray chemical, equipment servicing and maintenance leading to gross chemical wastage and equipment failure.

Conclusions and recommendations: The community members and spray operators are fairly knowledgeable about IRS although critical gaps exist in some aspects. There were general fears about the side effects of spray chemical and inadequate community actions to support the IRS campaign. MoH and local health authorities should institute strategies to increase community IRS knowledge, dispel the myths and clarify their roles in the campaign. Enough spray operators should be trained, adequately equipped and remunerated to motivate them to do a good job.

CHAPTER ONE

1.0 Introduction and Background

1.1 Introduction

The World Health Organisation (WHO) defines Indoor Residual Spray (IRS) as application of persistent insecticide to the interior walls of houses to kill, repel or irritate the adult malaria vector mosquitoes with a view to control malaria disease (WHO, 2006). The main effects of IRS in curtailing malaria transmission are twofold, namely: To reduce the life span of the vector mosquitoes so that they can no longer transmit malaria parasites from one person to another and to reduce the density of the vector mosquitoes (WHO, 2006). IRS derives its success from two habits of the main malaria vectors: *Anopheles gambiae s.l* and *Anopheles funestus*: They are highly endophagic and endophilic (feed and rest indoors). These behaviours make it easy to control these vectors with IRS using appropriate chemical and consequently control of malaria (Pan-American Health Organisation, 2002). Studies have shown that IRS is not only effective in controlling malaria but also cheaper compared to other commonly used control measures (Guyatt et al, 2002). The discovery of residual insecticides and their impact in controlling malaria transmission led to the intensive use of IRS in the 20th Century in the most malaria endemic countries (WHO, 2005). Widely reported evidence confirms that malaria control by IRS has made epidemics less frequent and reduced or eliminated malaria incidence in countries where it has been applied (Muswenkosi et al., 2004).)

The Malaria Control Programme of Ministry of Health in Uganda adopted vector control, through the use of indoor residual spraying (IRS) and insecticide treated nets (ITNs) as a major malaria control strategy. The other two being effective case management and disease surveillance (MoH, 2006). Since IRS takes place in peoples' homes with their participation, the community's IRS related KAP is very critical (WHO, 2002).Therefore for IRS to fulfil its purpose as an effective malaria control intervention, adequate sensitisation of the benefitting community members should be conducted in a timely manner to enable them understand the importance of the exercise, know their roles in the exercise and what precautions they need to undertake to avoid possible shortcomings of the exercise (WHO, 2002).

1.2 Background

Malaria is the world's major killer and life-threatening disease in many tropical and subtropical areas (WHO, 2007). It is currently endemic in over 100 countries worldwide. Each year an estimated 300 million people fall sick due to malaria globally and an estimated 1 million of these die from it (WHO, 2007). The regions most affected by malaria include Latin America, Sub-Saharan Africa and Eastern Asia. There are 396 million episodes of malaria every year and most of these occur in Africa, South of Sahara (WHO, 2004).World Health Organisation also reaffirms that about 90% of all deaths due to malaria occur in Africa South of Sahara and it accounts for 25-40% of all out-patients clinic visits in all malaria endemic countries in Africa.

In Uganda, Malaria is the leading cause of morbidity and mortality in spite of increased efforts by Government to reduce it (MoH, 2010). Malaria alone accounts for 15.4% of the total national death burden in the country. The Malaria situation is worse in highland districts of the country. In recent years, a series of malaria epidemics occurred in the highland areas of Uganda including Kabale. More than 75% of Kabale district experiences unstable malaria transmission resulting in frequent outbreaks with devastating effects and 93% of the population estimated to be at risk of contracting malaria (RTI, 2006). Since October, 1997, 60% of the deaths occurring in the district are due to malaria (MoH, 2009). The pattern of malaria occurrence in Kabale during the period 2002 - 2008 is shown by the figure in appendix 7.The plan to scale up application of IRS especially in epidemic prone is aimed at reversing this situation (MoH, 2009).

Given its geographic attributes, malaria epidemiology and prior experience using IRS, Kabale district was selected to be the pilot site for large-scale, well targeted IRS project that can be used to develop a robust IRS system for scaling up activities to other parts of the country. On 30th June, 2006, the Minister of Health, Dr Steven Malinga, launched mass IRS in Kabale district to address the frequent malaria outbreaks in the district. The first round of this campaign was implemented in June-July, 2006, the second round in February in 2007. Subsequent rounds were scheduled to be implemented at six months intervals for three years. The IRS Project being implemented in Kabale district is funded by the United States Agency for International Development (USAID) through the Ministry of Health. Research Triangle Institute (RTI) was contracted to provide technical support and overall coordination of the project.

CHAPTER TWO

2.0 Literature Review

2.1 Status of IRS-related literature on global and local scene

Many researchers have expressed their concern about little or no literature related to community knowledge, attitude and practice in the area of IRS. This KAP specific IRS literature scarcity could be either due to inadequate IRS related studies themselves or lack of documentation (Batega, 2004). In Uganda there has been a lot of studies on malaria as a disease, how it affects people's livelihood and general control measures. Although IRS is one of the vector control methods emphasized by the Uganda National Malaria Control Program of Ministry of Health, there is little researched data on IRS related Knowledge Attitudes and Practices (Batega, 2004). This gap was revealed by the Senior Entomologist in the Ministry, but also expressed in Malaria Treatment and Prevention literature review report (Batega, 2004). There are many instances in the past where IRS has been used to address malaria epidemics but rarely are such interventions followed up or preceded with studies to establish community KAP related to the intervention (Batega, 2004). Other than being used in disaster preparedness and response, the use of IRS has largely been under-emphasized in many local governments' programs on malaria control. Where IRS was being applied, it is largely limited to major health and educational institutions where large numbers of people sleep in wards or dormitories (Batega, 2004). This could partly explain the inadequacy of community KAP studies related to IRS because the beneficiaries are mainly temporary populations that disperse from these locations before or after this service. Scarcity of Community KAP related to IRS is not only a problem in Uganda. It has been reported in other parts of the world. It is highlighted in journal "Community knowledge, attitudes and practices on malaria in Swaziland" (Khumbulani et al., 2009). The scarcity in IRS related KAP was also amplified in a research article entitled, "KAP about Malaria and its Control in Rural North-western Tanzania" (Muzino, 2010).

A cost-effective analysis of IRS and ITN in malaria control in Kenya Highlands revealed that sleeping under a treated bed net reduced the risk of infection by 63% and sleeping in a room sprayed with insecticide reduced the risk by 75% (Guyatt et al., 2000). The economic cost per infection case prevented by IRS was US$ 9 compared to US$ 29 for ITNs. This study suggests

that IRS is more effective and cheaper than ITNs in communities subjected to low seasonal risks of infection and as such it should be considered as part of the integrated Vector management (Guyatt et al., 2002). However, this study fell short of establishing the part played by community KAP related to use of ITNS and IRS in the success of the two interventions of malaria control. The study is silent about the community related factors leading to one intervention being more cost-effective than the other, presumably due to limitation in scope of the study. A community/beneficiary KAP study related to use of both ITN and IRS would have bridged this gap.

2.2 IRS Knowledge-related literature review

The findings of a study on Knowledge, Attitudes, and Practices about Malaria and its control in rural Northwest Tanzania indicated that about half of the study participants had heard of IRS campaigns (Mazigo et al. 2010). Meaning that the other 50% had no idea about IRS. However even those who indicated that they had heard about it were mixing it with aerosol spray used in adult knock down destruction of mosquitoes in dwellings and resting areas. The oils and larvicides applied in breeding were erroneously categorized as part IRS. This is an indication of gross knowledge gap in this part of the world. Otherwise what else would explain this total ignorance when some people in the same location have an idea about IRS? Since Mazigo's study was not exclusively on IRS related KAP, no yard stick was developed to measure the adequacy of community knowledge on IRS. The same report states that 46.6% of respondents reported that their homes had been sprayed during the past 2 years, but they did not know why the homes were sprayed. This was a gross information gap which may affect the sustainability of such an important programme. In 2004 Dauda Waiswa Batega Department of Sociology Makerere University conducted a desk review of malaria related reports and documents for the Uganda Ministry of Health with a view of establishing the Knowledge Attitude and Practices about malaria treatment and prevention in Uganda. One of the preventive measures analyzed in these documents was Indoor Residual Spraying for malaria vector control (Batega, 2004). From the various studies as per Batega's review, most community members are aware that malaria can be prevented**.** The review also showed that various local authorities consider IRS to be a cost effective public health intervention given its ability to protect a large number of people for the

relatively low cost of spraying. In a study which investigated community knowledge, beliefs and practices regarding malaria transmission in Guatemala revealed that women were more aware of the role played by mosquitoes in malaria than their male counterparts (Klein et al., 1995). However this study fell short of showing the knowledge of these women in respect to malaria prevention and part played by IRS in malaria prevention.

2.3 IRS Attitude-related literature review

Mazigo et al. study further revealed that whereas the perceived main benefit of accepting IRS was to kill mosquitoes, only 17% mentioned protection from malaria. The link between IRS and malaria was not brought out by many participants. The findings in the same Mazigo study indicated that there was total rejection of IRS by a group of the beneficiaries citing bad smell of the insecticides and the fear that insecticides may kill their domestic animals, a feature which was also realized in the Kabale IRS related KAP study. Notable about Mazigo study is that IRS was left out of the statistical analysis among the various efforts being used to address the malaria situation in study country. Even the author who appeared to regret the scarcity of information on IRS community KAP related information also sidelined it in his own analysis. The findings of another IRS related study conducted by Americo and other researchers about people's knowledge on IRS in Southern Mexico indicated that most of the study participants associated IRS with controlling mosquitoes, cockroaches and rats with only 3% associating the exercise with controlling malaria (Americo et al, 2003). So the misconception about IRS is widespread which can affect uptake or embracing of IRS and negatively affect control of malaria using this strategy. However, the findings of a related study by Govere and other researchers entitled, "Community knowledge and perceptions about malaria and practices influencing malaria control in Mpumalanga Province, South Africa were different. Such findings showed that the majority of the respondents were aware of the causal role of mosquitoes in malaria and that community compliance with the malaria control programme (MCP) was satisfactory(Govere et al., 2006). A study conducted on malaria control in Zimbabwe showed that more than 50% do not understand the purpose of IRS (Vundule et al, 1996). They associate it mainly with the control of domestic pests and rodents not including mosquitoes. This is surprising because it is on record that government of Zimbabwe has sustained IRS as a major malaria control measure for more than four decades (Vundule et al., 1996).

The IRS related community attitude is highly influenced by high profile people in the political arena. The Uganda area Member of Parliament (MP) for Rubaga North Constituency, Mr. Ken Lukyamuzi vehemently opposed the administering of IRS as a malaria control measure. This halted the administering of IRS in targeted hotels and their immediate neighborhood, which were earmarked to host delegates for CHOGM in 2007. On August 14, 2007 Uganda's New Vision newspaper reported that malaria control spray men were "resisted" in Munyonyo, a suburb of Kampala, as they attempted to conduct an indoor residual spraying program. Mr. Ken Lukyamuzi has been vocal and outspoken about the use of IRS especially with DDT. For instance, at a public rally captured on camera and available on YouTube.com, Lukyamuzi claims among other things that, *"..... IRS especially using DDT is dangerous, and is being used by the Museveni Government to "murder people in broad daylight", it will be sprayed on trees and contaminate crops. It causes liver cancer, blindness, brain damage and kidney failure..."* The debate around DDT and IRS in Uganda has been handled poorly by most people. In most circles these two terminologies are used interchangeably. People frequently conflate the two, yet DDT is only one chemical that can be used in IRS. Frustratingly people equate IRS with DDT and assume that it is the only insecticide used in IRS (RTI 2006). Similar examples of malicious and misleading statements by political or religious leaders have hampered and harmed IRS programs in Nigeria (AFM, 2007). Recently IRS exercise in Ghana was severely affected because rumours spread that the medicine was killing children, as opposed to ridding them of harmful parasites. This incident highlights provide damaging evidence that is highly politicized and causes damaging debate around the use of IRS. Closely following this, a group of renowned environmentalists on behalf of Pesticide Action Network International wrote a letter to the President of the Republic of Uganda dated July 24, 2009, opposing the use of IRS as malaria control in Oyam and Apac districts in Northern Uganda. A copy of this letter was seen in New Vision daily publication (New Vision, 2009). In nutshell there are contradicting views among politicians and other dignitaries which can be a source of fears among IRS user communities and negatively affect its uptake.

2.4 IRS Practice-related literature review

The community based supportive and preparatory actions towards IRS are fundamental for the sustainability of the campaign (RTI, 2006). For the critical part of preparation involving plastering or smoothening the internal walls of houses to be sprayed, the Mazigo et al findings

indicated 86% were ready to do it.The other portion of 14% doesn't embrace it indicating a gap in the area of preparation for IRS by the community. The good thing is that if the 86% can render the spray walls smooth leading to successful IRS, then desired results of the intervention may be achieved because of the high coverage. Since Mazigo's study was not exclusively on IRS related KAP, no yard stick was developed to measure the adequacy of community knowledge on IRS. The report also pointed out that lack of specific practices such as replastering or washing of inside walls compromised the effectiveness of the MCP. Respondents expressed their desire for more information about malaria and their willingness to contribute to the control of malaria in their community was explicit. This report indicates that there is already potential to make malaria control programmes community based as long as adequate information is given to the community members and properly guided. This gap needs to be quantified in a KAP survey in order to address it appropriately. According to Betega and other researchers, some districts such as Kumi, Bugiri and Tororo among others are reported to be using this strategy for malaria control in selected institutions and through the commercial sector (Collin, 2003; Batega, 2003A). However, the little available research indicates that coverage levels for use of IRS are extremely low and only in initial stages of development. The primary reason indicated for low use of IRS was cost (estimated at Shs. 20,000 per house); lack of information on availability of IRS in district; and lack of adequate and trained manpower in public and private sector to offer the same service (Batega, 2003A). The reasons cited here have serious implication on attitude of community towards IRS and hence its uptake by community members as malaria control venture. For example the cost being high: Paying 20,000/= per house sprayed may appear to be expensive but protects 5-10 people against malaria while in terms of treatment one uses the same amount to treat only one person on a single episode. The average number of malaria episodes per child in Uganda about 6 per year (MACIS, 2006). This if well explained will attract the community members to play a role in promoting the intervention. If the services providers are themselves biased then the understanding can be much worse at community level.

