KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

KUMASI, GHANA

COLLEGE OF HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH

DEPARTMENT OF HEALTH PROMOTION AND EDUCATION

FACTORS AFFECTING ACCEPTABILITY OF INDOOR RESIDUAL SPRAYING (IRS) FOR MALARIA CONTROL IN THE EAST MAMPRUSI DISTRICT OF THE NORTHERN REGION OF GHANA

BY

DUUT BALONI TIMOTHY

NOVEMBER, 2016

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BY

DUUT BALONI TIMOTHY (BSc. NURSING)

A THESIS SUBMITED TO THE DEPARTMENT OF HEALTH PROMOTION AND EDUCATION, SCHOOL OF PUBLIC HEALTH, COLLEGE OF HEALTH SCIENCES, KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, IN PARTIAL FULFILMENT OF REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF PUBLIC HEALTH IN HEALTH EDUCATION AND PROMOTION

NOVEMBER, 2016

DECLARATION

I Duut Baloni Timothy, hereby declare that with the exception of reference used by various authors, which acknowledgement has been made. The study is my original work carried out by myself and that this work has never been presented either whole or in part by any one for the award of degree in this institution or elsewhere.

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DEDICATION

I dedicate this work to God for granting me the effort to complete this course and also to my wife; Amah Jaato and my children, Stella Duut, Edmond Duut, Bernard Duut and Edith Duut for their support and not forgetting friends and loved ones for their contribution in diverse ways in making this project a success.

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To begin with, my special thanks and gratitude goes to God Almighty for the wisdom, knowledge and understanding he has given to me throughout this project. I owe much appreciation to my hardworking and outstanding academic supervisor, Dr. Harry Tagbor, for his instructions and guidance which resulted in the success of this work.

I want to express my profound gratitude to my family and to the research participants for their cooperation during the collection of data for this research. To Sammy, Kasimu and Asibi, I would like to say a big thank you for the energy you spent during the data collection.

Finally to the authors of the various references used, I say thank you and God richly bless you.

DEFINITION OF TERMS

Acceptability – Is the act of allowing for the spraying operators to spray the houses.

Control Practice- Is the measure taken by the household heads regularly to prevent malaria.

Coverage–Is the percentage or number of houses that were sprayed.

Efficacy – The ability of the drug to kill mosquitoes or perform its intended purpose.

Factor: Is anything that influences the people to either accept or refuse the indoor residual spraying.

Household – Involve all the people in a family or group who live together in a house and eat from one pot.

Household head – Is any person either male or female who owns or rent a particular house and takes decision for the entire family.

Indoor Residual Spraying – Is the application of persistent insecticide to the interior walls of houses to kill or repel malaria vectors with the aim to control malaria.

Operators- Refers to the officials who go round to do the indoor residual spraying.

Perception - Is how the community members think about the indoor residual spraying.

Process - Is the series of actions carried out to achieve the indoor residual spraying.

Spray - Is the act applying the chemical and allowing drops of it on the walls.

ABBREVIATION/ACRONYMS

ACT	:	Artemisinin- based Combination Therapy.
AFRO	:	Regional Office for Africa
AIDS	:	Acquire Immune Deficiency Syndrome.
CHPs	:	Community Base Health Planning and service.
CHWs	:	Community Health Workers
CWCs	:	Child Welfare Clinics
DDT	:	Dichlorodiphenyltrichloroethane
DHMT	:	District Health Management Team.
GDHS	:	Ghana Demographic Health Survey
GHS	:	Ghana Health Service.
HIV	:	Human Immunodeficiency Virus.
IPTp	:	Intermittent Preventive Treatment in pregnancy.
IRB	:	Institutional Review board
IRS	:	Indoor Residual Spraying.
ITNs	:	Insecticide Treated bed Nets.
IVM	:	Integrated Vector Management.
KNUST	:	Kwame Nkrumah University of Science and Technology
LLINs	:	Long Lasting Insecticide Nets.
MDGs	:	Millennium Development Goals.
MOH	:	Ministry of Health.
MTN	:	Mobile Telecommunication Network
NMCP	:	National Malaria Control Programme.
PMI	:	President’s malaria Initiative

RBM	:	Roll Back Malaria
SPSS	:	Statistical Package for Social Sciences
UN	:	United Nation.
U.S	:	United States.
UNICEF	:	United Nations International Children's Emergency Fund
WHO	:	World Health Organization.

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ABSTRACT

Ghana is one of the developing countries in Sub-Saharan Africa where malaria is the main cause of disease, poverty and the low productivity for several decades. Malaria is considered at the moment to explain near 32.5% of all out-patient attendance and 48.8% of children less than five (5) admissions in the country. The National Malaria Control program indicated that the Northern Region had the highest load of the disease and therefore the highest morbidity and mortality according to 2005 Malaria report. The control of malaria in Sub-Saharan Africa continuous to be a public health challenge and so the World Health Organization (WHO) recommends the indoor residual spraying (IRS) as a measure of control for the malaria vector. According to the US president's malaria initiative (PMI), Ghana has put the experimental program of the IRS in execution in some Districts in the Northern Region. The objective of the study was to determine the factors that affect the acceptability of IRS in the East Mamprusi District. A descriptive cross-sectional survey using a structured questionnaire was conducted on 400 household heads. The quantitative data were analyzed using SPSS for association of factors and chi-square was used. If ($p<0.05$) the test was considered statistically significant. The study found that there was a statistically significant association between the use of other malaria control measures and IRS acceptability ($P<0.0001$). The study showed that the perception of the people about the efficacy of the spraying (chemical) is related to the acceptability of indoor residual spraying in the district ($P<0.0012$).This study, therefore recommends that the negative perception about the efficacy of IRS programme need to be demystified by the spraying officials, health professionals, opinion leaders and assemble members in the East Mamprusi District.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND INFORMATION

Malaria infection is caused by a protozoan of the genus plasmodium and is transmitted to humans through the bite of an infected female anopheles mosquito. Malaria is hyperendemic in Ghana. It is a major public health problem causing an enormous burden to health and economy. According to the World Malaria Report, 2011, there were 655, 000 malaria deaths worldwide in 2010, compared to 781,000 in 2009. It is estimated that 91% of the deaths in 2010 were in the Africa region, followed by Southeast Asia (6%) and the eastern regions of the Mediterranean (3%). Approximately 86% of deaths worldwide were in children under 5 years of age (WHO, 2011).

According to WHO, about 300 million people worldwide are affected by malaria and between 1and1.5 million people die each year. The situation became even more serious in recent years and increase resistance to anti-malarial drugs. The vast majority of cases of malaria in Africa, which has 89% of deaths, followed by the Eastern Mediterranean and South Asia (WHO, 2009).

According to World Health Report, 2002 about one million people in Africa die from malaria infections every year and most of these deaths are children under five years. In the year 2000, 189 countries made a pledge to contribute to achieving a better world at a UN summit in United States. Emanating from the Millennium Declaration are the eight (8) Millennium Development Goals (MDGs). The goal six (6) seeks to combat HIV/AIDs, malaria and other diseases by the year 2015.

Malaria control in sub-Saharan Africa remains a public health challenge and so the World Health Organization (WHO) recommends indoor residual spraying (IRS), with

dichlorodiphenyltrichloroethane (DDT), as a malaria vector control measure (WHO, 2006).

Ghana is one of the developing countries in Sub-Saharan Africa where malaria has been the major cause of poverty and low productivity for several decades. It is currently estimated to account for about 32.5% of all out-patient attendance and 48.8% of children under five (5) years admissions in the country (NMCP Annual Report, 2009).

In Ghana estimated 3.5 million people contract malaria every year and approximately 20,000 children die from malaria every year – 25% of the deaths are children under 5 years (UNICEF, 2007).

Malaria is a major cause of morbidity and mortality and represents a significant part of the burden of disease in Ghana. It represents about 45% of all outpatient visits to health centers and was ranked as the third largest cause of death (MOH, 2007).

Recent experience with IRS pilots in Ghana has been promising and efficacious in controlling malaria in Ghana. AngloGold Ashanti (a private mining company) launched IRS acts as an effective remedy in the Obuasi Municipal Council area as part of the fully integrated malaria program. The results show a decrease of more than 74% of the malaria cases in 2 years in the area which includes urban and rural areas (Ministry of Health, 2008)

1.2 PROBLEM STATEMENT

Malaria is a major public health issue and remains a challenge to global and national public health professionals. Increase in malaria incidence has a devastating effects on Ghanaians especially the pregnant women and children under five (5). National and household resources are channeled into health care and it lead to low productivity as parents have to

spend days from work to take care of their family members who suffer from malaria. The fight against malaria remains a challenge in Sub-Saharan Africa. In 2006, the World Health Organization (WHO) in an effort to strengthen indoor residual spraying (IRS) with dichlorodiphenyltrichloroethane (DDT) was implemented to reduce malaria transmission. The overall objective of the national malaria control strategy is to reduce man-vector contact as much as possible and to render the breeding environment unsuitable for mosquito breeding.

In 2006, WHO issued a position statement on the application that supported the scaling up of IRS as one of the primary vector control measures in developing countries including Ghana.

There is an increase from 13 million in 2005 to 75 million people in 2009 which represented an approximately 10% of population at risk of malaria infection that were known to have been protected from malaria after the implementation of IRS programme in the sub-Saharan Africa region (WHO, 2010).

The National Malaria Control Programme indicated that the Northern Region has the highest burden of disease and therefore greater morbidity and mortality, according to the 2005 malaria report.

In line with the U.S President's Malaria Initiative (PMI), Ghana implemented IRS pilot program in some Districts in the Northern Region.

