

## CHAPTER ONE – Introduction

### Background and Problem

The World Health Organization, World Malaria Report (2008) lists malaria as one of the world's major diseases with 3.3 billion people at risk of infection in 109 malarious countries and territories and around 247 million cases annually, leading to approximately 1 million deaths. It is a leading cause of death in lower-income countries and for children world-wide. More than 80% of cases and more than 90% of deaths occurred in Africa in 2006, mostly children under five years old. Overall, it is estimated that malaria costs Africa more than US\$12 billion annually.

According to the World Health Organization (WHO), children under two years and pregnant women are particularly at high risk for contracting malaria. These children have not developed sufficient immunity and pregnant women have a reduced immunity (WHO, 2008). Malaria is a protozoan infection caused by the genus Plasmodium of which there is four human species: *P.falciparum*, *P.ovale*, *P.vivax*, and *P.malariae*. *P.falciparum* is by far the most dangerous and is also the most common in Africa (The Malaria Research Programme of the Medical Research Council, South Africa, 2003). The Centers for Disease Control and Prevention (CDC) confirms that “malaria is a mosquito-borne disease” (CDC, 2010) transmitted to humans by the bite of a female anopheles mosquito which thrives in warm, tropical, and subtropical climates.

While malaria undoubtedly imposes a major burden on health, estimates of the numbers of cases and deaths have been, for many countries, too inaccurate to establish firm baselines

against which to evaluate the success of control measures. Therefore, while each year more people are protected against infected mosquitoes and more have access to antimalarial medicines, measures of the number of people who need and who receive these services are still lacking, either for programme planning or for evaluation against coverage targets. Most difficult of all is the assessment of epidemiological impact.

In Uganda, there is a lack of awareness surrounding prevention among the population. The reasons why this awareness is lacking, and how to improve this situation is an excellent way to deal with the malaria problem in this malaria-endemic country. Implementing malaria control programs that target the awareness problem is a good strategy to reduce incidence and prevalence rates in Uganda. It is therefore of vital importance that a survey is carried out to find out what is required to implement malaria control programs in Uganda, what could hinder and aid this process.

### **Malaria in Uganda**

Malaria is endemic in most parts of Uganda except the southwest and eastern parts of Uganda, which are epidemic prone (Uganda Ministry of Health, 2006, p. 6). Uganda's tropical climate typically where temperature and rainfall patterns are sufficient to allow a stable year round malaria transmission at high levels with relatively little seasonal variability provides a conducive malaria environment. Only in the high altitude areas in the Southwest, West, and East is malaria transmission generally low, with more pronounced seasonality, and the occurrence of epidemics. Swamps and open water occupy 18% of the land, while game parks and forests occupy 12%. This has consequences for the distribution of the flora and fauna including malaria (Uganda Ministry of Health, 2008).

*P. falciparum* is the most common cause of malaria in Uganda. The vector that carries this parasite is the Anopheles mosquito. When it bites an individual and deposits the parasite, on-set of symptoms usually occurs within 24 hours. Symptoms include high grade fever, often accompanied by shivering and vomiting. Patients have a fast recovery if they are properly diagnosed and promptly treated. If not, malaria can go on to involve the brain leading to a condition known as cerebral malaria where patients get seizures. This requires aggressive treatment, otherwise it is often fatal.

Malaria is highly endemic in most parts of Uganda. In 2005, 63% of the population of 26.9 million was exposed to high, and 25% to moderate malaria transmission levels. 12% of the population live in areas with low or unstable transmission and are epidemic prone. The burden of malaria is still high with estimated 70-100,000 deaths per year among children under 5 years of age and between 10 and 12 million clinical cases treated in the public health system alone (Uganda Ministry of Health, 2006, p. 6).

### **Purpose statement**

To review malaria awareness status, review efforts of other malaria intervention programs in Uganda and justify the need to implement education-based interventions like SLAM (Student Leaders Against Malaria) which is a one of MFI's (Malaria Foundation International) strategies, to fight malaria in Uganda. The questions to be answered by the survey are;

### **Research questions**

1. What are the main needs for implementing awareness malaria control programs in Uganda?
2. What are barriers to implementing awareness malaria control programs in Uganda?
3. What strategies and resources are available for awareness malaria control in Uganda?