2. 5 General remarks about IRS KAP related literature

The documentary review made during this study, which includes reviews of other reviewers, has revealed gaps in KAP both of IRS service beneficiaries and providers. Key among these are: lack

of basic knowledge of IRS and how it relates to malaria, preparations for IRS on part of the beneficiaries and service, the erroneous perception of its cost compared to the benefits and technical competency of IRS service providers. It was, therefore, found necessary to conduct a fully-fledged KAP study specifically related to IRS. This allows for identification and quantification of gaps in order to properly advise the IRS actors. The opportunity for conducting IRS related KAP in Uganda is abundant especially as government has taken it to big scale. Previously IRS was meant for areas with unstable malaria transmission like highland districts only. However World Health Organization in malaria report of 2006 recommends IRS in areas of endemic, stable transmission as well (WHO, 2006). Uganda has implemented mass campaigns of IRS in Kabale, Apac, Amur and Kapchorwa and plans are under way to cover other needy districts (MOH, 2010). A map of Uganda attached to this report shows other districts targeted for Mass IRS, necessitating continuous KAP studies on IRS and more researched data pertaining to the same. Findings from KAP studies (such as the current study) can be used to inform the Malaria Control Programme (MCP) of the Ministry of Health and other malaria control actors in planning and implementing this intervention in the other districts.

CHAPTER THREE

3.0 Problem Statement, study Justification, Conceptual framework and Research questions

3.1 Statement of the problem

Malaria is a common and life-threatening disease in many tropical and subtropical areas including Uganda (MoH, 2010). It is currently endemic in over 100 countries worldwide. Each year an estimated 300 million people fall sick due to malaria globally and an estimated 1 million of these die from it (WHO, 2006). In Uganda malaria is the leading cause of morbidity and mortality in spite of increased efforts by Government to reduce it (MoH, 2010). It is responsible for 324 deaths daily (MOH, 2006), most of whom being children under five years and pregnant women. Kabale is one of the most malaria epidemic prone highland districts in Uganda with 93% of the population estimated to be at risk of contracting malaria (RTI, 2006). The malaria situation in the district deteriorated grossly in March, 1998 when 600 people died of malaria alone. This death toll was dominated by children under five years and pregnant women (MoH, 1998).About 23% of child mortality in the district is due to malaria, which translates into a malaria specific mortality of 600-850 child deaths annually (MACIS, 2006).

Given this disease burden due to malaria, Malaria Control Programme of Ministry of Health in Uganda has adopted IRS as one of the three primary means of malaria control (MoH, 2010). Some of the suspected shortcomings during the first and second round of IRS campaign in Kabale indicate gaps in the community knowledge, attitude and practices related to IRS. Key among these were: resentment of the exercise by some community members, leaving a total population of more than 33,925 people unprotected (RTI, 2006), those who participated suffered gross adverse effects of the spray insecticide, the project experienced spray chemical wastage and high rate of spray equipment damage. Unfortunately, information quantifying the existing gaps in community KAP with respect to IRS is not available. This study was intended to address this gap. The study specifically sought to establish the current level of knowledge of community and spray team members in Kabale on IRS, the attitude of the community members towards the use of IRS and what practices the community members exhibit in readiness for IRS and thereafter.

3.2 Justification

The adoption of IRS by government, as a major malaria control measure, provides a strategic direction and operational frame work for state and non-state actors in malaria control like Uganda Red Cross Society (URCS). The success of this venture relies a lot on how the benefitting communities view and embrace it. Since there is little researched data on IRS related Knowledge Attitudes and Practices in Uganda (Batega, 2004), deliberate effort needs to be made to address the gap and hence the essence of this study. This study was therefore carried out in order to identify and quantify gaps that exist in the Knowledge, Attitudes and Practices of the people of Kabale district with regard to IRS. Uganda Red Cross Society will use some of this information to review her IRS communication strategy that will be used in her Malaria Behavioural Change Communication (BCC) interventions in Kabale district. Additionally the research report will be shared with Kabale district authorities and other key stakeholders in the district to take note of the recommendations for improvement of subsequent IRS rounds. A copy of the same report will be submitted to Ministry of Health to take note of recommendations that concern it for possible action.

3.3 Conceptual Framework

3.3.1 Narrative description

The adoption and utilisation of IRS as a malaria control measure at community level is influenced by a range of dependent and independent factors. These factors can be categorised as follows: social demographic characteristics which include: culture, education, age, gender, marital status, nature of occupation/livelihood and residence. Another set of factors is the environmental factors which dictate the weather pattern, presence of habitats for mosquitoes and other vectors, human activities and what goes with it, the immediate neighbourhood. Human race tend to do similar things as done in the neighbourhood. Nature and availability of social services is another set of factors that influence community KAP related to IRS. Such services may include presence of health units, schools and commercial centres. All of these contribute a lot in giving information about the available services including IRS or actually provides the service itself which positively affects community knowledge, attitude and practice related to IRS and other health services. The income levels of the community and spray operators also play a part. The thefts of the spray chemicals leading to artificial shortages during the first round of IRS in Kabale could have been as a result of low incomes on part of the spray operators who are part of

the community since they were drawn from within the local communities. Cultural factors and beliefs may divert the attention of the community members from the actual cause and control of malaria and hence overlook the part played by IRS in malaria control. Indoor Residual Spray has been so politicized that most people including the educated ones take all indoor insecticide sprays to mean DDT spray. This perception of IRS dissuades the would-be beneficiaries of IRS from cooperating and embracing the Mass IRS campaign. The way the dependent and independent variable relate and affect each other is as shown in the following figure.

3.3.2 Diagrammatic representation of conceptual frame work

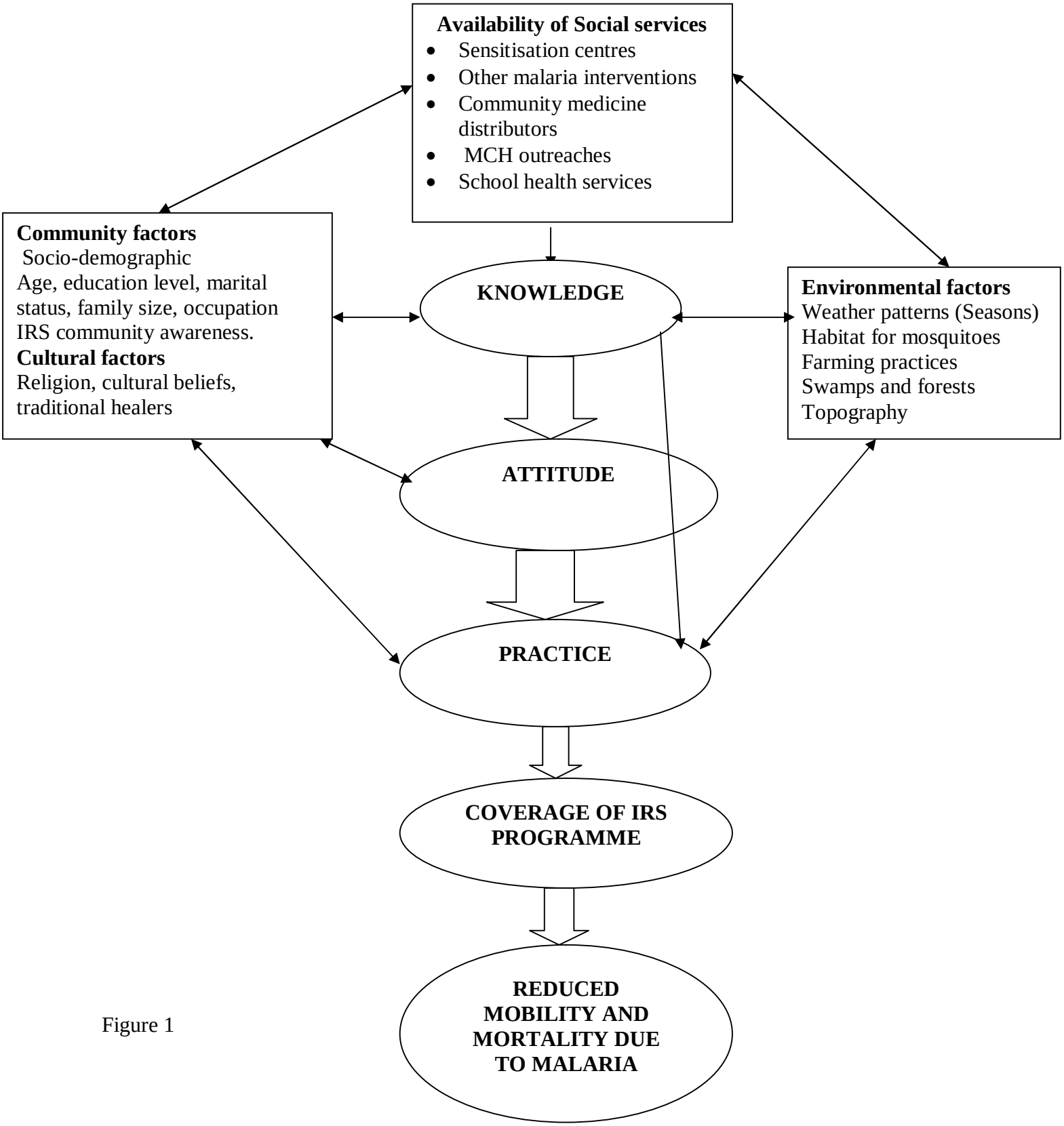


Figure 1

3.5 Research Questions

- What is the current level of knowledge of community and spray team members in Kabale on IRS and what are the gaps?
- What is the attitude of the community members in Kabale towards the use of IRS as a strategy for Malaria control?
- What are the practices of members of the community and spray teams in Kabale district that relate to IRS in malaria control?

CHAPTER FOUR

4.0 Study objectives

4.1 Overall Objective

To assess the Knowledge, Attitudes and Practices of community members and Spray operators in Kabale on Mass IRS as a strategy for malaria control and identify gaps for appropriate remedial actions.

4.2 Specific objectives

1) To determine the current level of IRS related knowledge of community members and spray operators in Kabale regarding malaria control.
2) To establish IRS related community attitudes regarding malaria control in Kabale.
3) To determine practices of community members and spray operators related to IRS campaign in Kabale.

CHAPTER FIVE

5.0 Methodology

5.1 Study area

This research was conducted in Kabale district on 16th – 21st March 2008. Kabale is located in the south-western region of Uganda, 430 Kms west of Kampala. It covers a total surface area of 1,827 sq.km (705 square miles). The topography is mainly green, interlocking and heavily cultivated hills with spectacular valleys. The altitude of the district ranges between 1,219 metres (3,999 ft) and 2,347 metres (7,700 ft) above sea level. This altitude makes Kabale district colder than the rest of the country. Temperature average is about 18 °C (64 °F) during the day and fall to about 10 °C (50 °F) at night (MOLG, 2006). The development of plasmodia (malaria parasite) requires a temperature of at least 18 °C constant for more than 48 hours (Goma, 2009). So, occasional fall to 10 °C at night makes it difficult for the plasmodia to develop, hence operating unstable malaria transmission. At the time of this study Kabale district comprised of three counties namely: Rubanda, Rukiga and Ndorwa and one municipality, Kabale municipality. At lower administrative levels, the district had 20 sub-counties, 120 parishes, 1,397 villages and an estimated 98,268 households with a population of 491,340 people. The district had a population density of 281 persons per square kilometre and an average household size of 5 people per household (Mugisha O.R, 2002). Three sub counties where Uganda Red Cross is already implementing some malaria control activities were purposively selected. These are Rwamucucu, Muko and Bufundi.

5.2 Study Design

The design of this study is cross-sectional and entails both quantitative and qualitative methods of data collection.

5.3 Study Population

Malaria is most devastating in children less than five years and pregnant women hence households with these highly vulnerable groups were specifically targeted. Therefore the primary study population for this research were heads of households with children under five years or/and pregnant women. However the spray operators as grass root campaign implementers formed part of the study population. Consideration of children and pregnant women only enabled the study

team to locate eligible households, but the actual respondents were heads of households or their eligible representative who were at least above 18 years.

5.4 Sample size

The EPI 30 X 7-Cluster sampling method which was used in this study has, in-built, a specific method for determining the sample size (WHO, 2005). That is; all the names of the villages in the whole survey area were written on pieces of paper and 30 of them were picked randomly. In the case of this research the entire research area was comprised of 3 sub counties which formed Uganda Red Cross Society (URCS) malaria intervention area. In each of the sampled villages, 7 households with children under five years or/and pregnant women were located as indicated in the inclusion criteria and this raised a total of 210 householders who were interviewed.

5.5 Sampling procedure

At district level, three sub counties, namely Bufundi, Muko and Rwamucucu were purposively selected. The sub counties were prioritised because that is where URCS was implementing malaria control behavioural change communication (BCC) activities. For equitable distribution, 10 villages were randomly sampled from each of the three sub counties to come up with 30 villages which in effect creating 30 clusters (EPI 30 X 7 –Clusters sampling method).

At village level, the first household to be visited was selected at random using existing sampling frames. These were listings of household names for elections or distributions of free nets or registers compiled in preparation for the Mass IRS in the district or Local Council (LC) household registers for other administrative purposes whichever was available. The LC1 chairperson or other member of LC1 executive committee of that village provided these. In the absence of existing sampling frames, an ad hoc list was generated with the help of community authorities. The list that was established was of all households in the cluster and not just for eligible households. The study team verified whatever sampling frame used with someone with knowledge of the area to ascertain that the adopted sampling frame is reasonably complete. When a reasonably complete list of the cluster households was made available, then the following steps to identify the starting household were as follow: The households on the list were given numbers. A random number was selected from one to the highest numbered household on

the list (1 and the highest number inclusive).A copy of table of random numbers is attached as appendix 6. The household on the numbered list whose number corresponds to the random number selected became the first household to visit. If this is an eligible household i.e. with a child less than five years or pregnant woman, then the household interviews started there. In case this household is not eligible, then household whose front/main door was nearest to the front/main door of the previous one was visited.