The implementation of the IRS programme was met with some challenges in the East Mamprusi District, where some people were rejecting the exercise. There seems to be some factors influencing the acceptance of IRS for malaria control among the public especially those in the rural settings. It has therefore become necessary that a study be conducted to

determine the factors affecting IRS acceptability in the East Mamprusi District of the Northern Region of Ghana

1.3 GENERAL OBJECTIVE

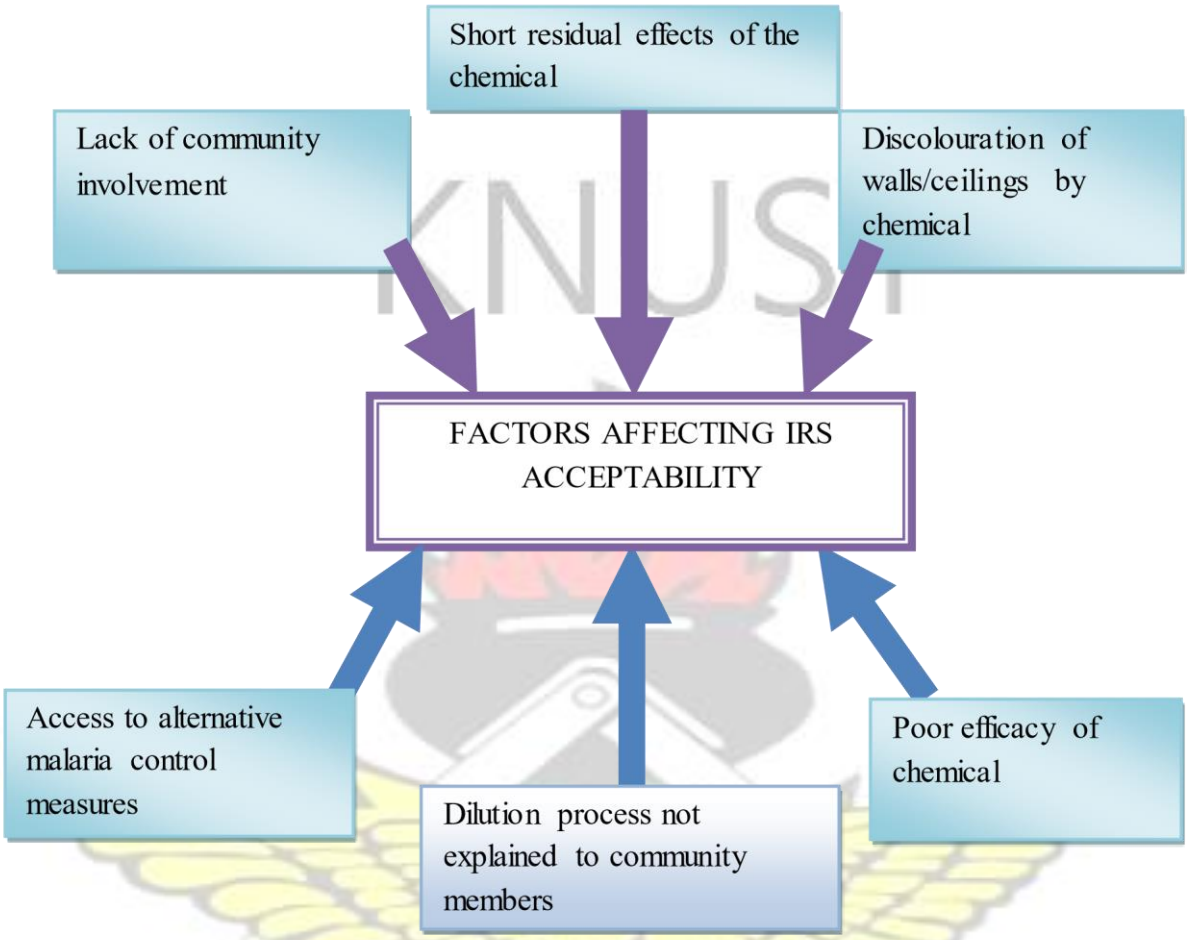
To determine the factors affecting acceptability of IRS for malaria control in the East Mamprusi District

1.4 SPECIFIC OBJECTIVES

1. To assess malaria control practices in the East Mamprusi District.
2. To investigate the IRS implementation process adopted by the spraying officials and operators
3. To determine perceived efficacy of the IRS exercise among the community members.
4. To assess the coverage of the indoor residual spraying in the district.

1.5 CONCEPTUAL FRAMEWORK

FIGURE 1: CONCEPTUAL FRAMEWORK



Source: The author's own construct.

Factors that affect acceptability of IRS programme have been summarized in the figure 1 above. Community acceptance level of IRS is dependent on the following factors; efficacy of chemicals, less side effects of chemicals on humans and domestic animals, not staining of walls and ceilings, spraying operator's courtesy to household members and whether the dilution process was well explained to community members as well as good community sensitization about the programme. However, when there is poor efficacy of chemicals, short residual effects, discolouration of walls and ceilings and lack of community involvement will affect the acceptability level negatively because the community members may refuse spraying of their houses or structures.

1.6 RESEARCH QUESTION

1. What factors influence the acceptability of indoor residual spraying (IRS) for malaria control in the East Mamprusi District of the Northern Region of Ghana?

1.7 RATIONALE OF THE STUDY

One of the most important events in organizing a successful malaria control programme is a comprehensive assessment of perception, knowledge, attitudes and practices of the people living in at risk area in order to collaborate with the members of the community.

The fundamental purpose is to provide information on or identify the factors that either positively or negatively affect IRS acceptability among the community members.

The significance of the study is to bring all stake holders on board especially the community members to tackle the issue of malaria control in the country holistically of which IRS is one of the vector control measures.

Findings from the study and the views and concerns from the community members will be of immense significance to policy-makers for future policy direction and to all stake holders especially the Ministry of Health and the National Malaria Control Program. Finally, findings from the study will go a long way to generate further research works on indoor residual spraying and its related areas.

1.8 PROFILE OF THE STUDY AREA

The study was conducted in the East Mamprusi District of Northern Region of Ghana. The People are mainly farmers belonging to Mamprusi, Konkombas, Bimoba's, Kusasi's and

Busangas ethnic groups. The main economic activities are agriculture, small businesses (petty trading), and livestock keeping.

The East Mamprusi District is one of twenty - six (26) districts in the Northern Region of Ghana. The capital is Gambaga and covers about 1,173 square miles. According to the Population and Housing Census 2010 the population is now 121, 009 (GSS, 2010).

It is located in the northeastern part of the region. In the north, it shares borders with Talensi Nabdam District, Bawku West and Garu-Tempane districts, all in the area of the Upper East and to the east it shares borders with Bunkpurugu-Yunyoo district. It is bordered to the west by West Mamprusi District, and to the South, Gusheigu District.

1.8.1 HEALTH CARE

The district has one hospital at Nalerigu and four health centres at Gambaga, Langbensi, Sakogu and Gbintiri. The district is divided into five (5) sub-districts and they are Gambaga, Nalerigu, Langbensi, Sakogu and Gbintiri sub-districts. There are seven Community based Health Planning and Services (CHPS).Three are in Langbensi subdistrict located at Wundua, Samini and Namangu. Gambaga sub-district has only one CHPS compound at Gbangu. The rest of the CHPS compounds are in Nagbo, Jawani and Kolinvai in the Nalerigu sub-ditrict. Malaria transmission in the district is all year round but peaks from April to September – during the raining season of the year.

1.8.2 TRANSPORT AND COMMUNICATION

The district is networked by one tarred road and neglected 3rd class roads and paths. The means of transport for the people are mostly by motorcycles and bicycles. Telephones services are provided by Mobile phone services such as Mobile Telecommunication

Network Ltd (MTN), VODAFONE, Airtel and TIGO only. The district relies on Unique FM, TIZAA Radio and Savanna FM for information, education, entertainment and others.

1.8.3 EDUCATION

The district is endowed with a number of educational facilities especially from Preschools to Junior High levels. The district has two (2) Senior High Schools, one in Nalerigu and the other in Gambaga.

The district has One (1) Nurses and Midwifery Training College, one (1) Vocational training institution and one (1) College of Education. Majority of people of school going age in the district are attending school, however those in the remote part of the district, especially deprived villages, many children in those communities do not attend school.

1.8.4 WATER AND SANITATION

Gambaga and Nalerigu are the only towns in the district that enjoy pipe borne water supply services. These towns are supplied from boreholes that have been mechanized. The rest of the communities are served by boreholes, streams, hand dug wells and dams. The district has a good water table that ensures that majority of the villages have boreholes. Waste management is taken care off by the District Assembly in Gambaga, Nalerigu, Sakogu, Langbensi and Gbintri townships but indiscriminate dumping on unauthorized sites and open defecation are practiced in the towns and villages in the district. The drainage system is poorly done especially in the Nalerigu township which results to flooding of streets after every rain fall in the area. There are public toilets constructed in the district and one third of the people in district have private toilets.

1.9 SCOPE OF STUDY

The study gathered primary data from household heads, in the East Mamprusi District about indoor residual spraying as malaria vector control. The data were used to determine the factors that influence the acceptance of IRS in the district. The data were assessed to analyse the perceived efficacy of IRS and other malaria control practice of the people. The coverage level of the IRS in the district was also assessed

1.10 ORGANISATION OF REPORT

This text is organized into six chapters. The first chapter includes background information on malaria, the problem statement, objectives, research question, the rationale of the study, conceptual framework, and the profile of the study area and the organization of the report. The second chapter presents a review of related literature on malaria in general and malaria control measures. The second chapter includes a review of information on suitable reading of different authors on the study variables.

The chapter three describes the methodology adopted in the study, which includes the study design, data collection techniques, study population, sample size and sampling technique. Chapter four presents the results of the study. Chapter five consists of the discussions and chapter six presents the conclusions and recommendations of the study.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 BRIEF OVERVIEW OF MALARIA

Malaria is an infection caused by a protozoan of the genus Plasmodium and transmitted through the bite of infected female anopheles mosquito. Malaria is a parasitic disease

transmitted by mosquitoes and is common in the poorest countries of the world. It is preventable and curable, but still kills some 881,000 people each year, 90% in Africa, and 85% are children under five years (WHO, 2006).

In Africa, the majority of malaria infections are caused by *Plasmodium falciparum*, the most dangerous of the four human malaria parasites. *Plasmodium falciparum* parasites are the most serious and complicated disease than the other species of *Plasmodium vivax, Plasmodium malariae and Plasmodium ovale*. This translates to approximately 90% of all malaria deaths in the world today occur in Africa. Indeed the most dangerous malaria vector (Anopheles gambiae mosquitoes) that is difficult to control is widespread in Africa (WHO, 2002).

Malaria is hyper-endemic in all regions of Ghana and the entire population of 25 million at risk. Transmission occurs throughout the year with an increase in cases of malaria during the rainy season from April to July. It has a marked seasonal variation in the northern regions of Ghana, faced with a prolonged dry season from October to April.

Over the past five years between 3.1 and 3.5 million cases of clinical malaria are reported in public health facilities in Ghana each year, of which over 900,000 cases are of children under-five years (NMCP Annual Report 2006).

Malaria is a disease which remains one of the major killers in the world. It is commonly referred to as the disease of the poor since it has very high prevalence rates in poorer countries compared to the more affluent countries (Worrall *et al.*, 2002).