## **Significance**

Uganda is a rather small country covering a total of 235,036 km<sup>2</sup> of which approximately 50,000km<sup>2</sup> are taken up by open water and swamps. From Lake Victoria in the South at an altitude of 1,200 meters the land gradually slopes downward to the Northwest reaching about 600 meters altitude where the White Nile leaves the country towards Sudan. Most of the Southwest lies between altitudes of 1,300 and 1,500 meters while high mountain ranges above 2,000 meters are found in the border region with Rwanda and the Democratic Republic of Congo in the Southwest, the Ruwenzori Mountains in the West and Mount Elgon in the East. *Below is a map of Uganda (Fig. 1)*. Given the geographical position between 1° south of the Equator and 4° North, the climate is tropical in most parts with mean annual temperature between 16° C in the Southwest, 25° C in the Centre, East and Northwest and close to 30° C in the Northeast. Average relative humidity varies between 54% and 88%. There are generally two rainy seasons, one between March and May and the other between September and December producing 1,200 mm to 1,800 mm of rainfall annually, with peaks up to 2,000 mm. However, towards the North and Northeast the rainy season becomes more mono-phased (April to October) and often does not exceed 500 mm per year (Uganda Ministry of Health, 2006, p. 8).

The country has about 80 districts with Kampala as the capital city (See Fig. 1) and a population of about 31 million people. Agriculture is the most important sector of the economy because it employs about 80% of the work force, and coffee is the principal export. English is the official language, but Luganda is the local language that is predominantly used. According to Outreach Uganda, Uganda has a 70% literacy rate (Outreach Uganda, 2009).

## An Assessment of Malaria Awareness in Uganda through the Eyes of Malaria Control Administrators



Figure 1: Map of Uganda

The fight against malaria in Uganda is part of the overall effort of the Government of Uganda to improve health. This effort is multi-sectoral and a number of organizations including the Malaria Control Program, Malaria Consortium, Ministry of Health, Ugandan Malaria Surveillance Project (UMSP), and the Northern Uganda Malaria AIDS and Tuberculosis Program (NUMAT), are involved in this fight. The main intervention strategies implemented in Uganda as per this Uganda Malaria Control Strategic plan are Case management, Intermittent preventive treatment during pregnancy. Malaria control requires an integrated approach comprising prevention and treatment with effective antimalarials. The combination of tools and methods to combat malaria has been used and these include long-lasting insecticidal nets (LLIN), artemisinin-based combination therapy (ACT), indoor residual spraying of insecticide (IRS) and intermittent preventive treatment in pregnancy (IPT) (WHO, 2008). Prevention is an avenue that would greatly reduce the morbidity and mortality of malaria. Awareness about the disease is a

leading instrument for use in the prevention and control of malaria. People need to be aware of the disease, how it is transmitted and treated. If they know how they could avoid transmission (e.g. use of mosquito nets, insecticides, etc.), and put it into practice, they would not have to suffer from malaria. They also need to know the different ways that malaria can be treated and where they can promptly get treatment and recover if they suffer from malaria. Schools need to make this a part of their curriculum, so that children learn early on about prevention methods. Although this information can be formally taught in schools or seminars, parents need to help pass on this information to their children as well.

### **Definition of terms**

***Awareness:*** This is the ability to perceive, or be conscious of something (events, objects)

***Endemic infection:*** An infection is said to be endemic in a population when it is maintained in the population without the need for external inputs. For example, malaria is endemic in Uganda but not in the United States.

***Epidemic:*** An epidemic occurs when new cases of a certain disease affect a disproportionately large number of individuals within a population, community, or region at the same time.

***Immunity:*** This is a state of having sufficient biological defenses to avoid infection or disease.

***Incidence:*** Is the number of new cases of a condition, symptom, death, or injury that develop during a specific time period, such as a year.

***Intervention:*** This is an orchestrated attempt by one, or often many, people to get professional help for a serious problem.

***Malaria:*** This is a mosquito-borne infection of humans caused by a parasite known as Plasmodium.

***Morbidity:*** This is the proportion of sickness or of a specific disease in a geographical locality.

***Mortality:*** This is a measure of the number of deaths in a given population.

***Prevalence:*** Refers to the current number of people suffering from an illness in a population, in a given year.

***Protozoan infections:*** These are parasitic disease organisms belonging to the Kingdom Protozoa.

***Seizures:*** These are abnormal electrical discharges in the brain that cause changes in attention or behavior.

***Vector:*** This is an organism, often an invertebrate arthropod, that transmits a pathogen from reservoir to host.

## CHAPTER TWO – Review of the Literature

### Introduction

According to the participants of this study, the transmission of malaria which is a protozoan disease is influenced by climatic conditions. The parasite likes wet conditions and therefore rainfall favors breeding. Idro stated the following:

“The use of the term ‘malaria’ was first attributed to Horace Walpole writing from Rome in 1740 where Italians used the term for ‘bad’ air to describe marsh fever which was thought to be an illness due to vapour exuding from marshes. However the association of intermittent fevers and the environment had appeared in the writings of Hippocrates 2500 years ago. It was only in 1880 that the causative agent for malaria was described by Laveran in human blood while Golgi described the detailed morphology of the three species of human malarial parasites namely; *P.falciparum*, *P.vivax* and *P.malariae*. The work of Bruce in Zululand in 1894 - 1896, showed that an insect could transmit a protozoan parasite. Manson then put up a theory that malaria was transmitted by mosquitoes and proved his theory on volunteers in Campagna and London in 1900” (Idro, 2001, p. 15).