After visiting the first household located as explained above, the second and subsequent households were located by using households whose front/main doors were nearest to those of previously visited households as explained above. The nearest household was not necessarily in the direct line of vision or the same side of the street or road. In case there are two or more households which were equi-distant in all aspects from the previous household, then the household on the immediate right as one stands in the doorway of the front/main door of the previous house looking out was taken. In case the household reached is not an eligible household as defined above, this was marked but no interviews were conducted there. Subsequent households were located, as described above, until an eligible household is reached. This process continued until 7 eligible households were covered in each of the selected cluster (village) and 210 households in all the 30 clusters in the three sample sub counties.

5.6 Inclusion criteria

- Households within the 3 selected sub counties (Rwamucucu, Muko and Bufundi).
- The respondents in the household interviews were heads of households with children under five years or/and pregnant women. In the absence of the heads of such households, the next person in the hierarchy was interviewed. The hierarchy, being referred to was as follows: The eligible respondent was the head of the household, in the absence of whom, the spouse would then take over. In the absence of both of these, the eldest son or daughter above 18 years or at least appears as such took over. In the absence of all these, an adult dependant who had stayed in the house for a long time took over. In case all these were absent then the household is marked as not covered and arrangements were made to come for interviews at a later stage.
- The respondent, no matter whom it was had to be 18 years or above.

- The household heads or their spouses or other eligible representatives must be willing to be interviewed.

5.7 Exclusion Criteria

- Although heads of eligible households were respondents during the household survey, the people were not interviewed even when they were heads of such households if they were Children below 18 years.
- Household heads or their eligible representatives with mental sickness
- Household heads or their eligible representative, but were perpetual drunkards. The guides and community leaders were very key in identifying these during household interviews and brought this information to the attention of the Research Assistants.
- Household heads or their eligible representatives who did not consent to being interviewed.

Study variables

5.8.1 Dependent variables

- Knowledge about IRS*:* Meaning of IRS, Chemical used, where the spraying takes place, frequency of spraying and why IRS conducted.
- Attitude towards IRS: perceived benefits of IRS, perceived harm caused by IRS
- Practice related to IRS implementation: preparations for IRS, supportive actions during IRS, Precautionary actions before, during and after the IRS exercise

5.8.2 Independent variable

Socio-demographic characteristics

- Sex
- Age in complete years
- Education level
- Marital status
- Occupation
- Household size
- Source of information
- House hold head (Yes or no)
- Religious affiliation

5.9 Data collection procedures

5.9.1 Research team

The study was conducted by a research team of 23 people. This included a Principal Researcher, three supervisors (author of this report), 3 Sub County supervisors (1 per Sub County) and 18 research assistants (RA) at the rate of 6 RAs per Sub County working in pairs. The research team was trained for three days and allowed one day to practice what they had learnt and also pre-tested the research tools. The principal researcher, in addition to following up household interviews, was engaged in the records review and Key Informant (KI) interviews.

5.9.2 Retrospective records review

Data was collected from relevant documents through a critical review guided by the Principal Investigator using a pre-made checklist. The following documents were reviewed:

- IRS Project documents
- Policy documents and guidelines from Ministry of Health related to malaria vector control especially using IRS.
- Memorandum of understanding between RTI and government of Uganda related to IRS.
- Campaign report of the first round and other project Reports.
- Records of vital statics kept at district and sub county level
- Baseline survey reports related to KAP.
- malaria surveillance reports for the past three years
- Ministry of Health Sector Strategic Plan 1 (HSSP 2001-2005).
- Health Sector Strategic Plan 2 (HSSP 2006-2011)
- National Communication Strategy for Malaria Control in Uganda, 2005-2010*)*

5.9.3 Primary data collection

5.9.3.1 Household interviews

Face-to –face interviews were conducted at household level and was used to collect data from the eligible respondents at that level through administering a semi-structured interview schedule (a copy of which is attached as appendix 3).18 Research Assistants worked in pairs. One of them was asking questions while the other recorded the responses. The Research Assistants could switch roles within their pair. Each pair covered on average 3 Clusters or 21 households completed within 5 days. An average of about 5 households was covered each day. Each pair was accompanied by a guide who was a resident of the village. Each supervisor followed up 3

teams of research assistants.

5.9.3.2 Key Informants Interviews

The Principal Researcher and supervisors conducted Key Informant interviews in addition to following up Research Assistants at the households and sitting in at least one of the FGD sessions conducted. The key informants guide designed on the basis of the issues being studied (a copy of the guide is attached as appendix 4) was administered face-to-face by the Principal Investigator and Supervisors to the officers and other key persons drawn from Ministry of Health headquarters and the following Kabale district offices:

- District Health officers (DHO),
- The District Vector Control
- Health Assistants in the Sub Counties
- Community Development Officers in the three Sub Counties
- World Vision field officer in Rwamucucu sub county.
- The offices of the sub county leadership (Sub County Chief or/and LCIII Chairperson).

5.9.3.3 Focus Group Discussions (FGDs)

FGDs were conducted at Sub county level within the three selected sub counties, giving a total of 3 FGDs for the whole study. The participants for the FGDs were exclusively spray operators drawn from all the parishes from that sub county. There were two spray operators per parish and each sub county had an average of four parishes. So in total there were about 12 spray operators in each sub county and all the spray operators in the selected sub counties were targeted. Each FGD had 9-12 participants using convenience sampling. That is the first nine to arrive at the FGD venue were included in the discussions and those that came later were left out depending on how late they arrived. The session venues and time for the discussions were communicated to all spray operators in the study sub counties well in advance. The Principal Researcher and the supervisors conducted all the three FGDs using FGD tool (appendix 5).

5.10 Data Management and Analysis

Data capture templates for data entry were developed in advance to capture the relevant information. The household questionnaires were pre-coded by assigning number codes to the different responses to individual questions therein. Completed interview schedules were edited for accuracy and completeness. All responses in each of the questionnaires were then transferred

to a master-sheet where they were tabulated. This data was transformed into an electronic database by entering it into the computer program SPSS (version 16.0) for quantitative analysis. Data generated from key informant interviews, Focus Group Discussions and document review was summarized and analyzed using content analysis technique based on study issues. Data presentation was done by using frequencies and proportions. Tables, cross tabulations and text were also used to present data.

All Data was summarized into descriptive statistics including frequencies and percentages. Cross tabulations of variables were done, and chi-squared test ($\chi 2$) was used to establish the existence of significant associations between dependent and key respondent variables. The strength of the associations was assessed using simple logistic regression to determine Odds Ratios (ORs). The ORs were subsequently adjusted simultaneously for possible confounding effects of other variables using multivariable logistic regression. In the multivariate analysis, all variables that were found to be significantly associated or thought to be plausibly associated with dependent variables in either the chi-square or logistic bivariate analysis were subjected to a full logistic regression model to simultaneously adjust for their effects on the likelihood of occurrence of the outcome. A backward conditional elimination method was used. Unadjusted and adjusted Odds Ratios (ORs) at 95% confidence interval (CI) were used to measure associations. The best-fit model for the logistic regression is given by the equation below:

Logit P(Y) = $\boldsymbol{a}$ **+** $\beta_1 X_1 + \beta_2 X2 + \ldots\ldots\ldots\ldots\ldots \beta_n X_n$

Where:

P(Y) denotes the probability of respondents having the intended outcome.

$\boldsymbol{a}$ is a constant

β_1, β_2 **+.....+** β_n =Coefficients of corresponding independent variables.

X_1, X_2 .....$+X_n$ = Corresponding independent variables.

The Principal Researcher spearheaded the whole exercise of data processing and report writing.

5.11 Quality Assurance

The starting point for quality assurance was the careful selection and adequate training of the research team. A one-day preparatory training session of the study team was conducted. The training was conducted by the Principal Researcher as a lead facilitator. The training among other things included discussing the concept of IRS, the burden of malaria in Uganda with special focus on Kabale district. All the research instruments were discussed and reviewed. Pre-testing of the tools took place including conducting mock focus group discussions. The mock FGDs were conducted in three different locations outside the study sub counties. The mock administering of questionnaires also enhanced confidence and competence on part of the research assistants in data collection. After the pre-testing exercise, the experience emanating from the pre-test was discussed and the interview schedule revised accordingly. This entailed discussing the survey instruments, question by question and the performance of the questions assessed in terms of relevance to the required data. In addition, the adequacy, clarity and sensitivity of the questionnaires to culture of the target community were ascertained and enhanced where necessary. Modifications of the questionnaire were made according to the outcome of the pre-test. The Principal Researcher and Supervisors guided the pre-testing exercise and the discussion sessions that followed. Research assistants were involved in the actual administering of the survey instruments during the mock interviews to get the necessary experience required for the actual data collection exercise.

During the actual data collection, the supervisors participated in some of the interviews conducted by Research Assistants during follow ups especially in the starting households. At the end of each day, the supervisors together with the principal researcher edited completed questionnaires to ensure that the questionnaire had been filled sensibly. Mistakes made in interviewing and recording responses were discussed and corrected on a daily basis in the evening meetings. The Principal Researcher sometimes made impromptu checks in the field to ascertain that data was actually being collected. He monitored progress of data collection and dealt on spot with problems that might have emerged in data collection process. The Principal Researcher together with Supervisors made checks on a small sample of households of about 5% of the households recorded to have been involved in the interview to certify that interviews were actually conducted.

5.12 Ethical Considerations

Firstly a Research Proposal was prepared and presented for clearance to the Makerere University School of Public Health (MUSPH) Higher Degrees, Research and Ethics committee. All ethical issues pertaining to the study were discussed and addressed at this level before clearance was sanctioned by the committee. At district level, a discussion was held with the district authorities to explain further the purpose of the study and what will be required of the participants of the study. Some of the members of the district officials especially those from line departments participated in the research either as Key Informant or other ways. This interaction allowed the district authority to clarify any ethical issues that could crop up and made sure the research was implemented within the confines of the research protocol. At community level the purpose of the study was adequately explained to the prospective participants and formal consent secured prior to their participation in the study. During the course of the research, the study team observed and respected cultural values, traditions or taboos of the community. A briefing session with the grass root leaders was conducted before home visits were made. This enabled the research team to know some of the salient community values and beliefs that needed to be observed or respected. The preliminary findings of the study were shared with community leaders and the key stakeholders at district level as transparently as possible to show that the only reason for the study was as explained in the research protocol.

5.13 Study limitations

- The sampling process involved purposive sampling to get the sub counties in the district. The idea was to sample sub counties where Uganda Red Cross Society (URCS) was implementing malaria control activities and study findings would substantially inform URCS future plans for further intervention in Kabale. So the 3 sub counties may not represent the IRS-related community KAP in the entire district.
- The quorum for FGDs was based on convenience sampling. The first eight spray operators to turn up at the venue discussions were included in the focus group. So their views might not have represented the views of all the spray operators involved in this exercise. Additionally it was not possible to get the knowledge and skills per spray operator in order to decide the proportion of those who were adequately knowledgeable and skilled.

- Uganda is patriarchal society, so any simple random sampling of heads of household will always give you more male participants than females. So balancing the sample on gender basis becomes a problem

5.14 Structure of the research report and dissemination of results

The most important output of the research is this report which was compiled by the principal researcher in consultation with his research team and data analyst. This report contains answers to the research questions asked in the research proposal. That it answers to questions related to the level of knowledge, attitudes and practices of community members in Kabale related to IRS as a malaria control measure. Additionally, it answers questions related to the extent the spray operators know about the procedures in conducting IRS and the skills they have in mixing the spray chemical, use and maintenance of spray equipment and how to protect themselves against the possible adverse effects of the spray chemicals. The key sections of this research report includes: Background, introduction to the study, methodology, research findings, discussion of research findings, conclusion of findings and recommendations. There are specific recommendations pertaining to Knowledge, Attitude and knowledge separately. There are also general recommendations pertaining to the whole IRS campaign but still aimed at improving the KAP of the people being studied. Other inclusions of the research report are appendences of relevant documents like the study tools, list of references used, list of names of the study team, map of the study area, list of titles of the Key Informants and FGD participants.

Although the preliminary findings of this research have been shared with the local leaders and key stakeholders in Kabale, this report will be shared further with them after the input of the Committee for higher degrees. The other people who will get copies of the final version of this report will include Uganda Red Cross Society and other Players in Malaria Control within Kabale district, the Ministry of Health and NEMA.

CHAPTER SIX

6.0 Results

6.1 Background information about respondents

There were three categories of respondents involved in this research namely: the household interview respondents, respondents for focus group discussions (FGDs) and Key Informant Interview (KI) respondents. There were 210 respondents who participated in the interviews at household level. Table 6.1 below shows the distribution of the socio-demographic characteristics and location of respondents that participated in household interviews of this research

Table 6. 1 showing the socio-demographic characteristics of respondents by Sub Counties (N=210)

Socio-demographics of respondents.		**Sub Counties**			
		Bufundi **Freq. (%)**	**Muko** **Freq. (%)**	**Rwamucucu** **Freq. (%)**	**Total** **Freq. (%)**
Sex	Male	41(59)	49(70)	43(61)	133(63)
	Female	29(41)	21(30)	27(39)	77(37)
	Total	**70(100)**	**70(100)**	**70(100)**	**210(100)**
Age	<25	5(7.1)	5(7.1)	5(7.1)	15(7.1)
Category	25 - 34	15(21.4)	19(27.1)	23(32.9)	57(27.1)
	35 - 44	24(34.3)	27(38.6)	17(24.3)	68(32.4)
	45 - 54	19(27.1)	11(15.7)	8(11.4)	38(18.1)
	55+	7(10.0)	8(11.4)	17(24.3)	32(15.2)
	Total	**70(100.0)**	**70(100.0)**	**70(100.0)**	**210(100.0)**
Marital	Married	56(80)	63(90)	60(86)	179(85)
status	Single	1(1)	0(0)	4(6)	5(2)
	Widowed	13(19)	7(10)	6(9)	26(12)
	Total	**70(100)**	**70(100)**	**70(100)**	**210(100)**
Number of	<3	1(1)	3(4)	0(0)	4(2)
people in	3 - 5	29(41)	18(26)	31(44)	78(37)
household	6 – 8	30(43)	33(47)	30(43)	93(44)
	9 - 11	10(14)	15(21)	7(10)	32(15)
	12+	0(0)	1(1)	2(3)	3(1)
	Total	**70(100)**	**70(100)**	**70(100)**	**210(100)**

Socio-demographics of respondents.		Sub Counties			
		Bufundi Freq. (%)	**Muko** Freq. (%)	**Rwamucucu** Freq. (%)	**Total** Freq. (%)
Occupation	Peasant	65(92.9)	65(92.9)	68(97.1)	198(94.3)
	Business	3(4.3)	2(2.9)	1(1.4)	6(2.9)
	Civil Servant	2(2.9)	3(4.3)	1(1.4)	6(2.9)
	Total	**70(100.0)**	**70(100.0)**	**70(100.0)**	**210(100.0)**
Level of	None	14(20.0)	13(18.6)	14(20.0)	41(19.5)
education	Primary	44(62.9)	40(57.1)	50(71.4)	134(63.8)
	Secondary	10(14.3)	14(20.0)	6(8.6)	30(14.3)
	Tertiary	2(2.9)	3(4.3)	0(0.0)	5(2.4)
	Total	**70(100.0)**	**70(100.0)**	**70(100.0)**	**210(100.0)**
Religious	Catholic	24(34.3)	31(44.3)	22(31.4)	77(36.7)
affiliation	Protestant	43(61.4)	35(50.0)	43(61.4)	121(57.6)
	Moslem	0(0.0)	3(4.3)	0(0.0)	3(1.4)
	Others	3(4.3)	1(1.4)	5(7.1)	9(4.3)
	Total	**70(100.0)**	**70(100.0)**	**70(100.0)**	**210(100.0)**

Table 6.1 shows that most of the respondents 63.3 %(133/210) were males and 36.7% (77/210) were female. The average household size is big with 44.3 %(93/210) of the households having 6-8 people and 16.6 % (35/210) households with 9 or more people. Most of the respondents, 85.2 % (179/210) were married. The majority 94.3% (197/210) of the respondents were peasant (with general education level of primary standard (63.8%).The respondents were predominantly Christian: 57.6% protestants and 36.7% Catholics.