The World Health Organization (WHO) Roll Back Malaria Partnership currently recommends using four key interventions: nets treated with long-term medication (LLINs), artemisinin combination therapy (ACT), residual indoor spraying (IRS) and intermittent preventive medicine during pregnancy (IPTp) (WHO, 2010).

According to WHO/AFRO (2014) four major interventions have proved very useful for the prevention and control of malaria. They are: the availability and use of drug-treated nets (ITNs); a treatment based on a diagnosis of malaria combination therapy with artemisinin (ACT); people involved in malaria control such as strengthening capacity in vector control for malaria. Some of the ways to prevent malaria shows that many people consider malaria as something that has always existed and will not be changed.

Therefore, when health workers educate them of draining swamps, spraying houses and the use of ITNs, some ignore the advice, so there is a need for multi-enterprises determined by the use of multiple conventional vector control measures. The 31% reduction in the incidence of malaria and 49% drop in the number of malaria deaths in the period 2000-2012 largely due to the increased use ITNs and IRS. This is a very cost-effective for Africa, usually with nets provided free or at a heavy price support (WHO / AFRO, 2014)

According to NMCP, (2009), Ghana's key malaria prevention and control strategies actually focus on the following objectives:

1) Reduce malaria transmission by the use of drug-treated nets (ITNs) bed nets, indoor residual spraying of houses (IRS) and Integrated Vector Management (IVM);

2) Prevent the consequences of malaria during pregnancy through the use of drugtreated nets, intermittent preventive medicine in pregnancy (IPTp), and case management for malaria illness.
3) Prompt management of solid and effective cases of malaria, especially in children.

Four out of ten households with at least one never treated net or net-treated mosquito nets (ITNs). Houses in the Upper West region reported the highest level of ownership of ITNs (71 percent), the lowest level of assets in households in the Greater Accra region (30 percent). Households in the lowest socioeconomic status are more likely to own at least one net than households in other high class. The average number of ITNs per household is 0.6. (GDHS, 2008)

2.2 INDOOR RESIDUAL SPRAYING (IRS) AND EFFICACY

Indoor residual spraying (IRS) is defined as spraying the inside walls of buildings and ceilings in order to reduce mosquito lifespan and population leading to reduction of malaria transmission. When mosquitoes enter homes at night to feed on the occupants, they rest on the walls, roof/ceiling before or after the blood meal. Therefore any contact with sprayed surfaces makes mosquitoes absorb the chemical which then kill them (Chunga and Kuwenda, 2014)

Indoor residual spraying (IRS) is a primary method of struggle against malaria vectors, but its potential impact is limited by several natural constraints: therefore the spraying must be repeated when the insecticide residues decompose.

The World Health Organization reported that 38 of the108 countries where IRS has shown significant success in reducing the burden of malaria during the period 20002008. There

are 108 countries with malaria in the world, 44 uses IRS. Of these 44 countries, 19, fewer than half of them are in Africa. Although about 85% prevalence of malaria in Africa (about 208 million cases), there is a significant part of the global burden in Latin America, South America, and Eastern Mediterranean and the IRS is used in many of these countries (WHO, 2009).

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There is empirical evidence on the effectiveness and efficiency of the IRS to greater coverage areas in reducing many mosquitoes and malaria morbidity and mortality (Mabaso *et al*., 2004). IRS has proven effective in reducing the prevalence of malaria for some time.

Mosquitoes get killed when they rest on walls sprayed with insecticide. Spraying of houses with dichlorodiphenyltrichloroethane (DDT) also either prevents mosquitoes from entering or promotes their rapid exit from the sprayed houses (Roberts and Andre, 1994). So far, studies have shown the IRS to be an effective strategy to preventing malaria morbidity and mortality through a series of parameters (Musawenkosi *et al*., 2004, Sharp *et al*. 2007, Zhou *et al*., 2010)

Up to date studies have shown IRS to be an effective strategy for preventing malaria infection and mortality across a series of settings (Musawenkosi *et al.* 2004, Sharp *et al*. 2007, Zhou *et al*., 2010)

It has been established that most countries which have employed integrated malaria control programmes such as the IRS have experienced an improvement in their economic growth after the intervention was introduced (Mabaso *et al.*, 2004).

Vector control mainly using insecticide treated bed nets (ITNs) and indoor residual spraying (IRS) are more effective in preventing the spread of malaria (RBM, 2005). There are empirical data showing the efficacy of ITNs in reducing malaria infections (Steketee and Campbell, 2010). IRS is another effective vector control tool to obtaining large-scale positive impact on both vector (mosquito) density and malaria morbidity and mortality (Pluess *et al*., 2010)

For the IRS to be effective, at least 80% of the houses and barns in an area needs to be sprayed and when most residents refuse spraying, the efficiency of the entire program will be compromised (WHO, 2010)

WHO further stated that, "susceptibility to insect vector case, the safety of people and the environment, and the effectiveness and efficiency" are the things that must be considered when choosing an insecticide for IRS.

Despite the widespread use of IRS and its contribution to the eradication and control of malaria successfully in recent years, the use of the IRS effectively has reduced due to lack of government commitment and funding to support the long term.

The decline in its use is also due to insecticide resistance and community acceptance (WHO, 2006)

2.3 COMMUNITY PERCEPTION AND ACCEPTABILITY OF IRS

Winning the fight against malaria, control interventions need vast coverage and interest in the individual and community members. One of the challenges of the appropriate use of these interventions is the perception of the IRS that fights against malaria at the community level.

A study to assess adherence to the local community about indoor residual spraying (IRS) for malaria control in the district of Manica, in Mozambique found that the impact of IRS on malaria was frowned upon at Community level as malaria control intervention (Munguambe *et al*., 2011).

The study suggests that the IRS for malaria control and the fight against mosquitoes are not fully accepted by the recipient and that effective intervention against malaria such as ITN's are preferred over IRS. Acceptance of the IRS was considered to be influenced by socio-political factors. The factors most associated with the acceptability of the IRS were the immediate reduction of insects, confidence in the spraying operators, implementation of government policies and persuasion by community leaders.

According to Aikpon *et al*. (2013), a study of representation and social services as far as malaria control is concerned in the Atacora region in Benin shows that most respondents had good feeling of IRS; just a few of them had negative perceptions of the use of IRS. According to Mabaso *et al*. (2004), many residents opposed DDT spraying in particular. This is because of several reasons; including the smell and stains it leaves on the wall. Although this staining is easy to check if the room was sprayed, it makes some villages to resist spraying their homes.

The rest of the villagers opposed DDT spraying because it does not kill cockroaches or bedbugs. On the contrary, these make the insects happy thereby increasing their nuisance (Mabaso *et al*., 2004)

A study conducted in Malawi to determine community satisfaction with IRS for malaria control stated that all the villages where the research was carried out reported low level of

satisfaction with IRS because the community members were not involved and the dilution purpose of the chemicals not explained to community members (Chunga and Kuwenda, 2014).

In Uganda, knowledge about IRS was found to be inadequate and the people had negative perception about IRS use especially among the rural people and less educated individuals. (Ediau *et al*., 2013).

A study on the knowledge and understanding of women in vector control interventions in malaria at Kessa, eastern Ethiopia realized that most of the households surveyed did not spray and also did not use available ITNs. The benefits of the interventions were poorly perceived and therefore the need for behavior change communications, and more efforts should be directed to education on malaria transmission and relevance of these malaria control measures (Tesfaye *et al*., 2013).

2.4 COMMUNITY PARTICIPATION ON IRS PROGRAMMES

Community awareness and support are other variable factors that influence the effectiveness of IRS programme. To ensure that the IRS is accepted by the local population, and contributes to the high level of coverage, then public education and community communication campaign should be implemented. Household heads should be informed about the program, and made aware of the benefits (WHO, 2013).

The community members do not directly interact with the IRS officials; they are able to encounter them directly at forums and meetings which are organized by the chiefs, District Assembly members and opinion leaders. The community members are last in line of the hierarchy. They are the recipients of the aid and mostly have no decisionmaking power

beyond accepting or refusing to spray their homes. Community members only listen to their assembly men, the chiefs and opinion leaders and the staff of the implementers telling them what to do with regards to the IRS programme.

Therefore, to ensure the integration and participation of householders in the exercise of the IRS in order to achieve a successful IRS programme, education is needed for the introduction of the IRS to address knowledge gaps and negative perceptions about IRS (Aikpon *et al*., 2013).

In India, a study showed that malaria control program was jeopardized or was put in serious danger due to lack of proper implementation of vector control measures; lack of appropriate professional and governmental in the whole programme. Strategy for malaria control in the long term must be based on creating more awareness about the disease and the different methods of control to the members of the community (Prasad, 2009).

Community satisfaction with IRS in Mwahimba Village was at least 68%. Factors underlying community satisfaction included: Communication, minimal adverse effect, good spraying time, IRS service in general, convenience, spray operator courtesy and confidentiality while those leading to dissatisfaction included dilution of chemical, poor efficacy, community involvement and quality of service. For leaders, similar results with community were found. Community leaders are more satisfied than the other members of the community. According to a study conducted in Mozambique, community leaders' involvement contributed to the acceptance and good perception towards IRS (Chunga and Kuwenda, 2014).

2.5 KNOWLEDGE, ATTITUDE AND MALARIA CONTROL PRACTICES

A study in southern Iran to assess knowledge, attitudes and practices of people to malaria control showed high level of illiteracy among the respondents. This ignorance factor can affect the success of malaria control programmes. The literacy level has a direct correlation with practices of the people in relation to malaria control. The survey found a significant correlation between the level of education of the respondents and their desire to participate in any malaria control programme. (Hanafi Bojd *et al*., 2011). The knowledge of the respondents on malaria transmission is good. 72.7% know that malaria is transmitted by the bite of infected mosquitoes.

According to Aikpon *et al*. (2013), a study of social representations and practices as far as malaria control is concerned in the region of Atacora in Benin showed that the respondents had little knowledge about the cause of malaria. There was, however, knowledge of preventive measures against mosquitoes. But, despite the diversity of prevention strategies against mosquito bites, bed nets are the most widely used.

According to some studies, a growing trend in illiteracy is a variable factor for malaria morbidity (Masoumi *et al*., 2001).

Despite reductions in many of the vector transmission of malaria caused by high coverage of ITNs, a large number of host-seeking vectors are there due to the nature of the local model to improve the entry of mosquitoes. In addition to ITNs and IRS, people try to be focused on improving the design of the house to prevent the entry of mosquitoes and eliminate malaria transmission (Dickson, 2013). This study was conducted in a high transmission season with reliable evidence on the association between the characteristics of private houses and the prevention of many of the malaria vector.

The transmission risk can be mitigated by allowing the people to develop their housing structures in a way that indoor malaria vector could be eliminated.

According to Atieli *et al*., (2009) Simple modifications of typical rural house design can be an effective and relatively simple method of reducing the population of mosquitoes and reduce the spread of malaria. Public Health scientists indicate the possibility of the design of the home to protect people against malaria, but this kind intervention remained almost ignored by community members.

The results of a study conducted in rural areas in north-western Tanzania have shown high knowledge about malaria transmission, and prevention of diseases. However, lack of education was identified as a major drawback for effective malaria control. Using bed nets is widespread and rigorous practical method use for malaria control. Perhaps, the collaboration between the public and private sector in the fight against malaria are encouraged because they both benefit from the malaria control activities (Mazigo *et al*., 2010).

In Swaziland, a survey has found that most participants showed understanding of malaria transmission and its effects. However, it is necessary to improve the availability of information through public education and professional health routes, such as CHWs. In addition, given the relatively moderate ownership of bed nets there is the need for future studies to evaluate the distribution of drug-treated bed nets compared with IRS. Although the knowledge, attitudes and practices related to malaria in the study area was quite reasonable, it has been shown that as the level of transmission of malaria infections decreases, the perception about malaria control practices also declines (Khumbulani *et al*., 2009).

2.6 IRS COVERAGE LEVEL

Ghana has been implementing IRS in the northern region with PMI funding since 2008. PMI, in collaboration with NMCP and the Ghana Health Service (GHS) selected and started IRS in five(5) districts in 2008 with a commitment to scale up to other districts.

By 2011, IRS had scaled up to 9 districts and the same 9 districts were covered in 2012.

The project was designed to meet the overall goal of reducing the malaria burden and malaria associated mortality, especially among pregnant women and children under 5years of age.

According to the Ghana End of Spray Report, the 2012 spray coverage for round one (1) was 93% and 95% coverage for round 2.

According to WHO (2006), for IRS to be effective at least about 80% of homes in the selected area must be sprayed.

CHAPTER THREE

3.0 METHODOLOGY

3.1 STUDY METHODS AND DESIGN

Across-sectional survey using a structured questionnaire, including demographic characteristics, availability of other alternatives of malaria control interventions to household heads, perceived efficacy about IRS and the application method employed by the spraying operators was administered. Non-interventional and cross-sectional study design that would employ quantitative approach designed to describe the relationships between study variables. In selection of the respondents, a multistage simple random sampling technique was employed. At the first stage, three sub-districts were randomly selected from a sample frame of all sub-districts in the district. At the second stage, two

communities were randomly selected from each sub-district making a total of six communities/villages. At the third stage, where there are more than one household head in a house or a structure, further random sampling was done on the household heads.

3.2 DATA COLLECTION TECHNIQUES AND TOOLS

The research tool used in this study was the questionnaire. Data were collected by the structured questionnaire containing open-ended and closed-ended questions that were employed to interview household heads about the IRS programme. Data from the household heads were collected through interviews using a structured questionnaire.

3.3 STUDY POPULATION

The study population comprised of all household heads (men and women) above 18 years in the East Mamprusi District. In situation where the household heads were not available their proxies were used.

3.4 SAMPLE SIZE AND SAMPLING TECHNIQUE

$$= \frac{n\, z^2.pq}{384.16\, d} = \frac{(1.96)^2(0.5^2)(0.5)}{(0.05)}$$

Using Cochrane formula to estimate the sample size

Where n=estimated sample size z = reliability coefficient (95%) = 1.96 p= 0.5 q= 1-p d = width of variation = 0.05

An estimated sample size of 385 was considered. And with non-response rate of 10%, the final sample size was 424. Six villages or communities were randomly selected; two communities each from the three sub-districts and then seventy (70) household heads from

each village/community who agreed and consented were interviewed using the structured questionnaire.

3.5 PRE-TESTING

To identify flaws in the research questions and to assess the sensitivity and reactions of the respondents about the research tool, a pre-testing was carried out to test for validity, reliability and clarity of the questions. The questionnaire was pre-tested in the West Gonja District and the necessary corrections made on the questionnaire before the actual administration of the research questionnaire.

3.6 ETHICAL CONSIDERATION

All the participants or the subjects were treated in accordance to the ethical guidelines of research ethics of the Kwame Nkrumah University of Science and Technology. Ethical clearance was sought from the committee on Human Research, Publications and Ethics (CHRPE) of the Kwame Nkrumah University of Science and Technology (KNUST).Although there are no risks to the subjects in this study, written informed consent were sought from the District Health Director of East Mamprusi District and the respondents. Every caution was taken to ensure that respondents are safe, comfortable and was free to withdraw from the study if they want to do so.

3.7 LIMITATIONS OF THE STUDY

The main limitation of the study was due to the limited time required to submit the final document to the University. Other limitation is that the study was conducted in the remote part of the region where a good number of the respondents were unlettered and needed

translators which could affect the results. The sample size was 424 but 24 of the respondent did not respond to the questions which could affect the findings of the research.

3.8 STUDY VARIABLES

The dependent variable that the researcher wanted to explore was acceptability of IRS programme.

The independent variables (factors affecting IRS acceptability) were; educational, sociodemographic characteristics, attitude of the spraying team members, sensitization level of the public about IRS, level of community involvement in the whole exercise, and perception of the people about the efficacy of the IRS programme were considered .

TABLE 1: STUDY VARIABLES

Conceptual definition of variable	**Operational definition**	**Scale of measurement**
Age	Age of household head	Continuous
Acceptability of IRS	Spraying operators allowed by household heads to spray	Binary
Perception about IRS	Household heads thinking about the efficacy of IRS	Nominal
Community involvement	Participatory level of the household members in the whole programme	Binary
Sensitization level	Respondents awareness level on the effects of the chemical on humans and other animals	Nominal
Attitude of spraying operators	The relationship between the spraying operators and the household member	Ordinal
Alternative control measures	Availability of other malaria control measures to the people	Binary

3.9 ASSUMPTIONS

The responses provided by respondents' indicated that majority of household heads accepted the indoor residual spraying. Then also, the participants who consented willingly, responded to the data collection tool (questionnaire).

3.10 DATA HANDLING

Responses and information obtained from the survey were entered into computers using Microsoft Office Excel 2007 of Windows. The data collected were checked for completeness and correctness. Collected data were cleaned and verified on regular basis and copies kept by the principal investigator and the District Health Management Team (DHMT) office.

3.11 DATA ANALYSIS

Statistical Package for Social Sciences (SPSS), version 18.0 was employed for the data analysis. The data on the Microsoft Office Excel was exported into SPSS 18.0 software. The data were presented in the form of frequency tables, pie chart, bar graphs and histograms.

Then, simple descriptive statistics such as frequency and percentage of variables were computed and cross-tabs were produced using SPSS software (18.0 version).

CHAPTER FOUR

4.0 RESULTS

4.1 SOCIO-DEMOGRAPHIC CHARACTERISTICS

The socio-demographic characteristics include sex, marital status of the respondents, age group of respondents, religion, occupation as well as the educational level of the respondents were assessed and presented below.

The sex distribution of the respondents as shown in table 2 below indicates that majority of the household heads thus 305 (76.3%) were males. There were a higher proportion of males 258 (64.5%) who agreed for their houses to be sprayed than females 71 (17.8%). The sex distribution of the household heads is significantly associated with IRS acceptability (P=0.028). Males accept IRS more than females.

From the table 2 shown below greater proportion of the respondents' age ranges from 30 – 49 years (53%). Only 36 (9.1%) of the respondents were over 70years. An interesting finding is that all the respondents above 70years allowed for their houses to be sprayed and none of them refused the IRS exercise. There was a statistical significant association between the age group of the respondents and IRS acceptability given a p-value of 0.005. This value of 0.005 indicates that the age of a person has an influence on their acceptability of IRS.

With regards to the marital status of the respondents, majority of the respondents 323 (80.8%) were married. A greater number of the married household heads 280 (70%) accepted the spraying than the unmarried people. Only 8 (2%) represented others (widows and widowers).

The religious background of the respondents shows that 226 respondents representing 56.5% were Muslims and 125 (31.3%) were Christians. 24(6%) of the Christians refused the IRS meanwhile out of the 226 Moslems, only 17 (4.3%) rejected the IRS, 4 (1.0%) of the respondents represented others (pagans and a secret society).

The table further indicates that greater number of the respondents 186 (46.5%) were farmers. Out of the 186 farmers almost all of them, 180 agreed for their house structures to be sprayed. The people who rejected the IRS mostly were in the employed group, where almost half of the people in that occupation refused for their houses to be sprayed.

The educational level of the research participants as indicated in this table below, more than half of the respondents which is 211 (52.8) had no formal education and out of this number, 199 representing almost 50% accepted the spraying, followed by 78 (19.5%) of the respondents who had only primary education, those who had their education up to the tertiary level were 64 (16%), and out of this number half of them, 32 (8%) rejected the spraying. There was a significant association between educational level of the respondents and the acceptability of IRS (P= 0.001)

TABLE 2: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS

		pted by the :ople		**Chisquare**
	Yes		**Total**	

			No			
Variable	**Parameter**	**N(%)**	**N(%)**	**N(%)**	**(X^2)**	**P-Value**
Sex	Male	258 (64.5)	47 (11.8)	305 (76.3)		
	Female	71 (17.8)	24 (6.0)	95 (23.8)	4.817	0.028
Age group	20 – 29	58 (4.8)	19 (4.8)	77 (19.3)		
	30 – 39	79 (19.8)	25 (6.3)	104 (26.3)		
	40 – 49	96 (24.0)	11 (2.8)	107 (26.8)	18.424	0.005
	50 – 59	39 (9.8)	12 (3.0)	51 (12.8)		
	60 – 69	21 (5.3)	4 (1.0)	25 (6.3)		
	70 – 79	31 (7.8)	0 (0.0)	31 (7.8)		
	80 – 89	5 (1.3)	0 (0.0)	5 (1.3)		
Marital status	Married	280 (70.0)	43 (10.8)	323 (81.0)		
	Single	34 (8.5)	21(5.3)	55 (13.8)		
	Divorced	9 (2.3)	5 (1.3)	14 (3.5)	23.466	0.000
	Others	6 (2.0)	2 (0.5)	8 (2.0)		
Religion	Christian	101 (25.3)	24 (6.0)	125 (31.3)		
	Moslem	209 (52.3)	17 (4.3)	226 (56.5)	11.322	0.001
	Traditionalist	44 (11.0)	5 (1.3)	49 (12.3)		
Occupation	Farmer	180 (45.0)	6 (1.5)	186 (46.5)		
	Trader	56 (14.0)	7 (1.8)	63 (15.8)		
	Employed	49 (12.3)	41 (10.3)	90 (22.5)	87.774	0.0001
	Unemployed	27 (6.8)	6 (1.5)	33 (8.3)		
	Retired	13 (3.3)	6 (1.5)	19 (4.8)		
	others	4 (1.0)	5 (1.3)	9 (2.3)		
Educational level	primary	62 (15.5)	16 (4.0)	78 (19.5)		
	secondary	36 (9.0)	11(2.8)	47 (11.8)		
	tertiary	32 (8.0)	32 (8.0)	64 (16.0)	68.15	0.0012
	none	199 (49.8)	12 (3.0)	211 (52.8)		

Source: Field survey, 2015.