The respondents in the FGDs were exclusively spray operators drawn from the same sub counties as the household interview respondents. These were also predominantly male respondents with most of them having an education background of upper primary and a few with secondary education. There were 3 FGDs conducted at a rate of one FGD per Sub County, each focus group consisting of 9-13 respondents.

The Key Informant Interview respondents were 23 in total comprising of national, district and sub county level officials; mainly drawn from the key line departments, administration and local

council (LC) system. At national level, 3 officials were interviewed namely: the Senior Entomologist and two Vector Control Officers in the Ministry of Health. At district level 6 officials were interviewed namely: the Chief Administrative Officer (CAO), Ag. District Health Officer (DHO), District Vector Control Officer (DVCO), District Health Educator (DHE), District Health Inspector (DHI) and the Secretary for Health. At sub county level a total of 13 officials were interviewed. These included from each of the three sub counties: the Chairperson LC111, Sub County Chief, Health Assistant and Community Development Officer (CDO). In addition to these, an official from World Vision in Rwamucucu Sub County was also interviewed because he participated in the IRS campaign. The following are research findings presented by objectives.

6.2 Level of Knowledge of the community members and spray operators on IRS

6.2.1 Knowledge of household interview respondents.

The respondents were asked about the basic information about IRS. The questions asked and the responses made are indicated in the table 6.2 below.

Table 6.2: Showing knowledge related responses about Indoor residual spray (N=210)

Knowledge area	Frequency	Percentage (%)
What is Indoor Residual Spray?		
Spraying inside of houses with insecticide	159	75.7
Spraying in and out of houses with insecticide	35	16.7
Spraying in and out of houses with insecticide	1	6
Spraying a homestead with insecticide	15	7.1
What is the primary reason for conducting IRS?		
To kill mosquitoes	80	38.1
To control malaria	88	41.9
To kill cockroaches and other vermin	15	7.1
To treat malaria	27	12.9
Why is it applied only inside?		
Malaria Mosquitoes feed and rest inside houses	128	61.0
Cockroaches and other vermin are found inside house	15	7.1
The available insecticide is only adequate for indoor application	12	5.7
People sleep inside houses only	48	22.9
Others	7	3.3

Table 6. 2 continued

Knowledge area	Frequency	Percentage (%)
What is the recommended frequency of IRS using ICON?		
Twice a year	122	58.1
As often as possible	64	30.5
Once a year	13	6.2
Every after three months	8	3.8
Others	3	1.4
What are the reasons for this frequency?		
The insecticide remains in the sprayed surface for about 6 months	126	60.0
The insecticide remains in the sprayed surface for a short time	25	11.9
The insecticide is too scarce and expensive	51	24.3
Others - It helps sick people	8	3.8
Were you sensitized about IRS?(N=210)		
No	52	24.8
Yes	158	75.2
If yes, in what forum?(N=158)		
General community meetings	98	46.7
During household visitation by the health and other project	11	5.2
Radio Programmes	37	17.6
Newspapers	7	3.3
Others - Where we were found	5	2.4
What were the key issues discussed?(N=158)		
Meaning of IRS	11	5.2
Importance of IRS	62	29.5
Chemical used in IRS	48	22.9
Protective measures	14	6.7
Role of community	19	9.0
Others	4	1.9

Table 6.2 above indicates that the knowledge level of respondents varied from one knowledge area to another, with most of them 75.7%(159/210) being able to state correctly the meaning of IRS, but less than half 41.9%(88/210) are knowledgeable about the primary reason for conducting IRS as being controlling malaria. The reason for applying IRS chemical internally

was well articulated by fairly good number of the respondents. That is, 61.0 %(128/210) correctly stated that IRS is applied internally because the malaria parasites feed and rest indoors. However, a relatively big section 22.9(48/210) of the participants indicated that spraying is conducted inside residences because that is where people sleep. A fairly large portion of the respondents, 75.2 % (158/210) were sensitised and had heard about IRS, mainly through community general meetings, 46.6 %(98/210) and a few through health workers and radio programmes. However, some of the respondents 24.8 %(52/210) were not sensitised.

6.2.2 Factors associated with knowledge level of respondents

The key dependent variables used to determine a respondent's level of knowledge on IRS were 5 in number, namely: Meaning of Indoor Residual Spray, reason for applying IRS chemical internally, primary reason for conducting IRS, recommended frequency for IRS exercise using ICON, and the reason for the recommended frequency. A knowledge adequacy variable was computed from these 5 variables by assigning a score 1 for a correct response and 0 for an incorrect one and computing the total score for each respondent. Respondents who scored less than 3 were considered to have had inadequate knowledge on IRS while those who scored 3 and above were considered to have adequate knowledge. In all, 140 respondents (66.7%) were found to have adequate knowledge using this yard stick, while the remaining 70 respondents (33.3%) had inadequate knowledge.

In order to test whether the knowledge level about IRS of the respondents was significantly associated with the independent variables, an analysis using a univariable logistic regression was conducted. The results of this analysis are shown in Table 6.3. Occupation and Religious affiliation were not used as independent variables in this analysis because they were found to be largely homogeneous as peasant and Christian, respectively.

Table 6.3 showing association between respondents' knowledge about IRS with their key independent variables. (N=210)

Key variables		Knowledge Level		P-value	Unadjusted OR	95% CI
		Inadequate	Adequate			
		n	n			
Sex	Male	50	83	0.09		
	Female	20	57		1.72	.925 - 3.19
Head of household	Yes	58	118	0.79	.901	.417 - 1.95
	No	12	22			
Marital status	Married	60	119	0.89	.944	.418 - 2.13
	Not Married	10	21			
Number of people in household	0 - 5	27	55	.874	.934	.399 - 2.18
	6 – 8	32	61	.750	.874	.380 - 2.01
	9 +	11	24		1.0	
How did you get to know IRS	From radios	5	6	.482	.400	.031 -5.15
	From Health workers	5	12	.861	.800	.066 - 9.67
	From LCs	39	87	.800	.744	.075 - 7.38
	Village meetings	20	32	.597	.533	.052 - 5.49
	Others - did not know about IRS	1	3		1.0	
Age group	0-25 yrs	8	12	.432	.873	.323 - 2.36
	26 - 40 yrs	30	73	.263	1.42	.770 -2.60
	>40 yrs	32	55		1.0	
Education level	None	14	27	.902	1.05	.509 - 2.15
	Primary & above	56	113			

As seen from the above table, no significant association (at a 95% level of significance) was found between knowledge level and the independent variables. However, there was slight association between knowledge level and sex (OR 1.717, 95% CI 0.925 - 3.187) indicating that

the female respondents were about 72% more likely to be knowledgeable about IRS than their male counterparts. This necessitated further analysis to adjust for the possibility of confounding variables. A multivariate analysis was conducted to establish the relationship between knowledge level and sex while adjusting for other key respondent variables. The results of this analysis are shown in table 6.4

Table 6.4 showing association between knowledge level and sex while adjusting for other key respondent variables
Variables. (N=210)

Key variables		Unadjusted OR	95% CI	Adjusted OR	95% CI
Sex	Male				
	Female	1.72	.925 - 3.19	4.29	1.37 - 13.4*
Head of household	Yes	.901	.417 - 1.95	.285	.085 - .962*
	No				
Marital status	Married	.944	.418 - 2.13	2.18	.681 - 6.97
	Not Married				
Number of people in household	0 - 5	.934	.399 - 2.18	.783	.308 - 1.99
	6 – 8	.874	.380 - 2.01	.824	.347 - 1.96
	9 +			1.0	
How did you get to know IRS	From radios	.400	.031 -5.15	.451	.366 - 5.15
	From Health workers	.800	.066 - 9.67	.668	.576 - 7.56
	From LCs	.744	.075 - 7.38	.622	.556 - 6.03
	Village meetings	.533	.052 - 5.49	.444	.392 - 4.41
	Others - did not know about IRS	1.0		1.0	
Age group	0-25 yrs	.873	.323 - 2.36	.884	.276 - 2.83
	26 - 40 yrs	1.42	.770 -2.60	1.38	.718 - 2.64
	>40 yrs	1.0		1.0	
Education level	None	1.05	.509 - 2.15	1.03	.447 - 2.37
	Primary& above				

The table 6.4 *indicates* that there was a statistically significant association between IRS knowledge level and sex (AOR 4.29, 95% CI 1.37 - 13.4). Although in the previous analysis the association between sex and knowledge level was not conspicuous, in this analysis the female respondents were found to be about 4 times more likely to be knowledgeable about IRS than their male counterparts. Additionally, in this analysis a significant association was observed between knowledge level and head of household status (AOR 0.29, 95% CI 0.09 - 0.96). Respondents who were heads of households were found to be about three and half times more likely to be knowledgeable about IRS than those who were not heads of households. The rest of the respondent variables had no significant association with IRS knowledge level even after adjusted analysis.

6.2.2 Knowledge of the spray operators related IRS

Information on IRS knowledge level of the spray operators was generated from the FGDs comprising, exclusively, of spray operators in the three study sub counties mentioned earlier. The responses varied slightly, but the consensus in each FGD was captured and documented as the representative response. The gaps in their knowledge are as summarized in the table below:

Table 6.5 showing Knowledge of spray operators assessed according to the key knowledge areas

Knowledge area	Consensus response	Remarks
Meaning of IRS	*An effort made to kill or repel mosquitoes in houses using insecticide*	No relationship to malaria control indicated.
Spray chemical used	*The spray used was in packets and powder form called ICON*	ICON was mentioned in general terms, 10%WP not specified
Advantages of IRS	*It is free and brought to people's homes*	No mention was made to the effect that IRS as a malaria control venture.
Disadvantages of IRS	*Chemical caused headache, body itching and sneezing to the spray operators and increased the population of fleas in the households. In the second round of the mosquito population in sprayed houses even increased after the spray exercise.*	Negative attitude towards IRS.

Knowledge area	Consensus response	Remarks
Preparations required by the households in readiness for IRS	*Removal of household items to decongest the houses was necessary. The food items were to be covered.*	No mention was made about rendering the internal walls of the houses to be sprayed smooth which is cardinal requirement.
Post household-spray precautions	*The sprayed houses to be re-entered at least 2 hours after spraying. All the insects like cockroaches and flies that might have died as a result of the spray to be swept and disposed of in a manner that they cannot be accessed by chicken and other household animals.*	No explanation was given as to why it was necessary to execute these precautions
Any anticipated shortcomings associated to spraying and recommended remedial measures	(*No concrete response made*)	No first aid actions were suggested in case of accidental ingestion of the chemical or if the chemical accidentally spills on any part of the body

Table 6.5 above indicates that the spray operators generally had some good level of knowledge about IRS although gaps in very crucial IRS areas were glaringly evident. For example IRS was more related to killing mosquitoes and other pests than controlling malaria. The type of ICON used was not specified. The range of disadvantages listed was largely erroneous and the critical preparatory, precautionary and remedial actions by community members were missed.

6.3 Attitude of community members towards IRS

6.3.1 General Attitude of Respondents

Information under this section was derived from all the three categories of interviews conducted. All the household respondents were asked a range of attitude related questions including one whether or not their houses were sprayed. The questions asked and responses to them are as shown in table 6.6

Table 6.6 showing respondents' attitudes towards IRS

Variable / Response	Frequency (N=210)	Percentage (%)
Was your house sprayed?		
No	29	13.8
Yes	181	86.2
Is IRS useful or not?		
Not useful	38	18.1
Fairly useful	26	12.4
Useful	66	31.4
Very useful	80	38.1
What are the reasons for the answer?		
Its negative side effects	32	15.2
It is free	107	51.0
It is effective in malaria control	63	30.0
Others	8	3.8
What are the alternative malaria control methods?		
Sleep under ITNs	114	54.3
Clear the bushes, drain stagnant water pools around the house	46	21.9
Seek cultural redress	0	0.0
Treatment	49	23.3
Others	1	0.5
What are the advantages of IRS?		
It is free of charge	108	51.4
The service is brought to our homes	52	24.8
Once the house is sprayed properly, everybody sleeping in it is protected	23	11.0
No advantage	27	12.9
What are the major disadvantages of IRS?		
Has a negative side effect	35	16.7
The chemical used is poisonous	44	21.0
Contaminates the environment	6	2.9
Causes political conflicts	5	2.4
Not applicable-No disadvantage	109	51.9
Others - Increase of fleas / mosquitoes	11	5.2
How are these disadvantages addressed?		
Avoid using IRS as a malaria control measure	20	9.5
Adequate information about IRS should be obtained	50	23.8
Use other malaria control measures	11	5.2
Use other spray chemicals	17	8.1
Not applicable – No disadvantage	109	51.9
Others	3	1.5

Table 6.6 shows that most of respondents 86.2 %(188/210) had their houses sprayed during the IRS although 69.5 % (146/210), said that IRS was useful. Most of respondents 51.4% (108/210)

said that the main advantage of IRS was that the exercise is free of charge and main disadvantage was that the chemical used was poisonous. However, more than half of the respondents, 51.9%(109/210) did not associate IRS with a major disadvantage.