4.2 OTHER MALARIA CONTROL PRACTICES OF THE COMMUNITY MEMBERS

The malaria control practices of the people in the district was assessed and which showed that 177 (44%) uses IRS, 169 (42%) of the respondents uses mosquito sprays as a malaria preventive measure. The other malaria control practices of the respondents were mosquito repellents, local herb repellents and only 8 (2%) of the respondents employ the use of malaria chemoprophylaxis to prevent the transmission of malaria in their household. This shows that there is a positive relationship between the use of other malaria control practices of the people and the acceptability of IRS in the district ($P<0.001$)

4.3 RESPONDENTS PREFERRED MALARIA CONTROL MEASURES

As shown in table 3 below, majority of the respondents 258 (64.5%) preferred IRS as a malaria control method. Only 2 (0.5%) of the respondents indicated that they prefer malaria chemoprophylaxis to all the other malaria preventive measures.

TABLE 3: DISTRIBUTION OF MALARIA CONTROL PREFERENCE OF THE PEOPLE IN THE DISTRICT

Respondents preference	Frequency	Percent
IRS	258	64.5
ITNs	29	7.3
local herb repellents	19	4.8
malaria chemoprophylaxis	2	0.5
mosquito repellents	10	2.5
mosquito sprays	82	20.5
Total	400	100.0

Source: Field survey, 2015

4.4 INDOOR RESIDUAL SPRAYING COVERAGE IN THE DISTRICT.

The coverage level of the IRS programme in the district was good because a greater percentage (82.3%) of the respondents agreed and allowed for their house structures to be sprayed whiles 17.8% of the respondents rejected the programme due to various reasons.

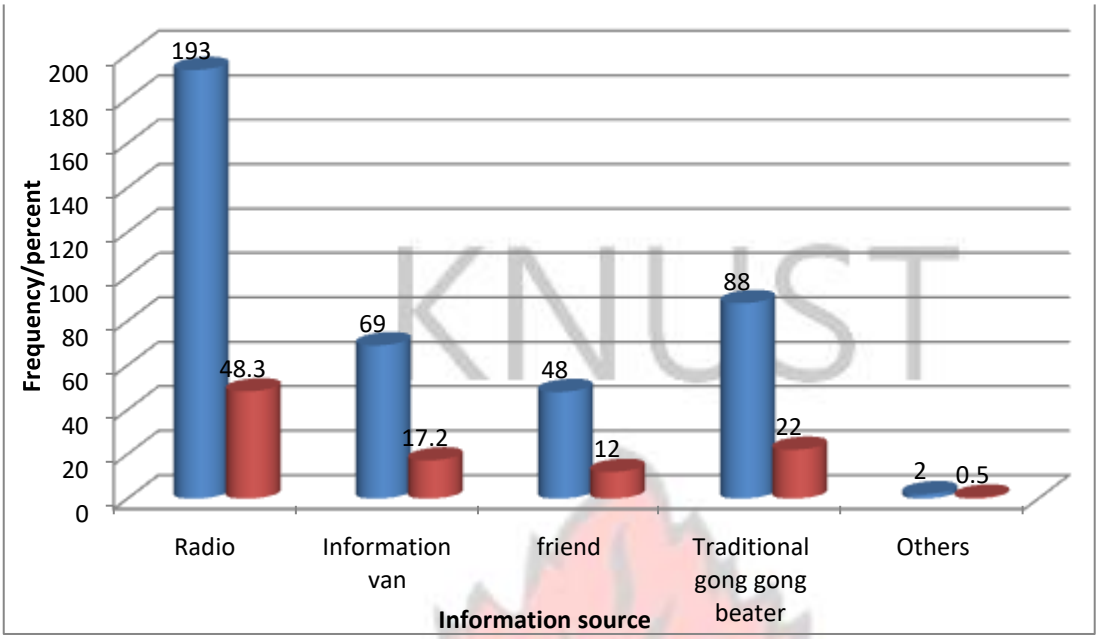
Concerns of the people regarding the programme was assessed and 56% of the respondents did not have any concern about the indoor residual spraying employed in the district as a malaria control programme and 44% of the respondents stated they had some concerns regarding the whole exercise and some of these concerns includes the bad smell of the chemical, staining of walls, timing of the exercise, and non-efficacy of the drug affected the acceptability of the IRS.

4.5 ASSESSMENT OF THE IRS IMPLEMENTATION PROCESS (SERIES OF ACTIONS) TAKEN BY OFFICIALS/OPERATORS FROM THE RESPONDENTS

The source at which respondents got to know about the programme was assessed. From the field survey as shown in figure 2 below, out of the 400 respondents 193 (48.3%) of respondents source of information was through the radio. Similarly, the role of the traditional gong gong beaters cannot be underestimated because 88 (22%) of the respondents heard it from the traditional gong gong beaters. The study found a statistically significant association between the source of information about the programme and the acceptability of IRS (P=0.001).

FIGURE 2: RESPONDENTS SOURCE OF INFORMATION ABOUT THE

INDOOR RESIDUAL SPRAYING



Source: Field Survey, 2015

4.6 THE IMPACT OF OPERATORS EDUCATION ON IRS ACCEPTABILITY

The table 4 shown below indicates that 286 (71.5%) were educated about the effects of the chemical. Out of the 286 respondents who were educated about the effects, 271 (68%) accepted the IRS and only 15 (4%) rejected the IRS. The significance value (P=0.0001) shows that the two variables that is education about the effects of the chemicals and IRS acceptability are unlikely to be independent.

Respondents knowledge about their responsibilities before, during and after the spraying was further asked and from table 4, only 289 (72%) of the respondents were educated by the spraying operators and 111 (28%) of the respondents were not educated at all. From the 289 respondents who were sensitized, 276 (69%) accepted the IRS exercise and only 13 (3%) did not spray their house structures. The respondents who were not educated (111, 28%) about the dos and don'ts of the IRS, more than half, 58 (52%) refused for their houses

to be sprayed. The results is statistically significant (P<0.0001) and hence there is an association between education and respondents acceptance.

TABLE 4: EDUCATION/SENSITIZATION LEVEL OF THE PROGRAMME AND ITS EFFECTS ON THE COMMUNITY ACCEPTABILITY

		Was IRS accepted by the people				
		No	**Yes**	**Total**	**Chi-square (X^2)**	**P-Value**
Variable	**Response**	**N (%)**	**N (%)**	**N (%)**		
Effects made known	Yes	271 (67.8)	15 (3.7)	71 (17.7)	107.491	0.0001
	No	58 (14.5)	286 (71.5)	114 (28.5)		
	Total	329 (82.3)	56 (14.0)	400 (100)		
Sensitize about dos and don'ts	Yes	276 (69.0)	13 (3.3)	289 (72.3)	125.27	0.0000
	No	53 (13.3)	58 (14.5)	111 (27.8)		
	Total	329 (82.3)	71 (17.7)	400 (100)		

Source: field data, 2015.

4.7 ATTITUDE OF OPERATORS TOWARDS THE HOUSEHOLD HEADS

The attitude of the operators towards the household heads showed that (311, 77.75%) of the respondents said the operators had a very good attitude towards the household heads, 74 (18.5%) of the respondents said the operators relationship was somehow good and 15 (3.75%) of the respondents indicated that the relationship of the operators towards them was not good. The computed chi-square=171.776, P=0.00001 is considered statistically significant and so there is positive association between the attitude of the operators and then IRS acceptability.

4.8 COMMUNITY MEMBERS INVOLVEMENT ON IRS IMPLEMENTATION

Respondents' involvement in the recruitment of spraying operators was assessed as well. Most of the community members were not involved in the recruitment process. From the table shown below, almost all the respondents 363 (91%) said they did not take part or got involved in the recruitment of the spraying operators. Inadequate involvement of household heads regarding recruitment of spraying operators was significantly associated with IRS acceptability (P=0.045).

Then also, the sensitization aspects of the program as shown in table 5 below indicates that more than half of the respondents – 211 (53%) were not involved during the sensitization. Despite the non-involvement in the sensitization about 167 of the respondents still accepted the IRS. Involvement of community members in the sensitization did not show any significant association with IRS acceptability (P=0.086).

Here again, over 94% of those who took part in the mixing of the chemical allowed the operators to spray their houses and only 6% of the respondents rejected the exercise. Meanwhile, those who did not take part in the preparation of the chemical found 63 (24.6%) of the respondents rejecting the spraying. The result is statistically significant (chi-square=22.918 and P<0.0001).

TABLE 5: THE EFFECTS OF COMMUNITY MEMBERS' INVOLVEMENT ON IRS ACCEPTANCE

		Was IRS accepted by respondents				
Variable	**Parameter**	**No (%)**	**Yes n n(%)**	**Total n(%)**	**Chi-square (X^2)**	**P-Value**
Involved in recruitment	**No**	60 (15)	303 (75.8)	363 (90.8)	4.008	0.045
	Yes	11 (2.8)	26 (6.5)	37 (9.3)		

Involved in sensitization	**No**	44 (11)	167 (41.8)	211 (52.8)	2.945	0.086
	Yes	27 (6.8)	162 (40.5)	189 (47.3)		
Involved in mixing drug	**No**	63 (15.8)	193 (48.3)	256 (64.0)	22.918	0.000
	Yes	8 (2.0)	136 (34.0)	144 (36.0)		

Source: field survey, 2015.

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4.9 OPERATORS INTERFERENCE WITH COMMUNITY MEMBERS' PRIVACY

The operators' interference with community members' privacy was examined. The results shows that 100 (25%) of the respondents said their privacy was invaded. Similarly, majority of the respondents, 300 (75%) said that the operators did not interfere with their privacy during the spraying exercise. The Chi-square is 8.682 and the corresponding P-value=0.003. The above statistical inferences indicate that there is an evidence to support that interference with privacy affect the acceptability of IRS.