Some of the Key Informants said, *"…..the community members believe that the second round of the campaign increased the population of mosquitoes in their residents and served no useful purpose. The community members needed more time of sensitisation to internalise the programme and understand their role in the exercise...."* Another view point of Key Informants related to house spraying was, *"..... some of the municipality residents spray their houses routinely and these may not have participated in the mass campaign. "....there were some political overtones which could have negatively affected the progress of the campaign"* (Key Informant)

On alternative malaria control measures, majority of the respondents, 54.3(114/210) said they prefer using Insecticide Treated Nets (ITNs). Another proportion of the respondents to a tune 21.9 %(46/210) felt that the other alternative is clearing the bushes and drain stagnant water pools around the house. Another big portion of the respondents (23.3%) said that the other preferred malaria control method is treating. No mention was made by any of the respondents about malaria redress by cultural methods.

6.3.2 Factors associated with respondent attitudes

The response to the question about the usefulness of IRS was taken as a key determinant of one's attitude towards IRS. All responses that mentioned IRS as useful or very useful were coded as positive attitude while the rest were coded as negative attitude. A univariable logistic regression was conducted to establish possible association between the key independent variables and the attitude of the respondents. The results of this analysis are shown in Table 6.7

Table 6.7 showing association of respondents' attitude with the key independent variables (N=210)

Independent Variable	Attitudes towards IRS		p-value	Unadjusted OR	95% CI
	Negative N (%)	Positive N (%)			
Sex					
Male	43 (32.3)	90 (67.7)	.443	1.27	.686 - 2.37
Female	21(27.3)	56 (72.7)			
Household Headship					
Yes	51 (29.0)	125 (71.0)	.285	.659	.307 - 1.42
No	13 (38.2)	21 (61.8)			
Marital Status					
Married	55 (30.7)	124 (69.3)	.850	.922	.399 - 2.13
Not married	9 (29.0)	22 (71.0)			
Number of people in the household					
1-5	27 (32.9)	55 (67.10)	.440	.705	.290 - 1.71
6-8	28 (31.1)	65 (69.9)	.625	.804	.334 - 1.93
9+	9 (25.7)	26 (74.3)		1.0	
Age group(in complete years)					
Young(18 – 29)	7 (35.0)	13 (65.0)	.444	.667	.237 - 1.88
Middle(30-44)	34 (33.0)	69 (67.0)	.325	.729	.389-1.37
Old(45+)	64 (73.6)	23 (26.4)		1.0	
Education level					
None	14 (34.1)	27 (65.9)			
Primary & above	43 (32.1)	91 (67.9)	.570	1.23	.598 - 2.55

Table 6.7 continued

Independent Variable	Attitudes towards IRS		p-value	Adjusted OR	95% CI
	Negative N (%)	Positive N (%)			
Source of IRS information					
From radio	3 (27.3)	8 (72.7)	.120	8.00	.580 – 110.3
From Health workers	5 (29.4)	12 (70.6)	.121	7.20	.596 -87.0
From LCs	39 (31.0)	87 (69.0)	.104	6.69	.675 – 66.4
Village meetings	14 (26.9)	38 (73.1)	.080	8.14	.781 - 84.9
Others	3 (75.0)	1 (25.0)		1.0	
Knowledge adequacy					
Inadequate	53 (75.7)	17 (24.3)			
Adequate	11 (7.9)	129 (92.1)	.000	36.56	16.1 –83.0*

**** Statistically significant (at 95% level of significance)***

The table 6.7 shows that there is a statistically significant association between respondents' attitudes towards IRS and IRS knowledge adequacy (OR 36.6, 95% CI 16.1 – 83.3). In this analysis the respondents with adequate knowledge were found to be about 36 times more likely to have positive attitude towards IRS than their counterparts with inadequate knowledge. The rest of the respondent variables had no significant association with respondents' attitudes towards IRS. The strong association between attitude and knowledge was subjected to a multivariate analysis to determine the possible confounding effect of the other variables on this association. The results of the multivariate analysis are shown in the following table (table 6.8)

Table 6.8 showing association of respondents' attitude with the key independent variables with adjusted OR

Independent Variable	Unadjusted OR	95% CI	Adjusted OR	95% CI
Knowledge adequacy				
Inadequate				
Adequate	36.6	16.1 –83.3	87.0	28.0 – 270.7*
Source of IRS information				
From radio	8.00	.580 – 110.3	.092	.011 – .777*
From Health workers	7.20	.596 -87.0	.234	.037 – 1.50
From LCs	6.69	.675 – 66.4	.193	.038 - .978*
Village meetings	8.14	.781 - 84.9	.339	.110 – 1.05
Others	1.0		1.0	
Sex				
Male	1.274	.686 - 2.37	1.36	.366 – 5.028
Female				
Household Headship				
Yes	.659	.307 - 1.42	.432	.083 – 2.236
No				
Number of people in the household				
1-5	.705	.290 - 1.71	1.02	.402 – 2.59
6-8	.804	.334 - 1.93	.807	.365 – 1.78
9+	1.0			
Age group(in complete years)				
Young(18 – 29)	.667	.237 - 1.88	1.63	.478 – 5.54
Middle(30-44)	.729	.389-1.37	2.72	1.064 – 6.96*
Old(45+)	1.0			

Educational level				
None				
Primary & above	1.23	.598 - 2.55	1.87	.588 – 5.96

**** Statistically significant (at 95% level of significance)***

The table 6.8 shows that even after adjusting for the possible confounding effects of other variables, the association between repondents'attitudes towards IRS and knowledge level remains statistically significant (AOR 87.3, 95% CI 28.0 – 270.7).The respondents with adequate knowledge were 87 times more likely to have positive attitude towards IRS than their counterparts with inadequate knowledge. This association is more profound among middle aged respondents (AOR 2.72, 95% CI 1.06 – 6.96), whose source of information was LCs (AOR .193, 95% CI .038 - .978) and radio (AOR .092, 95% CI .011 – .777).

6.4 The practices of the respondents related to IRS

6.4.1 Practice of the community members

The respondents were asked about the actions they executed before, during and after the spray exercise. Some of these actions were executed as part of the preparations for the exercise code named "preparatory actions." Others were executed as a contribution in kind towards the exercise code named "contributory actions," others were executed to avoid the likely negative side effects of the spray chemical, code named "precautionary actions" and those executed to save the affected people after an accidental happening resulting from the spray exercise code named "remedial actions". The table below shows the actions as exhibited by the respondents.

Table 6.9 showing different IRS related practices executed by respondents (N=210)

Practices	**Frequency**	**%age**
Did you make any monetary contribution made towards IRS?		
No	210	100.0
Yes	0	0.0
What other contributory practices did you execute?		
Raising food for the spray team workers	4	1.9
Providing soap for the washing of equipment and clothing	14	6.7
Mixing of IRS chemicals	43	20.5
Holding/carrying spray equipment/chemicals for the spray	1	0.5
No other contribution	148	70.5

What pre-spray preparatory practices did you execute?		
Rendering the internal surface of walls smooth	2	1.0
Making the houses less congested	16	7.6
Removing/covering food items in the houses	115	54.8
Removing cloths and other items from the internal walls	43	20.5
Sending children and other people away	5	2.4
Not applicable – Household not sprayed	29	13.8
What precautionary practices did you execute?		
Re-enter the sprayed premises at least after one hour	115	54.8
Wash the hands before eating or touching the face	47	22.4
Any mixed spray chemical should not be kept in the house	8	3.8
In case of contact with the chemical, wash the area of contact with soap	10	4.8
Not applicable – Household not sprayed	29	13.8
Others	1	0.5
Why were the above precautions practiced?		
To avoid accidental ingestion of the chemical	60	28.6
To avoid negative side effects of the chemical	116	55.2
To avoid contaminating the environment	3	1.4
Not applicable – Household not sprayed	29	13.8
Others	2	1.0
What accidental happenings were experienced/witnessed?		
Accidental ingestion of the chemical solution	103	49.0
Premature re-entering of the premises	23	11.0
Over spraying of the premise	20	9.5
Eating food without first washing of the chemical	34	16.2
No accidental happenings experienced/witnessed	30	14.3
What were the effects of the experienced/witnessed shortcomings?		
Body itches	73	34.8
Sneezing	102	48.6
Miscarriages	4	1.9
Deaths	15	7.1
Eye defects	11	5.2
None	5	2.4
What remedial actions were executed to address the above shortcomings?		
Rushed the affected people to the nearest health unit	130	61.9
Reported the matter to Project officials	66	31.4
Conducted some first aid	7	3.3
Contacted a traditional healer/herbalist	4	1.9
Others	3	1.4

The above table indicates that the respondents executed some desirable preparatory, contributory, precautionary and remedial actions related to IRS campaign in varying amounts.

The contributory actions were least executed with no respondent contributing any money towards this exercise. The largest percentage of respondents 70.5% (148/210) did not make any other contribution either. Only a few of them 20.5 %(43/210) were involved in mixing of Spray chemicals while a few (6.7%) reported having provided soap for the washing of equipment and clothing. Nearly no respondents participated in raising food for the spray team workers or holding/carrying spray equipment/chemicals for the spray exercise.

For pre-spray preparatory practices, more than half of the respondents, 54.8 %(115/210) either removed food items from the houses or covered them before the spraying exercise started while nearly 20% removed items like clothing from walls. The desirable practices that were not named among the key practices by respondents were rendering the internal surface of walls smooth and sending children and other people away before the spray exercise.

The most practiced precaution was re-entry of the sprayed premises at least after one hour (54.8%) and washing hands before eating or touching the face (22.4%) which tallied with the reason given for this precaution being to avoid negative side effects and accidental ingestion of the chemical. Important precautions like mixed spray chemical not being kept in the house and washing of the area of contact with soap in case of contact with the chemical were hardly mentioned by the respondents.

In terms of remedial practices, the most mentioned was to rush the affected people to the nearest health unit (61.9 %) and reporting the matter to Project officials (31%). Very few respondents (3%) mentioned the crucial practice of offering first aid to the victims of accidental ingestion of the chemical.

6.3.2 Factors associated with IRS related practices

The response to the question about community contribution towards IRS campaign was taken as a key determinant of one's practices related to IRS. All responses about contribution were coded either as "contributed" or "no contribution". A univariable logistic regression was conducted to establish possible association between the key independent variables and the practice of the respondents related to IRS. The results of this analysis are shown in Table 6.10

Table 6.10 showing association of respondents' IRS related practices with the key independent variables (N =210)

Independent Variable	Contribution towards IRS		p-value	Unadjusted OR	95% CI
	No contribution N (%)	Contributed N (%)			
Sex					
Male	98(73.7)	35(26.3)			
Female	50(64.9)	27(35.1)	.182	1.51	.824 - 2.77
Household Headship					
Yes	126(71.6)	50(28.4)	.422	1.36	.633 - 2.99
No	22(64.7)	12(35.3)			
Marital Status					
Married	126(70.4)	53(29.6)	.948	1.03	.444 - 2.38
Not married	22(71.0)	9(29.0)			
Number of people in the household					
1-5	62(75.6)	20(24.4)	.092	.484	.208 -1.13
6-8	65 (69.9)	28 (30.1)	.290	.646	.288 - 1.45
9+	21 (60.0)	14 (40.0)		1.0	
Age group(in complete years)					
Young(18 – 29)	14 (75.0)	5 (25.0)	.760	1.19	.384 - 3.70
Middle(30-44)	65 (63.1)	38 (36.9)	.025	2.1	1.1 - 4.0*
Old(45+)	68 (78.2)	19 (21.8)		1.0	
Education level					
None	30 (73.2)	11 (26.8)			
Primary & above	118 (69.8)	51 (30.2)	.674	1.18	.549 - 2.53
Source of IRS information					
From radio	9(81.8)	2 (18.2)	.771	.667	.043 -10.3
From Health workers	17 (100.0)	0 (0.0)	.998	constant	constant
From LCs	80 (63.5)	46 (36.5)	.641	1.73	.174 - 17.07
Village meetings	39 (75.0)	13 (25.0)	1.0	1.0	.096 - 10.47
Others	3 (75.0)	1 (25.0)		1.0	
Knowledge adequacy					
Inadequate	69 (98.6)	1 (1.4)			
Adequate	79 (56.4)	61 (43.61)	.00	53.3	7.20 - 394.5*
Attitude					
Negative	55(85.9)	9(14.1)			
Positive	93(63.7)	53(36.3)	.002	3.48	1.59 - 7.61*

* ***Statistically significant at 95% level***

Table 6.10 shows that there is a statistically significant association between respondents' IRS Contributory practices and three key respondent variables namely; middle age (OR 2.09, 95% CI 1.10 - 4.0), Knowledge adequacy (OR 53.3 95% CI 7.20 - 395.0) and attitude (OR 3.48, 95% CI 1.59 - 7.61). Middle-aged respondents were twice more likely to have performed a desirable IRS practice than those in other age groups. Similarly, respondents with adequate IRS knowledge were over 50 times more likely to have performed a desired practice compared to those with inadequate knowledge. Respondents with positive attitudes were three and a half times more likely to perform a contributory IRS practice than those with a negative attitude. The other respondent variables did not have any significant association with IRS Contributory practices. A multivariate analysis was conducted to establish the possible confounding effects of the other key independent variables on the contributory practice of the respondents. The results of the multivariate analysis are shown in the following table (table 6.11)

Table 6.11 showing association of IRS related Practice with knowledge adequacy, attitude and age group while controlling for other plausible variables

Key variables	**Unadjusted OR**	**95% CI**	**Adjusted**	**95% CI**
Attitude				
Negative				
Positive	3.48	1.59 - 7.61	.272	.061 - 1.22
Knowledge adequacy				
Inadequate				
Adequate	53.28	7.20 - 394.5	154.1	14.1 - 168*
Age group(in complete years)				
Young(18 – 29)	1.19	.384 - 3.70	2.01	.448 - 9.04
Middle(30-44)	2.09	1.10 - 4.0	2.24	1.01 - 4.96*
Old(45+)	1.0		1.0	
Sex				
Male				
Female	1.512	.824 - 2.774	1.372	.581 - 3.243
Household Headship				
Yes	1.375	.633 - 2.99	.979	.306 - 3.14
No				

Number of people in the household				
1-5	.484	.208 -1.13	.304	.102 - .910*
6-8	.646	.288 - 1.45	.572	.213 - 1.53
9+	1.0		1.0	
Education level				
None				
Primary & above	1.18	.549 - 2.53	1.06	.396 - 2.84

** **Statistically significant at 95% level of significance***

Table 6.11 shows that the association between IRS related practice, knowledge adequacy and age group remained significant even with adjusted OR. Respondents with adequate knowledge were over 150 times more likely to contribute towards IRS campaign than their counterparts with inadequate knowledge. The middle-aged remained about twice more likely to contribute than the other age-groups. Additionally under adjusted OR analysis, household size was significantly associated with IRS contributory practice, with the large households (9+) nearly three times more likely to contribute than the small households (5 and below). However, the association between attitude and practice collapsed, meaning that its unadjusted significance was only due to its strong association with another variable, knowledge adequacy.

6.4.2 Practice of the spray operators related to IRS

The practice of Spray operators was assessed through FGDs comprising exclusively of spray operators and Key Informant interviews whose respondents included some of the supervisors of the spray operators and local leaders/ administrators. The gaps in spray operators' IRS related actions are as summarized in the following table.

Table 6.13 showing gaps in spray operators' IRS related actions

Desired practice	Consensus description	Remarks
Mixing of spray chemical	*One sachet of ICON is mixed in 10 litres of water and stirred to mix*	No specifying whether mixing happened in another container and then solution transferred to the pump.
Use of personal protective wear	*Not adequate so sometimes shared or not used for fear of catching skin disease or were washed but did not dry up in time.*	Gap in preparation for the exercise by project organisers.
Actual spraying process	*The pump is held on the back and the nasal directed to spray surface, then moved from*	The magnitude of spray swath not specified. The

	down up the surface and down again until the wall is fully sprayed.	distance of spray operator relative to spray surface not indicated. No mention made about pump pressure.
Spray equipment maintenance	*Dismantle the pump at the end of the day's exercise and clean the pump parts and reassemble it.*	When the pump was provided for them to demonstrate, most of the operators were not forthcoming indicating lack of confidence to it correctly.
Other activities apart from spaying	*Record keeping, report writing and accounting for used spray chemical*	The role played in sensitising people about the importance of IRS was not explained.
Workload remuneration	*Work involves a lot of movement while carrying the equipment and supplies. In return paid 6000/= per day.*	Looked demotivated

Table 6.13 shows crucial gaps in the spray operators' IRS related actions. These include inadequate adherence to IRS standard operating procedures (SOPs) and low level of involvement in the community sensitisation drive for IRS. One of the Key Informants said,"..... *Spray operators were over worked and underpaid thereby compromising the quality of their work including dropping out in big numbers. Some of them were unskilled due to inadequate or no training as they were hurriedly recruited to replace those who have dropped out. For better services, their remuneration and conditions of work should be reviewed and adequate training be conducted for all those recruited to work as spray operators*" (Key Informant).

CHAPTER SEVEN

7.0 Discussion

7.1 Knowledge of the community members and spray operators on IRS

This study shows that a big proportion of the respondents, 66.7 %(140/210) had adequate knowledge about IRS, while the remaining 33.3 %(70/210) respondents inadequately knowledgeable. The primary reason for conducting IRS was among the least scored areas of knowledge with only 41.9% of the respondents being able to state correctly that IRS is conducted to control malaria. The low level of community knowledge about the meaning and importance of IRS does not only apply to Kabale community members. The study conducted on community knowledge and perceptions about malaria and practices influencing malaria control in Mpumalanga Province, South Africa, revealed that 86.6% (259/299) of respondents reported that their homes had been sprayed during the past 2 years but did not know why these homes were sprayed(Govere et al. 2006). This is a very crucial knowledge gap because unless one knows the reason for conducting IRS, it is unlikely that such a person will appreciate the importance and support the exercise. Given that this study was conducted after two rounds of the IRS campaign in Kabale district, it is surprising that there are still people to this magnitude who do not know the primary aim of IRS. The sensitisations that precede each round of the campaign should have corrected this anomaly. There is therefore need to revisit the mode of sensitisation drive used.

Statistical tests conducted in this study indicated that there was significant association between knowledge level and sex. The female respondents were found to be about 4 times more likely to be knowledgeable about IRS than their male counterparts. This compares well with the findings of a study conducted on KAP about malaria and its control in rural Northwest Tanzania which indicated that there was a significant difference between males and females on correct knowledge to prevent malaria ($P < .008$). That more females, 57.7% (211/366) reported to use IRS and ITNs compared to 30.9% (113/366) men (Humphrey D. Mazigo et al., 2010).Although the ideal situation should be that both males and females need to be knowledgeable about IRS, the women particularly need to be adequately knowledgeable about the key malaria preventive measures because mothers are immediate caretakers of patients at household level (Kengeya-

Kayondo, 2005). It is therefore important that they have the correct information about IRS in order to influence its uptake as a malaria control strategy at that level. However, since this is patriarchal society, with male dominating decision making, it is very important for the males to be adequately knowledgeable about IRS.

This study showed that the main source of IRS information was LCs and community meetings and only a few got information from Health Workers. It is unfortunate that the Health Workers who have technical information about IRS did not reach many people to disseminate it. This may explain why critical issues like primary importance of IRS and need for smoothening internal walls before spraying are not adequately understood by the community.

The spray operators have critical gaps linking IRS with malaria control, even when this is emphasised in the standard manual used for training them. This gap is reflected among the community members, which is not surprising because the same spray operators were the ones who disseminated IRS information to the community members. Other areas with knowledge gaps on part of spray operators included the type of ICON used, main advantage of IRS and key preparatory community actions in readiness for IRS. These are critical gaps because have implications on the success and sustainability of the project. The standard training content for spray operators is emphatic on most of these issues and if adequately followed would bridge these gaps (MoH-Zambia, 2009)

7.2 Attitude of the community members towards IRS

Majority of respondents 86.2 %(188/210) had their houses sprayed during the IRS but 69.5 % (146/210) said that IRS was useful. This means 16.7% just accepted to have their houses sprayed but did not believe in it. Even those who said IRS was useful, said so because IRS is conducted free of charge and services are brought to their homes. This watered down the credit they had attached to IRS. As mentioned earlier, if being free becomes the only reason why IRS is useful, then sustainability of the exercise is questionable. Only a few respondents had genuine reasons for ranking IRS as useful, i.e. that the exercise is effective in controlling malaria. Records in the office of the District Health Office, Kabale indicate the significant decline of malaria in the district after round 2 (Appendix 7). This should have been made known to the community to appreciate the role of IRS in this cardinal achievement. Most of those who said that IRS is not

useful said so because they attached negative effects IRS. This is also revealed in a similar study conducted by Hlongwana and other researchers in Swaziland. In that study respondents expressed fears associated with IRS as follows, *"....the reasons of rejecting IRS were mainly bad smell of the insecticides and the fear that insecticides may kill their domestic animals"* (Hlongwana et al, 2009). In that study 17% of the respondents expressed this fear. Though a small portion in both studies, this group of people cannot be ignored. The key informants said the community members were always wondering, *"....if the exercise is not harmful why are the spray operators "protected to the teeth?"* Another concern was: *if it is necessary to protect those in contact with the chemical why are the community members who were helping the operators to hold the pumps not equally protected?* They were also wondering *why the soil on which the chemical had spilled over was scooped and buried*. *These are indications that the chemical is very harmful and should be having very adverse side effects (Key informants).* A significant proportion associated IRS with increase of mosquitoes and fleas. This was also expressed by spray operators as follows.... *the spray chemical used during IRS causes headache, body itching and sneezing to the spray operators and increases the population of fleas in the household* (FGD). The IRS training guide for spray operators indicate that the first few days of spraying the mosquitoes will hover around as it avoids the sprayed surface in search for a safer surface. This mosquito hovering will give a misleading impression of increased mosquitoes (RTI, 2006). Relatedly, if the crevices, where fleas ordinarily stay, are not sealed by plastering or smoothening the walls before spraying, the fleas will be provoked by the spray and come out in search of safer habitat. This will give misleading impression of increased fleas (RTI, 2006).

This should have been explained as part of community sensitisation and during the training of spray operators. Otherwise with this kind of thinking one would not expect the community to embrace IRS whole heartedly and will negatively affect subsequent rounds of IRS. There were some respondents who associated IRS with killing cockroaches and other vermin more than mosquitoes. Similar sentiments were expressed by community members in a related study conducted by Americo and other researchers et al. (Americo et al, 2006) referred to earlier on. This may appear positive as killing these vermin by the spray chemical is good, but the main objective of the exercise may be lost if this is perceived as the main benefit of the exercise. It may have a negative impact on the uptake of IRS by the community especially if the cockroaches and the other vermin are not directly linked to or associated with any disease or other harmful

condition. The killing of these vermin more than the mosquitoes as observed by the beneficiaries is because of the bodily sizes of the vermin and hence more conspicuous. The malaria vectors are so small that even if they died it difficult to see their "dead bodies" (Goma L.K.H, 2009). This misleading observation will be addressed in the communication strategy being reviewed by URCS.

Statistical analysis conducted to establish the relationship between attitude and knowledge adequacy, while adjusting for key respondent variables indicated that adequate knowledge is strongly associated with positive attitude. This meant that knowledgeable people are most likely to have positive attitude towards IRS compared to their counterparts who are not/inadequately knowledgeable. This points to the importance of giving people adequate information about IRS to improve their attitudes that will in turn influence their uptake of IRS.

7.3 Practice of the community members and spray operators related to IRS

The community actions code named "contributory actions," were taken as supportive actions towards IRS. They are the actual community efforts to supplement government and a measure of community capacity to take over in the absence or reduction of government contribution. So this was a main yardstick for measuring desired community practice related to IRS. This study showed that the contributory actions were least executed with no respondent contributing any money towards this exercise. Even the other contributory actions like providing water for mixing the spray chemical, helping spray operators to mix IRS chemicals, helping the spray operators to hold or carry spray equipment during the spray exercise at their homes, providing soap for the washing of equipment and raising food for the spray operators were executed by only about 30% of the respondents. Raising food for the workers, although not obligatory could help to reduce on the time such workers would use to look for food and also save on meagre income 6000/= per day for their other essential needs. Other community contributory practices would ease work when the spray team arrives at a house so that this team is only reserved for the technical actions like actual spraying and besides increases the participation beneficiaries in the spray exercise. The current level of community contribution shows that, community members cannot sustain the IRS exercise on their own which is the government vision related malaria control (MoH, 2006).

During this study, an analysis, using logistic regression, was conducted to establish the association between the key independent variables and the practices of the respondents based on their level of contribution towards IRS. The analysis showed a significant association between the respondents' contributory practice and each of the following; age, IRS knowledge level, attitude and source of information. Respondents who knew about IRS from LCs and radios had a higher likelihood of contributing to IRS than those who heard from other sources. Respondents with adequate knowledge levels and those with a positive attitude about IRS had a much higher likelihood of contributing to the IRS exercise. These are very important revelations in terms of improving uptake of IRS. For example that information to the community through LCs and radio is more effective that through other channels. It was regrettably noted that nobody from among respondents who got information through Health Workers about IRS contributed anything towards the campaign. This may require the Health Workers to check their communication skills while passing on key messages. It may also mean that community members in Kabale take seriously what they get from LCs, whom they themselves elect, than from Health Workers. They may think that the Health Workers are saying whatever they are communicating simply because they get a salary and not because it is important. This issue may require further inquiries. The analysis also showed that adequate knowledge about the importance is very key in embracing IRS since it has direct impact on the attitude of community members which in turn affects uptake of IRS. The likelihood of contributory practice also increased with increasing numbers of households and the middle aged were more likely to contribute than the young or old age group which outcome is interesting to note for future actions in this regard. When the household size is large it is possible to spare some energies for IRS campaign and better still if most of the household members are middle aged.

The desired practice that was executed by majority of the respondents in preparation for the spray was removing/covering food items in the houses. The findings revealed that 63.5% of the respondents did this. This was a good practice because it saves such food from contamination by the spray chemical. The next most executed preparatory action was removing cloths and other items from the internal walls. The removal of such items from the wall was to ensure that the spray operators access the wall they are spraying and also that the escaping mosquitoes do not

take “refugee” in the hanging cloths. Unfortunately although it was a very good practice the respondents who reportedly executed it were only 23.8%. Other desired practices in descending order of prominence included: Helping the spray operators with the mixing of chemical. This practice in a way also serves to transfer skills to household members so that in future in the absence of paid spray operators the spraying can be done by the members of the community themselves. It also reduces the workload of spray operators who are already strained. Making the houses less congested was also desired practice that was executed which helped to provide ample working space.

Other desired practices of paramount importance, but grossed missed, was the rendering the internal surface of walls smooth. This very important omission was also realised by Govere and other in a similar study in South Africa as stated, “Of the 279 sprayed households 10% of the respondents had already replastered or painted the inner house walls by the time of the IRS exercise” (Govere J et al., 2006). This explains the apparent increase, after spraying, of vermin like fleas that live in cracks and crevices of walls. Additionally the open walls consume more spray chemical so if this is not corrected the exercise appears more expensive and the association of the exercise with increased vermin may make it lose popularity and hence unsustainable.