4.10 CHEMICAL STAINS AND ITS INFLUENCE ON RESPONDENTS ACCEPTANCE TO SPRAY

312 (78%) agree that the chemical leaves some stains on their walls and ceilings. Out of this 312 respondents, 283 (70.8) rejected the IRS outright. The computed chi-square is 69.445 and the significance level (P<0.0001). The staining of the walls accounted for a significant association with household heads acceptability of the IRS.

218 (54.5%) of the participants said the reasons for the stains were not made known to them and out of this number 155 representing 38.8% refused the IRS exercise.

TABLE 6: NATURE OF THE IRS STAINS AND ITS INFLUENCE ON

RESPONDENTS' ACCEPTABILITY

		IRS accepted by respondents				
		Yes	No	Total	Chi-square	
Variable	**Response**	**N(%)**	**N(%)**	**N(%)**	**(X2)**	**P-Value**
Chemical discolour walls						
	No	42 (10.5)	46 (11.5)	88 (22.0)		
	Yes	29 (7.3)	283 (70.8)	312 (78.0)	69.445	0.0000
Reason of stains made known						
	No	63 (15.8)	155 (38.8)	218 (54.5)		
	Yes	8 (2.0)	174 (43.5)	182 (45.5)	40.793	0.0001

Source: field data, 2015.

4.11 COMMUNITY MEMBERS PERCEIVED EFFICACY OF THE IRS PROGRAMME

The perception of the people about the efficacy of the drug was assessed and from the table shown below, over 80% representing 323 of the respondents accepted the fact that the chemical kills all insects including mosquitoes. 77 (19.3%) of the respondents had negative perception about the efficacy of the drug and hence 55 (13.8) respondents in this category rejected the spraying.

Again from the field data gathered and presented in the table below indicates that 32 (81.5%) testified that the IRS has been able to reduce the number of mosquito bites The perception of the people regarding the residual effects of the chemical and its ability in reducing malaria infections in the communities was evaluated. From table 9 shown below, 327 (81.8%) of the participants thinks that the IRS programme has been able to reduce the number of malaria cases in their families and because of that 320 (80%) out of the 327 agreed for their house structures to be sprayed. The below statistical inferences indicate

that there is evidence to support that the perception of the people about the efficacy of the spraying (chemical) is indeed related to the acceptability of indoor residual spraying in the district (P<0.0001).

TABLE 7: RESPONDENTS NOTION ABOUT THE EFFICACY OF THE CHEMICAL

IRS accepted by respondents				Response	No	Yes
Does chemical kill insects	**No**	(13.8)	(5.5)	(19.3)		0.0001
	Yes	(4.0)	(76.8)	(80.8)		
Spraying reduce mosquito bites	**No**	(15.3)	(3.3)	(18.5)	260.303	0.0012
	Yes	(2.5)	(79)	(81.5)		
Spraying reduce malaria cases in the household	**No**	(16.0)	(2.3)	(18.3)	299.033	0.0000
	Yes	(1.8)	(80.0)	(81.8)		
Total	**Chi-square (X2)**	188.198				
	PVariable					
		N (%)	**N (%)**	**N (%)**		**value**

Source: field survey, 2015.

4.12 RESPONDENTS FUTURE ACCEPTORS RATE OF IRS

The table presented below indicates that 354(88.5%) of the respondents have agreed that they will willingly allow for their house structures to be sprayed in the future.

TABLE 8: HOUSEHOLD MEMBERS' READINESS TO ACCEPT THE NEXT

ROUND OF IRS EXERCISE

Response	Frequency	Percentage (%)
No	46	11.5
Yes	354	88.5
Total	400	100

Source: field survey, 2015.

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CHAPTER FIVE

5.0 DISCUSSION

This chapter discusses findings from the data analysis supported by related studies in the literature review. The purpose of the study was to find out the factors that influence the acceptability of IRS as malaria control in the East Mamprusi District. Therefore this section is arranged based on the objectives of the study.

5.1 DEMOGRAPHIC AND BACKGROUND CHARACTERISTICS OF THE RESPONDENTS

The socio-demographic characteristics considered in this study included sex, age, marital status, religion, occupation and the educational level obtained by the respondents. In this study, majority of the respondents were males (76%). This is due to the fact that household heads were the participants and in African culture mostly the males are the heads and decision makers in the family. It is perceived that women care a lot about their health and one would have thought that all the female heads will accept the spraying exercise. However, a higher proportion of males (65%) accepted the IRS and their houses were sprayed than the females where only 18% agreed for their houses to be sprayed.

In terms of the age distribution, greater proportion of the respondents age ranges from 30 – 49 (53%) and only 9% of the household heads were over 70 years of age. The young household heads turn to reject the IRS than the older ones. Perhaps, due to the odour and the stains the chemicals leave on the walls after spraying. In fact the study found that all the respondents above 70 years actually allowed for their houses to be sprayed and none of them refused the IRS probably due to the vulnerability of the aged in the society. The study found a statistical significance, indicating a relationship between the age and acceptability of IRS (P=0.0005).

Over 51% of the respondents had no formal education but a greater number of them accepted IRS with only 3% refusing the spraying. The study found that those who had formal education turn to reject the IRS than the unlettered. This is because those who had their education up to the tertiary level were 64 (16%), and out of this number 32 (8%) accepted the spraying and the remaining 32 (8%) rejected the spraying. Educational level obtained is indeed dependent on the IRS acceptability in the district (P=0.0012). This study is consistent with the study conducted by Hanafi-bojd *et al.*, (2011) which found a significant correlation between educational level of the respondents and their interest in participating in malaria control programmes.

The religious background of the respondents was also assessed. This is because the religious background can determine the choice or decision to accept malaria control measures like IRS. The study showed more than half of respondents representing 56.5% were Muslims, 125 (31.3%) were Christians.24 (6%) of the Christians refused the IRS meanwhile out of the 226 Moslems, only 17 (4.3%) rejected the IRS. 49 (12.3%) of the respondents were traditionalists and out of this number only 5 (1.3%) refused the spraying

but the rest accepted the IRS exercise. The study was conducted in an area where the Muslims are dominating which could have accounted for these results.

The study further revealed that a greater number of the respondents 186 (46.5%) were farmers. This is because the study was conducted in a rural area where the main economic activity of the people is farming. There were other occupations like carpentry, masons and shoe makers, which made up of 9 (2.3%) respondents and out of this number 5 rejected the IRS probably due to lack of knowledge about the benefits of the exercise.

5.2 MALARIA CONTROL PRACTICES OF THE PEOPLE IN THE EAST MAMPRUSI DISTRICT

The use of IRS could be influenced by the practice of other malaria control measures of the people in the district. From the study, 207 of the respondents representing 52% indicated that they use ITNs in their homes and 193 (48%) of the participants do not use ITNs as additional malaria control measure. There was no significant difference between the respondents use of ITNs and the acceptability of IRS (P = 0.473).

Quite apart from ITNS, the respondents use other malaria control interventions; 42% uses mosquito spray, 5% of the respondents' uses mosquito repellents and 2% uses malaria chemoprophylaxis to prevent malaria in their entire household. The use of local herb repellent cannot be underestimated because 7% engages in the use of local herb repellent in their homes to help prevent mosquito bites and hence control malaria transmission. Due to the cost involved in getting some of these control measures and the fact that majority of these people are peasant farmers they resort to the use of local herb repellents. The computed chi-square was 47.302 with a corresponding P<0.0001, indicating that the use of other malaria control practices of the people affects the acceptability of IRS in the district. This study is consistent with Munguambe *et al*., (2011) in Mozambique which

revealed that IRS is not entirely accepted by the beneficiaries due to other low cost malaria control interventions. However, in this study the respondents most preferred malaria control method was IRS - 64.5% of the respondents opted for IRS over the other control interventions probably due to the cost effectiveness of it. This study is however in contrast with Munguambe *et al*., (2011) where ITNs were preferred over IRS.

5.3 INDOOR RESIDUAL SPRAYING (IRS) IMPLEMENTATION PROCESS ADOPTED BY THE SPRAYING OFFICIALS

To ensure that IRS is accepted by the local population, and also contributes to achieving high level of coverage, community education and communication campaigns must be implemented properly in terms of information dissemination to the community members. This is because for the implementation of IRS to be successful household heads needs to be informed about the exercise. The study revealed that, 193 (48.3%) of respondents source of information was through the radio, 69 (17.3%) got to know about IRS through announcement by the information van. The spraying officials did well to reach the people by using various ways to disseminate the IRS information. Similarly, the role of the traditional gong gong beaters cannot be underestimated because 88 (22%) heard it from the traditional gong gong beaters and only 2 (0.5%) heard it through other source like the CWCs.

The computed Ch-Square =30.329 and P<0.001. The study found a statistically significant association between community awareness about the programme and the acceptability of IRS. This is consistent with a study conducted by the WHO, (2013), which revealed that Community awareness and support are among other critical factors like the source of information that influence the effectiveness of IRS programmes and that household should be well-informed about the programme and made aware of its

benefits.

As part of the series of action to be taken before the actual implementation, the household heads needed to be sensitized about the effects of the chemical on human health as well as the effects of the chemical on domestic animals. The study further revealed that 286 (71.5%) were educated about the effects of the chemical. Out of the 286 respondents who were educated about the effects, 271 (68%) accepted the IRS and only 15 (4%) rejected the IRS. The significance value (P=0.0001) shows that the two variables that is education about chemical effects and acceptability are unlikely to be independent. Perhaps, operators' education about the effects of the chemical is indeed related to the community members' acceptability of IRS. This findings is consistent with a study conducted in Benin by Aikpon *et al*, (2013) which stated that householders' cooperation and participation in the IRS exercise is essential to achieve a successful IRS programme, sensitization is needed, prior to introduction of IRS to address the identified knowledge gaps and poor perceptions about it.

Furthermore, respondents knowledge about their responsibilities before, during and after the spraying was somehow good, 289 (72%) of the respondents were educated by the spraying operators. The things that householders need to do and what not to do before, during and after the spraying should be made known to them. From the 289 respondents who were sensitized, 276 (69%) accepted the IRS exercise and only 13 (3%) did not spray their house structures. The respondents who were not educated (111, 28%) about the dos and don'ts of the IRS, more than half, 58 (52%) refused for their houses to be sprayed. The result is statistically significant (P<0.001) and hence there is an association between education and respondents acceptance. This survey supports a study conducted in rural

communities in northwestern Tanzania which showed that low education about IRS was detected to be a major drawback for effective malaria control, and intervention measures (Mazigo *et al.*, 2010).