The spray operators had critical gaps in chemical mixing and actual spraying mechanism which must have contributed to spray wastage as reported in round one and two IRS campaign report (RTI, 2008).Other practical areas with gaps included IRS equipment handling and maintenance which contributed greatly to gross equipment breakdown and failure which also featured prominently the two campaign reports (RTI, 2008). The protective gear was not consistently used mainly because they were not adequate. This should have contributed to negative effects experienced by spray operators like body itching and sneezing. The International Code of Conduct on the Distribution and Use of Pesticides adopted in 1985 by the FAO Conference and revised in 2002 promotes sound pesticide management practices that minimize potential health and environmental risks (WHO, 2002). This code of Conduct provides a framework for management of all pesticides and prescribes at the bare minimum to what extent the handlers like spray operators are supposed to be protected. Measured against this code of conduct, the spray operators in the Kabale IRS campaign were under protected. Additionally the spray operators bore big workload and inadequate remuneration/facilitation which comprised their efficiency and

in many cases led drop out of such spray operators. The most important resource in any IRS campaign is the human resource notably the spray operators (USAID, 2009). It is therefore important these actors are well motivated and facilitated to execute their functions diligently to register the desirable results. The Kabale IRS campaign fell short of this requirement.

CHAPTER EIGHT

8.0 Conclusions and Recommendations

8.1 Conclusions

8.1.1 Knowledge about IRS

- The study has shown that both the community members and spray operators are fairly knowledgeable in some aspects of IRS, but also have critical gaps in others.
- The primary reason for conducting IRS, relating it to malaria control was among the biggest knowledge gaps for both the household respondents and spray operators.
- There was significant association between knowledge and sex. The female respondents were found to be about 4 times more likely to be more knowledgeable about IRS than their male counterparts.
- The commonest source of information about IRS was LCs, village meetings and radio, only a few respondents got IRS information from Health Workers.

8.1.2 Community attitude towards IRS

- The biggest proportion of the respondents is positive about IRS, although the main reason for embracing it is different from the intended purpose.
- Some members of the community have fears about IRS because they associate it with adverse side effects, increasing the population of fleas and contaminating the environment.
- There is a strong association between attitude and knowledge. Respondents with adequate knowledge were more likely to be positive about IRS than their counterparts with inadequate knowledge.

8.1.3 IRS related practices

- Generally, there were inadequate community supportive actions towards IRS campaign. Apart from covering food items and decongesting the houses before spraying, most of the household respondents remained onlookers throughout the spraying exercise.
- The biggest preparatory omission on part of community members was rendering the spray walls smooth in readiness for the exercise resulting in undesirable consequences.
- There was a very strong association between attitude and practice. The respondents with positive attitude towards IRS were three and a half times more likely to perform a contributory IRS practice than those with a negative attitude

- The spray operators on the other hand had gaps in equipment maintenance, mixing spray chemical and actual spray skills. Besides, there was a high attrition rate of trained spray operators replaced by people who were inadequately trained and incompetent thereby compromising quality of work

8.2 Recommendations

Ministry of Health and local health authorities should:

- As part of the preparations for IRS, step up community sensitisation component to ensure that the community members have enough information on IRS especially the main purpose of conducting it and clarify their roles in the campaign.
- Ensure that Health workers, who are technical officers in area of IRS, are adequately on board to communicate technically related information to the community.
- The spray operators should be adequately trained, equipped and motivated to execute the functions of IRS effectively and minimise tendencies to drop out.
- Ensure that the number of spray operators trained is slightly more than the number that is immediately required to cater for appropriate replacement in case of any drop-out.
- Commission a similar KAP study to be conducted in Kabale after instituting these remedial measures to assess the level of improvement of IRS campaign performance.

REFERENCES

Abyan and Osman (1993), Malaria Challenges in Uganda, Makerere University Printing Press, Kampala, Uganda.

Dauda Waiswa Bagenda(2004), Literature Review Report, Knowledge, Attitudes and Practices about Malaria Treatment and Prevention in Uganda, Makerere University Printing Press, Kampala, Uganda.

EXTOXNET(1996), Pesticide Information Profile: L lambdacyhalothrin, Oregon State University, Corvallis, http://extoxnet.orst.edu/pips/ghindex.html. Accessed on 5th May, 2007.

Goma L.K.H(2009), Swamp breeding mosquitoes in Uganda, Bulletin of entomology Research, Cambridge University Press, London, U.K.

Guyatt.L.Helen,Corlett K.Sarah, Timothy P Robinson, Ochola Sam A and Robert W (2002), Malaria Prevention in highland Kenya: Indoor Residual House-Spraying vs. Insecticide-Treated bed Nets, Blackwell Publishing LTD, Nairobi, Kenya http://www.ingentaconnect.com/content/bsc/tmih/2002/00000007/00000004/art00002 Accessed on 21/03/2007.

Mazigo D. Humphrey,Obasy Emmanuel,Mauka Wilhellmus,Manyiri Paulina, Inga Maria Zinga,Kweka J.Eliningaya,Mnyone L.Ladslaus,Heukelbach Jorge(2010) Knowledge, Attitude and Practices about malaria and its control in rural Northwest Tanzania, Weill Bugando University College of Health Sciences, Mwanza, Tanzania.

IPCS (1990), Environmental Health Criteria 99-Cyhalothrin, World Health Organization Publications, Geneva Switzerland, http://www.inchem.org/documents/hsg/hsg/hsg038.htm. Accessed on 17/05/2007

Kengeya-Kayondo(2005), Perception, of Cause of Malaria among rural women in Uganda, Journal of Biosocial Science, Cambridge University Press, London, UK.

Khumbulani W Hlongwana,Musawenkosi L H Mabaso,Simon Kunene,Dayanandan Govender,Rajendra(2009), Malaria Journal, Community Knowledge, Attitude and Practices on Malaria in Swaziland, South African Medical Research Centre, Durban, South Africa.

Klein Robert E,Weller Susan C,Zeissig Rodolfo,Trenton K.Ruebush,II(1995),Knowledge, Beliefs and Practices in relation to malaria transmission and vector control in Guatemala, Am J. Tropical Medicine and Hygiene.

MACIS (2005), Strategic Plan 2006-2010, Alkan Management Consultants, Kampala, Uganda, Ministry of Health Annual health sector performance report 2003/2004, Kiggs Enterprises, Kampala, Uganda.

Ministry of Health(2001), Annual Health Sector Performance Report 2000/2001, Makerere University Printing Press, Kampala, Uganda.

Ministry of Health (1992), Health facilities inventory, Makerere University Printing Press, Kampala, Uganda.

Ministry of Health (2003), Health sector strategic plan 2000/01- 2004/05, Burden of malaria in Uganda, Kiggs Enterprises, Kampala, Uganda.

Ministry of Health (2011), Health Sector Strategic Plan III 2010/11-2014/15, Makerere University Printing Press, Kampala, Uganda.

Mugisha Odek Rwabwaooga (2002), Uganda Districts, Information Handbook, Fountain Publishers, Kampala, Uganda.

Kilian AH, Langi P, Tulisuna A, Kabagambe (1999), Rainfall Pattern, El Nino and Malaria in Uganda, Transaction of the Royal Society of Tropical Medicine and Hygiene, London, UK. http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=10492781&dopt=Abstract. Accessed on 5/5/2007.

Ministry of Health (2005) Annual health sector performance report 2003/2004, Kiggs Enterprises, Kampala, Uganda.

Ministry of Health(2001), Annual Health Sector Performance Report 2000/2001, Makerere University Printing Press, Kampala, Uganda.

Ministry of Health (2003), Health sector strategic plan 2000/01- 2004/05, Burden of Malaria in Uganda, Kiggs Enterprises, Kampala, Uganda.

Ministry of Health(2006) Malaria Control Strategic Plan, 2005/06-2009/10, Kiggs Enterprises, Kampala, Uganda,.

Mouchet .J, Mangun .S, Sircouton .J (1998), Evolution of Malaria in Africa for the past 40 years, Impact of Climatic and Human Factors. Journals of American Mosquito Control Association 14, New York, USA, 1998. http://cat.inist.fr/?aModele=afficheN&cpsidt=2403223. Accessed on 6/5/2007.

Mugisha Odek Rwabwaooga (2002), Uganda Districts, Information Handbook, Fountain Publishers, Kampala, Uganda.
PMI (2005), Rapid Malaria Assessment Report, Kampala, Uganda, http://www.fightingmalaria.gov/countries/uganda_assessment.pdf Accessed on 21/03/2007.

New Vision (2007), Malaria control spray men “resisted" in Munyonyo, New Vision Printing and Publication Co.LTD, Kampala,Uganada

RTI (2006), Environmental Monitoring of IRS in Kabale District, Progress Report June and July 2006, Fountain Publishers, Kampala Uganda.

UBOS (2003), Population and Housing Census, 2002, Fountain Publishers, Kampala, Uganda.

UNDP(2006), Getting Africa on Track to Meet the MDGs, A status Overview of Sixteen African Countries, WSP-Africa Nairobi Regional Office, Hill Park Building, Nairobi, Kenya.

USAID (2009), Manual for training pump operators in Zambia, USAID, Washington, U.S.A.

Vundule, Mharakurwa .S(1996), Knowledge, Practices about Malaria in Rural Communities in Zimbabwe: Relevance to Malaria Control, Bulletin of World Health Organisation, WHO, Geneva, Switzerland.

WHO (2005), Immunization Coverage Cluster Survey, World Health Organization CH-1211, Geneva 27, Switzerland, WHO, http://en.wikipedia.org/wiki/Indoor_residual_spraying#World_Health_Organization_recommendations

WHO(2002), Manual for Indoor Residual Spraying, Application of Residual Sprays for Vector Control, Communicable Disease Control, Prevention and Eradication, Pesticide Evaluation Scheme PAHO Publishing House, New York. http://www.paho.org/English/AD/DPC/CD/mal-who-insecticide-manual.htm. Accessed on 21/03/2007

WHO (2005), Report on Infectious Diseases, WHO HOME, Geneva, Switzerland. http://www.who.int/infectious-disease-report/ accessed on 20/03/2007

WHO (2007), World Health Statistics 2007, WHO Press, Geneva Switzerland. http://bookorders.who.int/bookorders/anglais/home1.jsp?sesslan=1 Accessed on 5/10/2007.

WHO/CDC/RBM (2000), The Abuja Declaration and Plan of Action, Malaria summit goals and target, CH-1211, Geneva, Switzerland.

WHO (2007),World Health Statistics 2007, WHO Press, Geneva Switzerland. http://bookorders.who.int/bookorders/anglais/home1.jsp?sesslan=1 Accessed on 5/10/2007.

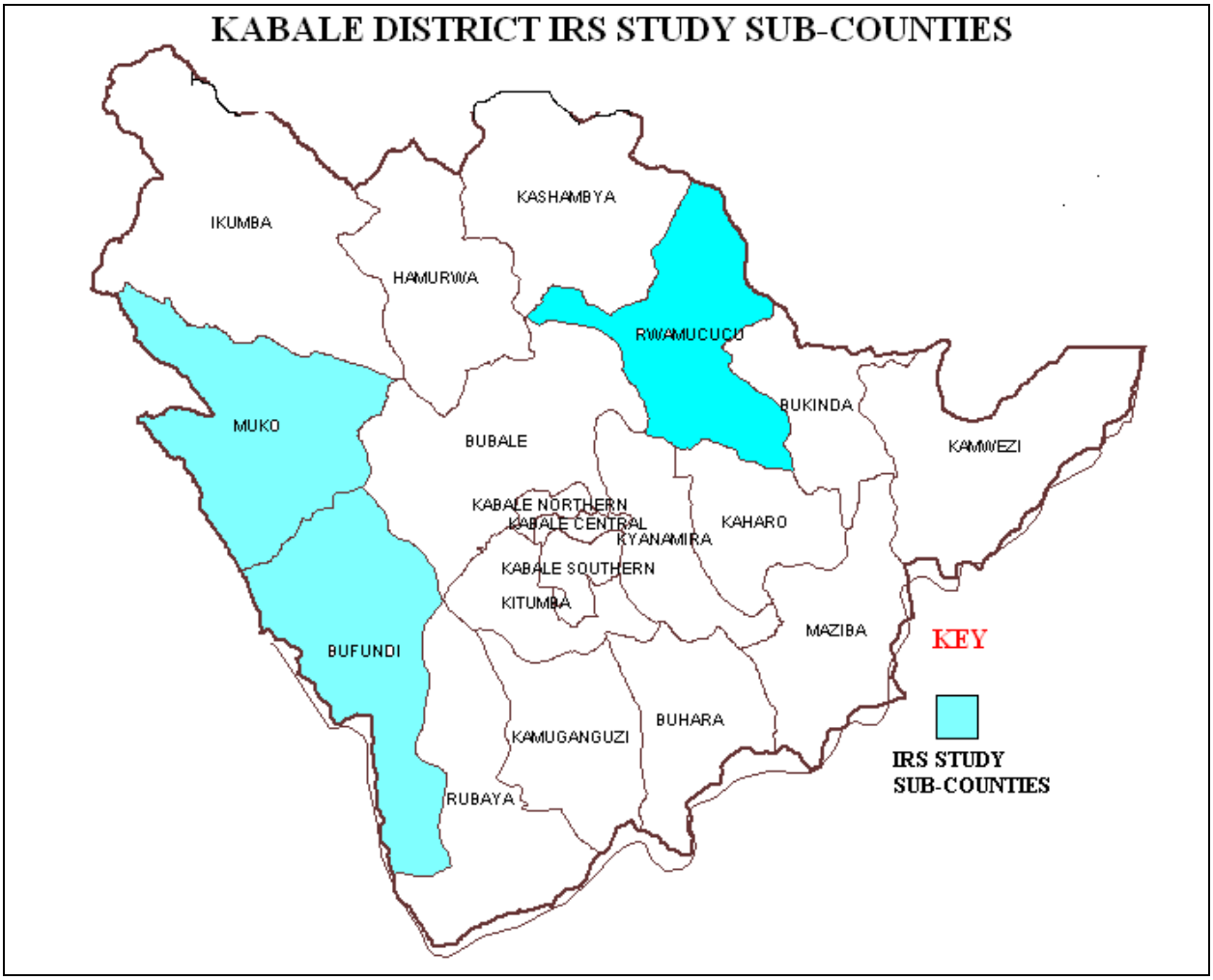
WHO (2011), World Malaria Report 2009, World Health Organisation, Geneva, Switzerland, http://www.who.int/malaria/publications/atoz/9789241563901/en/index.html. Accessed on 21/07/2011

YouTube (2007), The DDT Wars-John Ken Lukyamuzi, http://www.youtube.com/watch?v=4t2B-jbGIn4 assessed on 15th August, 2011.