The attitude of the operators towards the household heads showed that (311, 77.75%) of the respondents said the operators had a very good relationship towards the household heads, 74 (18.5%) of the respondents said the operators relationship was somehow good and 15 (3.75%) of the respondents indicated that the relationship of the operators towards them was not good. Bad attitude of the operators obviously affected the exercise which accounted for almost all those respondents who encountered unfriendly spraying operators refusing to spray. The computed chi-square=171.776, P<0.001 is considered statistically significant and so there is positive association between the attitude of the operators and then IRS acceptability. This study is consistent with what was found in Mozambique where the spray operators courtesy affect adherence to IRS (Chunga and Kuwenda, 2014).

Community members' involvement is important for any community entry and for any successful implementation of a project. Most of the community members were not involved in the IRS implementation process. The study revealed that, almost all the respondents 363 (91%) did not take part or got involved in the recruitment of the spraying operators. Only 37of the respondents representing 9% were involved when the recruitments of the spraying operators were being done in the district. Inadequate involvement of household heads regarding recruitment of spraying operators was significantly associated with IRS acceptability (P=0.045).

Then also, the sensitization aspects of the program indicates that more than half of the respondents – 211 (53%) were not involved during the sensitization. Involvement of community members in the sensitization did not show any significant association with IRS acceptability (P=0.086). However, according to a study conducted in Mozambique, community leaders' involvement contributed to the acceptance and good perception towards IRS (Chunga and Kuwenda, 2014).

The spraying operators were expected to involve the community members in the mixing of the chemical before the actual spraying and therefore this was also assessed. The survey revealed that, 256 (64%) of the respondents were not involved during the mixing of the chemical and only 144 (36%) of the respondents indicated that they took part in the mixing of the chemical. Over 94% of those who took part in the mixing allowed the operators to spray their houses and only 8 respondents rejected the exercise. Meanwhile, those who did not take part in the preparation of the chemical found 63 of the respondents rejecting the spraying. The result is statistically significant (P=0.0001). This study is consistent with a study that was conducted in India which revealed that the malaria control programme was jeopardized badly due to improper implementation of vector control measures, lack of adequate professional support and various commitments on the part of the State Government and community members. (Prasad, 2009).

The interference of the people's privacy cannot be underestimated if the community members' belongings need to be brought outside or put in the middle of the room before the actual spraying begins. The operators' invasion of community members' privacy was examined and there was a significant number of the respondents 100 (25%) who said their privacy was invaded (P=0.003). The statistical inferences indicate that there is an evidence to support that interference with privacy affect the acceptability of IRS. This study

confirms what Chunga and Kuwenda, (2014) found in their study conducted in Mozambique, which revealed that convenience, spray operator courtesy and confidentiality were among several factors that affect community satisfaction and adherence to IRS.

Then again, due to residual effects of the chemical, it leaves some stains on walls and ceilings of structures sprayed which may affect community members' decision to accept the IRS. From the study, 312 (78%) agrees that the chemical leaves some stains on their walls and ceilings after the spraying. The staining of the walls accounted for a significant association with household heads acceptability of the IRS ($P<0.0001$). According to Mabaso *et al.*, (2004) many residents resisted spraying of DDT in particular due to a multiplicity of reasons; including its smell and the stains it leaves on the walls. Meanwhile the stain makes it easier to check whether the room has been sprayed, it causes some members of the community to resist the spraying of their homes.

5.4 COMMUNITY MEMBERS PERCEIVED EFFICACY OF THE IRS PROGRAMME

The thinking of the people about the efficacy of the IRS for malaria control in the district was positively perceived as over 80% representing 323 of the respondents accepted the fact that the chemical kills all insects including mosquitoes. Only 77 (19%) of the participants had a negative perception about the efficacy of the drug and that they did not see the effect of the chemical on the mosquitoes and hence the chemical does not kill the insects including mosquitoes. This is in contradiction with a study conducted in Uganda, where majority of the people had negative perception about IRS use especially among the rural people and less educated individuals (Ediau *et al*., 2013). There are other studies that

have shown that IRS is actually efficacious and effective strategy for preventing malaria infection and mortality across a series of settings (Musawenkosi *et al.* 2004, Sharp *et al*. 2007, Zhou *et al*., 2010).

Apart from the efficacy of the chemical, the study showed that 326 (81.5%) of the respondents said that the IRS has been able to reduce mosquito population and the number of mosquito bites in their respective communities. IRS is a highly effective vector control tool for obtaining rapid, large-scale impacts on both vector populations and malaria morbidity and mortality *(*Pluess *et al*., 2010).

Then also, the perception of the people regarding the residual effects of the chemical and its ability in reducing malaria infections in the communities, 327 (81.8%) of the participants think that the IRS programme has been able to reduce the number of malaria cases in their families whiles the remaining 73 (18.3%) of the participants believes the chemical is not efficacious and hence not being able to reduce malaria cases in the catchment area (P=0.0012).

The above statistical inferences indicate that there is evidence to support that the perception of the people about the efficacy of the spraying (chemical) is indeed related to the acceptability of indoor residual spraying in the district

5.5 THE IRS COVERAGE IN THE DISTRICT

The coverage level of the IRS programme in the district was good and effective because a higher proportion (82.3%) of the respondents agreed and allowed for their house structures to be sprayed whiles 17.8% of the respondents rejected the programme due to various reasons like the bad smell of the chemicals, staining of walls, timing of the exercise, non-

efficacy of the drug, increase in mosquito nuisance and to mention just a few. This study is consistent with WHO (2006), for IRS to be effective, at least 80% of homes and barns in the area must be sprayed. However, the coverage of 82.3% was not up to the Ghana End of Spray Report, because the 2012 spray coverage for round one (1) was 93% and 95% coverage for round two (2).

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Even though the coverage was high in the district, the respondents encountered some issues about the IRS. 56% of the respondents did not have any concern about the indoor residual spraying employed in the district as a malaria control programme and 44% of the respondents stated they had some concerns regarding the whole exercise. Some of the concerns included bad odour of the chemicals, timing of the exercise, staining of walls, issues about packing of belongings outside the room and increase in the number of mosquitoes despite the spraying. With regards to respondents future acceptability of the exercise 354 (88.5%) of the respondents have agreed that they will willingly allow for their house structures to be sprayed in the future. This is a little higher than the IRS coverage rate of 82.3% in the district because some of the household members were not around during the spraying due to the timing (mostly during the raining season) of the programme where majority of the rural folks are farmers. These people think the IRS is good and very effective in reducing malaria cases. Only 46 (11.5%) of the respondents have indicated that they will not allow for the spraying in the future because the chemical discolour their walls, has bad odour, mosquito nuisance has increased and again not effective against malaria.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATION

6.1 CONCLUSION

At the end of the study, it was interesting to note that majority of the householders accepted IRS and hence the following conclusions were made.

The availability and the use of other malaria control methods of the people affect the acceptability of IRS in the district. There was a relationship between the use of other malaria control measures and IRS acceptability (P=0.0001). Improper implementation of IRS by the operators such as poor dissemination of information, lack of sensitization about the benefits of IRS, negative perception about its efficacy and the operators' attitude towards the household members were associated with IRS non-acceptability.

Other factors were the invasion of the people's privacy, bad odour of the chemical and the stains it leaves on the walls were associated with the refusal of IRS. The strongest factors associated with acceptability of IRS were the instant killing of all insects, reduction of mosquito bites and the reduction in the number of hospital visits.

Despite these numerous factors influencing the IRS acceptability, the IRS coverage in the district was good because a greater percentage (82.3%) of the household structures was sprayed.

6.2 RECOMMENDATIONS

Based on the findings from this study, the following recommendations are made for the stakeholders in malaria control:

1. The Ministry of Health should liaise with the manufacturers of the IRS chemical to enable them alter the odour and the staining nature of it if possible to make it acceptable to the householders.
2. The NMCP officials involved in the recruitment of spraying operators should educate the sprayers to be courteous to community members, ensure that they recruit sprayers from the district and the calibre of people they recruit will relate well with the community members.
3. The District Health Directorate should ensure that community members are involved during the planning and implementation stages of IRS to ensure household heads cooperation and acceptability of the IRS programme.
4. The District Health Directorate must ensure the intensification of health education in the district to help demystify the negative perception about the IRS exercise either in their consulting rooms, during health education of mothers and fathers in CWCs or during their outreach programmes.
5. The chiefs, opinion leaders and assembly men and women in the district should ensure adequate community sensitization prior to application of IRS for effective malaria control.
6. Finally, given the perception level about the efficacy of IRS there is a need for future studies to evaluate the impact of IRS in the East Mamprusi District.

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APPENDIX

APPENDIX A: DATA COLLECTION TOOL (QUESTIONNAIRE)

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF PUBLIC HEALTH

DEPARTMENT OF HEALTH EDUCATION AND PROMOTION

QUESTIONNAIRE

Dear Respondent**,**

I am a postgraduate student of Kwame Nkrumah University of Science and Technology, School of Public Health conducting a study on the topic: **"Factors Affecting Acceptability of Indoor Residual Spraying (IRS) for Malaria Control in the East Mamprusi District of the Northern Region of Ghana".**

I shall be grateful if you could take few minutes to answer the following questions. The sole purpose of the research is for an academic exercise and your responses and all information provided will be kept confidential.

Contact: timothybaloni@yahoo.com (0208977341)

INSTRUCTIONS

Please indicate or tick [√] where appropriate in the space provided and give answers where required.

SECTION A: SOCIO-DEMOGRAPHIC CHARACTERISTICS

1. Sex: A. Male [ ] B. Female [ ]
2. Age: ……
3. Marital status: a. Married [ ] b. Single [ ] c. Divorce [ ] Others (specify)……
4. Religion: a. Christian [ ] b. Moslem [ ] c. Traditionalist [ ] Others (specify)……...
5. Occupation: a. Farmer [ ] b. Trader [ ] c. Employed [ ] d. Unemployed [ ]

   e. Retired [ ] Others (specify)……
6. Educational level: a. Primary [ ] b. Secondary [ ] c. Tertiary [ ] d. None [ ]

   Others (specify)……

SECTION B: MALARIA CONTROL PRACTICES OF THE PEOPLE

7. How many people are in your household? ……..

8. Do you use insecticide treated bed nets (ITNs) in your house?

   a. Yes [ ] b. No [ ]

9. If Yes to question 8, how many ITNs do you have in your house? ……

10. Apart from ITNs, what else do you do to prevent malaria?

    (**Choose as many as possible**)

    a. mosquito sprays

    b. mosquito repellents

    c. malaria chemoprophylaxis

    d. Indoor residual spraying (IRS)

    e. local herb repellents

    Others (specify)…….

11. Which of the above control measures do you prefer? …….

SECTION C: THE COVERAGE LEVEL OF IRS IN THE DISTRICT

12. Have you heard of the IRS Program? a. Yes [ ] b. No [ ]

13. If Yes or No to the above, did the spraying operators spray your house structures during the last IRS exercise? a. Yes [ ] b. No [ ]

14. If Yes to question 13, why did you have to spray your house?

    .....

    .....

    .....

15. If No to question 13, why did they (spraying operators) not spray your house?

    ……

……..……

……...

16. Will you agree for the spraying of your house during the next round of the exercise?

a. Yes [ ] b. No [ ]

17. Do you have any concern(s) about the IRS program? a. Yes [ ] b. No [ ] 18. If Yes, please can you write down your concern(s)

……

……

…….

SECTION D: TO ASSESS IRS IMPLEMENTATION PROCESS (SERIES OF ACTIONS) ADOPTED BY SPRAYING OFFICIALS AND OPERATORS

19. How did you get the information about the IRS?

a. through the radio

b. through information van

c. through a friend

d. through the traditional gong gong beater

Others (specify)……

20. Do the operators tell you about the effects of the chemicals on human health and domestic animals? a. Yes [ ] b. No [ ]

21. If Yes, what are some of the effects of the chemicals on human health and domestic animals?

……

……

……..

22. Do the officials sensitize you about the do's and don'ts before and after the spraying?

    a. Yes [ ] b. No [ ]

23. If Yes, please write down the do's and don'ts before and after the spraying

……

……

……

24. What will you say was the relationship between the spraying operators and the household members?

    a. Very good

    b. Somehow good

    c. Not good

25. Were you involved in the whole program as in?

    a. the recruitment of spraying operators [ ]

    b. the sensitization of the community members [ ]

    c. preparation and mixing of the chemicals [ ]

26. Was the mixing process of the chemicals well explained to you? a. Yes [ ] b. No [ ]

27. Does the operators unduly interfere with your privacy?

    a. Yes [ ] b. No [ ]

28. Does the chemicals stain/discolour your walls and ceilings? a. Yes [ ] b. No [ ]

29. If yes, were the reasons of the staining made known to you? a. Yes [ ] b. No [ ]

SECTION E: COMMUNITY MEMBERS PERCEPTION ABOUT IRS EFFICACY

30. Does the chemicals kill all kind of insects including mosquitoes?

a. Yes [ ] b. No [ ]

31. If yes, has it reduced the number of mosquito bites? a. Yes [ ] b. No [ ]

32. If No to question 30, why does it not kill the insects?

……

……

……

33. Will you say that the IRS has reduced the episodes of malaria cases in your family?

a. Yes [ ] b. No [ ]

34. If Yes to question 33, why and if No why?

……

……

……

35. Will you allow for your house to be sprayed next time? a. Yes [ ] b. No [ ]

36. Why will you allow or not allow for your house to be sprayed?

……

……

……

THANK YOU.

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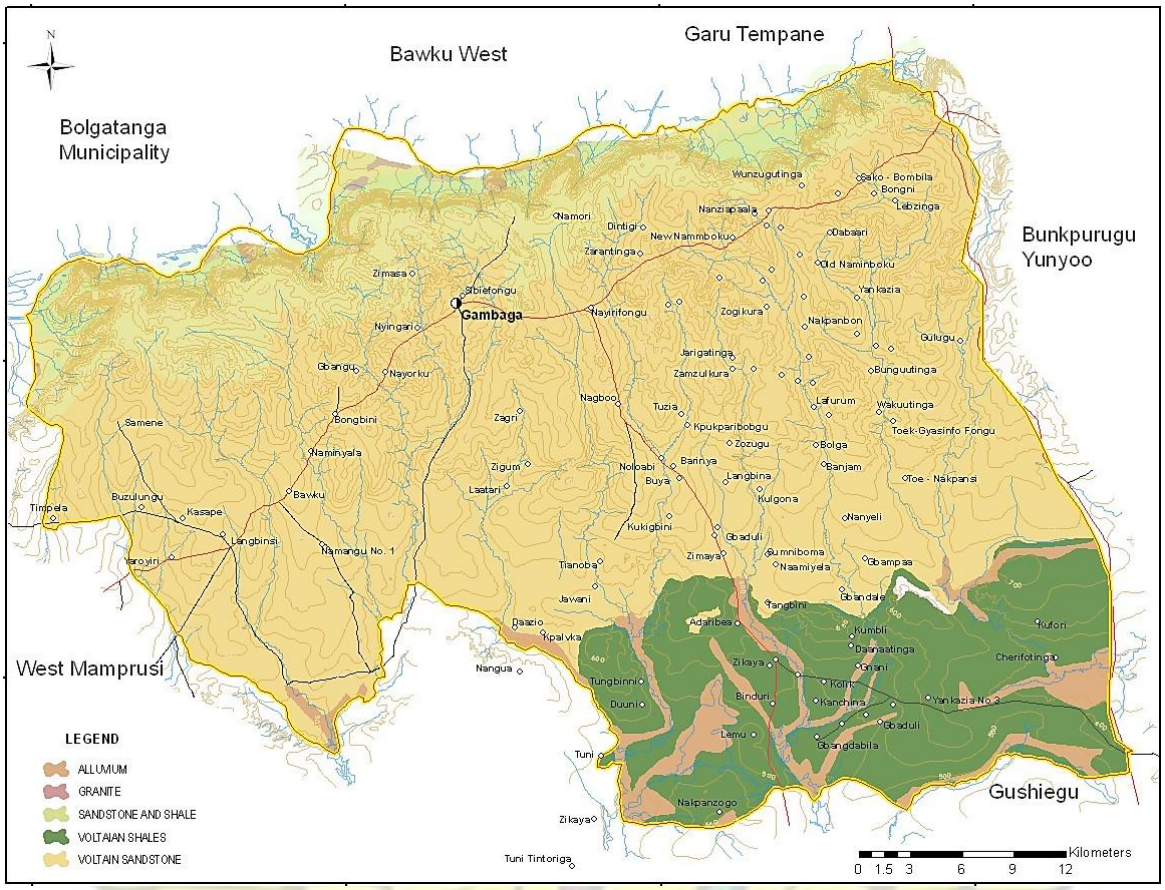
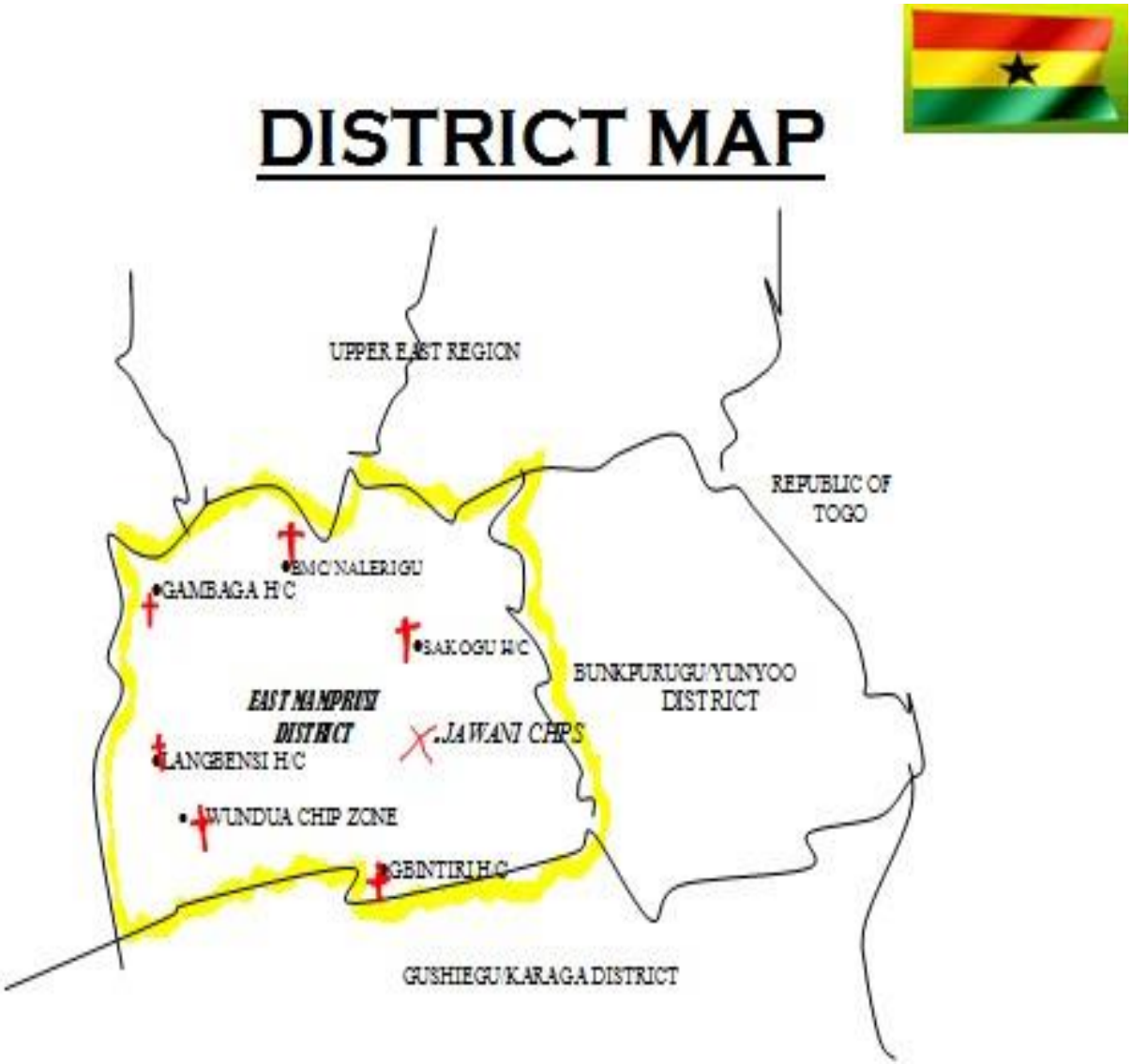
APPENDIX B: EAST MAMPRUSI DISTRICT MAP



APPENDIX C: EAST MAMPRUSI DISTRICT HEALTH FACILITIES MAP