APPENDICES

Appendix 1: Map of Uganda showing location of Kabale District

Appendix 2: Map of Kabale District showing location of IRS Study Sub Counties



Appendix 3: Questionnaire for household interviews

Perspectives on Knowledge, Attitudes and Practice on Indoor Residual Spray (IRS) in control of Malaria in Kabale District

1.0 Background information about the Respondent.
(Fill in or ring the appropriate response)

1.1 Date ----------

1.2 Sub County…….

1.3 Parish ----------

1.4 Village ----------

1.5 Name of respondent……

1.6 Age of respondent ----------

1.7 Head of household?

1. Yes
2. No

(If no specify)……

1.8 Sex

1. Male
2. Female

1.9 Marital status

1. Married
2. Single
3. Divorced/separated
4. Widow (er)

1.10 Number of people in household *(put actual number mentioned by the respondent)*

…….

1.11 Occupation

1. Unemployed
2. Peasant

3. Business
4. Civil Servant

1.13 Level of education

1. None
2. Primary
3. Secondary
4. Tertiary

1.14 Religious afflation

1. Catholic
2. Protestant
3. Moslem
4. Others. Specify……...

2.0 Knowledge on Indoor Residual Spray

2.1 What is Indoor Residual Spray?

1. Spraying inside of houses with insecticide.
2. Spraying inside of houses with water.
3. Spraying in and out of houses with insecticide.
4. Spraying in and out of houses with water.
5. Others: Specify…….

2.2 Why is Indoor Residual Spray conducted?

1. To kill mosquitoes
2. To control malaria
3. To kill cockroaches and other vermin.
4. To treat malaria
5. Others: Specify…….

2.3 Why is it applied only inside the house and not outside?

1. Malaria Mosquitoes feed and rest inside houses
2. Cockroaches and other vermin are found inside houses.

3. The available insecticide is only adequate for indoor application
4. People sleep inside houses only.
5. Others: Specify……...

2.4 What advantages does IRS have over other malaria control measures you know?

1. It is free of charge
2. The service is brought to our homes by service providers.
3. Once the house is sprayed properly, everybody sleeping inside it is protected against malaria
4. All the above
5. Others: Specify…….

2.5 Are there disadvantages of IRS?

1. No
2. Yes

2.6 If yes, what are the disadvantages?

1. Has a negative side effect
2. The chemical used is poisonous
3. Contaminates the environment
4. All the above
5. None
6. Others: Specify……

2.7 How would these disadvantages be addressed?

1. Avoid using IRS as a malaria control measure.
2. Adequate information about IRS should be obtained and adhered to.
3. Use other malaria control measures.
4. All the above
5. Others: Specify……

2.8 How did you get to know about the IRS exercise?

1. From radio or/and TV.
2. From Health workers.
3. From LCs
4. From posters.

5. All the above
6. Others: specify……

2.9 Were you sensitized about IRS before the actual spray exercise?

1) No
2) Yes

2.10 If yes, in what forum?

1. General community meetings
2. During household visitation by the health and other project officials
3. Radio Programmes
4. TV programmes
5. All the above
6. Others: Specify……

2.11 What were the key issues discussed during this sensitization session?

1. Meaning of IRS IS
2. Importance of IRS
3. Chemical used in IRS
4. Protective measures
5. Role of community
6. All the above
7. Others: Specify……

2.12 How often is the IRS exercise supposed to be conducted?

1. Twice a year
2. As often as possible
3. Once a year
4. Others: Specify……..

2.13 Why should the exercise be conducted so often?

1. The insecticide remains in the sprayed surface for about six months.
2. The insecticide remains in the sprayed surface for a short time.
3. The insecticide is too scarce and expensive.
4. Others: Specify……

3.0 Attitude towards IRS

3.1 Was your house Sprayed?

1) No

2) Yes

3.2 In your opinion, is IRS useful or not?

1- Not useful at all

2- Not useful

3- Fairly useful

4- Useful

5- Very useful

3.4 What reason do you have for the answer given in (3.2) above?

1- Because we are forced to pay for it.

2- because of its negative side effects.

3- Because it is free.

4- Because it is effective in controlling malaria

5- Others: Specify……..

3.5 What alternative method of controlling malaria would you prefer?

1- Sleep under treated mosquito nets

2- Clear the bushes drain stagnant water pools around the houses

3- Seek cultural redress

4-Treatment

5-Others: Specify……

4.0 Practice related to IRS

4.1 Is there any monetary contribution you made towards the spray exercise?

1. No

2. Yes

4.2 If so how much did you pay? *(Insert the actual amount mentioned by the respondent)*

.....

4.3 To whom did you give this contribution?

1. LCs

2. Project office
3. Spray operators
4. Health department
5. Others: Specify……

4.4 What other contribution did you make to the IRS exercise?

1. Raising food for the workers
2. Providing transport for the spray team.
3. Providing soap for the washing of equipment and clothing for the spray team.
4. Mixing of IRS chemicals
5. Holding/carrying spray equipment/chemicals for the spray operators.
6. Washing equipment & protective gear for spray men.

4.5 What did you do in preparation for your house to be sprayed?

1. Rendering the internal surface of walls smooth.
2. Making the houses less congested.
3. Removing/covering food items in the houses.
4. Removing cloths and other items from the internal walls
5. All the above.

4.6 What precautions did you take during the spraying exercise?

1. Re-enter the sprayed premises at least after one hour.
2. Wash the hands before eating or touching the face.
3. Any mixed spray chemical should not be kept in the house.
4. In case of contact with the chemical, wash the area of contact with adequate water and soap.
5. All the above
6. Others

4.7 Why did you have to take the above precautions?

1. To avoid accidental ingestion of the chemical
2. To avoid negative side effects of the chemical
3. To avoid contaminating the environment.
4. All the above
5. Others: Specify……..

4.8 What accidental happenings occurred or could occur during indoor residual spray

1. Accidental ingestion of the chemical solution
2. Premature re-entering of the premises.
3. Over spraying of the premises
4. Eating food without first washing of the chemical
5. All the above
6. Others: Specify……

4.9 What shortcomings resulted or could result from the above happenings?

1. Body itches
2. Sneezing
3. Miscarriages
4. Deaths
5. Eye defects
6. All the above
7. Others: Specify…….

4.10 What actions would you execute in case such accidental incidences occurred?

1. Rushed the affected people to the nearest health unit
2. Reported the matter to Project officials
3. Conducted some first aid
4. Contacted a traditional healer/herbalist
5. All the above
6. Others: Specify……

Thank you for your time and information.

Appendix 4: Questionnaire for Key Informant (KI) interviews

Perspectives on Knowledge, Attitude and Practice on Indoor Residual Spray in the control of Malaria in Kabale District

Instructions

- *This questionnaire can either be administered by the interviewer or Self-administered by a respondent*
- *All responses should be entered in the spaces provided, preferably in pencil to allow for ease of rubbing in case the respondent changes his/her mind*.

Name of Interviewer……

Section 1: Background Information

1.1. Date of interview……
1.2. Name of respondent……
1.3. Designation…….

Section 2: Knowledge about Indoor Residual Spray (IRS)

2.1 Agency spearheading the Mass IRS exercise in the district.
……
2.2 Community awareness about IRS and how this awareness was created/raised.
……
……
2.3 Chemical used for IRS and advantages over other chemicals
.....
.....
2.4 Any preparatory activities by the implementing agency and district prior to actual mass IRS.
……
……
……
……..

2.5 Any information gaps about IRS still among the intended beneficiaries, likely impact on the programme and how these could be addressed.
……
……
…….

Section 3.0: Attitude related to IRS

3.1 General feelings about IRS among the community members?

……
……
……

3.2 Any association of IRS with DDT use by community members.

……
……
……

3.4 Possible ways of addressing negative feelings about IRS exercise.

……
……
……

Section 4 0: Community Practice related IRS.

4.1 Proportion of the household sprayed in the area of jurisdiction.

……..

4.2. Reasons for defaulting if any.

……
……

4.3 Preparations by community members in readiness for IRS?

……
……
……..

4.4 Any lack of compliance, reasons for non-compliance and possible remedial actions

……
……
……
……

4.5 Any monetary or other contributions by community members towards the Mass IRS and effect of requirement of such contributions on the progress of the exercise.

……
……
……
……..

4.6 Any bodily harm experienced by community members and spray operators as a result of this exercise, remedial action taken and suggestion to avoid similar happenings in future.

……
……
……
……..

4.7 Selection and training of members of the spray teams.

……
……
……
……

4.8 Terms of reference for the members of the spray teams.

……
……
……
……
……..

4.9 Quality of performance of spray operators, gaps in their work and how they can be addressed.

……
……
……
……

4.10 Remuneration of members of the spray teams Vs their workload

……....
.....
……....
.....

4.11 Recommendations for improvement in the subsequent phases of the Mass Residual Spray in the district?

……

……

……

……

……

Thank you for your time and information.

Appendix 5: Interview Schedule for Focus Group Discussion (FGD)

Perspectives on Knowledge, Attitude and Practice on Indoor Residual Spray (IRS) in control of Malaria in Kabale District

Instructions:

- The responses from participants should be recorded on separate sheets of paper provided.
- The focus group will be conducted by at least two Research Assistants, a moderator and a recorder.
- The participant will be spray operators drawn from the parishes. Avery parish in the sub county should be represented.

Background information:

Date of interview……

Name of moderator……

Name of recorder……

Time taken for discussion (*to be filled in at the end of the discussion)*…….

Name of Sub County.……

Number of participants……. *(With full list of participants attached to a record of responses)*

Knowledge related to IRS

- Selection, training, deployment, workload , remuneration and facilitation(including protective gear and treatment in case of chemical mishandling) of Spray operators
- Type of chemical used for IRS, its advantages and possible shortcoming and how to overcome them.
- Proportion of households sprayed and factors contributing to this coverage.
- Frequency of IRS and the rationale for this frequency
- Awareness and preparations by the community members in readiness for IRS.
- Precautions to be taken by household members during and after spray of the household.
- The various channels used to disseminate information to the community about IRS (e.g. radio, drama shows, video shows, social gatherings or meetings etc.)
- People responsible for the presentation of this information to community members.

- Any information gaps and ways of addressing them.

Attitude related to IRS

- People's opinion about the use of IRS (e.g. association with DDT and other misconception).
- Their perceived effect of the chemical used on the environment, property, animal and human health.
- The opinion of the spray operators about IRS in the control of malaria compared to other control methods they know.
- Hindrances limiting access to IRS service and these could be removed.
- The effect of community opinion on the entire programme and ways of correcting negative opinion.
- Ways of correcting the above opinion, in case there is need to correct it.

Practice related to IRS

- Mixing of IRS chemical, conducting the actual spray and precautions to be taken.
- Storage of the chemicals while not in use
- Medical attention to spray in case of accidental happening during and after the spray exercise.
- Performance of spray teams(execution of the assigned tasks)
- Suggestion for improving motivation for the spray teams.
- Suggestions for improvement in the dissemination of information on IRS and Malaria control as a whole.

Thank you for your time and information.

Appendix 6: Table of random numbers

Row	Column 0	1	2	3	4	5	6	7	8	9
01	89008	13730	06504	37113	82248	04709	17481	77450	46438	61536
02	01309	13283	70650	11467	66136	06265	36402	06164	35106	77350
03	45896	59490	98462	11032	78613	78744	13478	72648	98769	28262
04	50107	24914	99266	23640	76977	31340	43678	23128	03536	01590
05	71163	52934	03287	86680	68794	94323	96879	75529	27370	68228
06	76445	87636	23392	01883	27880	09235	55886	37532	48542	01416
07	84130	99937	86667	92780	69283	73995	00941	66606	28855	86125
08	00642	10003	08917	74937	57338	62496	08681	28890	60738	81521
09	54478	94624	82914	00608	43587	95212	92406	63366	06609	77253
10	02379	83441	90151	14061	26858	68580	66009	17687	49511	37211
11	32525	44670	57715	38888	28199	80522	06532	45322	57247	46333
12	01976	16524	32784	48037	78933	50031	64123	83437	09474	73179
13	67952	41501	45383	78897	88627	07376	07061	40959	84155	88644
14	38473	83533	39754	90640	99083	38201	94259	67599	50797	75352
15	91079	93691	11606	49357	55363	96324	30250	20794	63946	06387
16	10186	08121	28065	95768	03739	65182	68713	63290	57801	72830
17	75518	59323	64104	24926	85715	67332	49282	66781	92989	40947
18	70765	40826	74118	62567	75996	68126	88239	57143	06455	44068
19	29851	16968	66744	77786	62301	99585	23955	15725	64404	19154
20	90988	34929	14992	07902	23622	11858	84718	22186	35386	13206
21	56106	13672	31473	75329	45731	47361	47713	99678	24102	13822
22	24742	21956	95299	24066	60121	78536	61805	39904	59863	62284
23	05173	48492	68455	77552	87048	16953	45811	22267	57389	70298
24	44679	66289	66203	54780	75661	90479	79388	15317	63741	76077
25	35733	27600	06266	76218	42258	35198	26953	08714	17417	56413
26	34154	96277	83412	70244	56791	64774	75699	85797	58089	91501
27	37158	54395	38978	20127	40939	80977	73093	65145	97885	44847
28	81946	36871	97212	59592	85998	34897	97593	24436	65453	37073
29	05888	49306	68363	56012	12792	04498	20096	20891	03289	98203
30	52271	92515	08932	25963	69674	72824	04456	81253	41034	09730
31	54535	01881	16357	72140	00903	45029	64337	64052	30113	09089
32	29714	96021	33162	30303	81940	91596	35929	76261	43784	19406
33	60593	11822	89895	80143	80351	33822	34525	54453	43516	48537
34	29987	90828	72361	29342	72406	44942	27505	45413	42176	94190
35	76958	85857	85892	75341	32682	00546	92413	00212	35474	22456
36	15904	79837	46307	40836	69152	76304	57063	70591	06343	38828
37	01436	68094	78222	61283	40512	17680	92757	40299	96105	57139
38	36898	64356	19740	77068	78392	43281	36931	26091	42028	62718
39	81109	73155	58289	62768	58409	30647	40659	23679	04204	67528
40	47061	44640	52069	98038	49113	26840	42152	80242	57640	19189

Appendix 7: Pattern of Malaria occurrence in Kabale District during the period 2002 – 2008