The United Nations International Children's Emergency Fund (UNICEF) which is one of the world's strongest humanitarian relief organizations believes in helping children through partnership and this is the source of its strength to save the lives of children around the world. UNICEF’S celebrity ambassadors help children by bringing increased awareness to the troubled



areas where children are most in need (UNICEF, 2011). Increased global awareness about malaria has contributed to a significant rise in available resources over recent years, thanks to the Global Fund to Fight AIDS, TB and Malaria, the U.S. President's Malaria Initiative, the World Bank, UNICEF and others. These funds are now facilitating the rapid improvements and scaling-up of malaria intervention coverage. If malaria is to be controlled, interventions must be further scaled up, sustained financing must be made available, and community involvement and leadership must be encouraged, alongside stronger global, regional and national partnerships (UNICEF, 2008 a).

The Roll Back Malaria partners have also funded and participated in local and national health drives, spreading awareness about the importance of malaria prevention and early treatment. These efforts have gone a long way, but an increase in sustained funding is necessary to allow the partners to build on their success (UNICEF, 2008 b).

The U.S. government has shown cooperation with the Ugandan government to fight malaria by supporting malaria awareness. A news release by the Ugandan Embassy in Washington D.C, the Ugandan Ambassador recognized that in marking Malaria Awareness Day, President George W. Bush announced that, as part of the President's Malaria Initiative, "America will expand our cooperation with the government of Uganda, and the non-profit group Malaria No More, to distribute more than a half-a-million bed nets in Uganda. We're going to focus this distribution on children and pregnant mothers in areas of the country with the greatest vulnerability. And when we're finished with this effort, half of all the households in Uganda will own a bed net to protect against malaria" (Embassy of the Republic of Uganda, Washington, DC, 2007).

## **Malaria Control**

### **Brief history of malaria control in Uganda**

Malaria control received little attention within the Ministry of Health (MoH) until the creation of the Malaria Control Unit (MCU) within the Directorate of National Disease Control in 1995. Similarly, until early 90's, few resources from international partners have been available specifically for malaria control with a steady increase. Political commitment from government also has increased dramatically since the late 90's. In the past, the mainstay of malaria control for many years has been treatment of clinical cases mainly with chloroquine (CQ). Attempts at large scale chemoprophylaxis (e.g. chlorinated salt pilot project in the 60's) were limited and not very successful, probably because they never were implemented at a national scale. With the rapid recovery of the economy after 1986, access to medicines improved dramatically, not only through government and non-governmental organization-based health facilities, but also through the private for-profit sector (Uganda Ministry of Health, 2006, p. 14).

With respect to malaria prevention, environmental management was strong in municipalities and towns but not in rural areas in the 50's and 60's with drainage (malaria channels) and reduction of breeding sites for all mosquitoes (tin-collectors). This approach ended in the late 70's with the beginning of political destabilization in Uganda. Indoor residual spraying (IRS) was implemented at a larger scale only as part of the World Health Organization pilot programme (1959-1963) in the Southwest (Kigezi) and South (Masaka) (Zalueta et al, 1964). While significant reductions in malaria transmission could be achieved, IRS was never implemented or scaled up as a national programme. The reasons for this are not entirely clear; lack of resources and the coincidence with the end of WHO malaria eradication campaign certainly played a role. Since then IRS has been used only sporadically during epidemics, (e.g.

1998 El Niño) or in small, local initiatives mainly in the Southwest as well as in some institutions (e.g. boarding schools, army barracks, etc). With mosquito nets only used traditionally in very few areas of Uganda mainly around Lake Kyoga, the introduction of insecticide treated nets (ITN) started with small trials and projects in the early 90's. First, district-based distribution/sales were carried out through NGO's and bilateral organizations (e.g. AMREF, GTZ) but these did not exceed several thousand nets per year. After intensive discussions, ITNs were included as a key preventive strategy for the first time as part of malaria control policy in 1998. In financial year 2000/01, Uganda was one of the first countries to introduce a waiver of taxes and tariffs for ITNs. This helped in the rapid development of a commercial mosquito net and ITN sector which since has shown exponential growth rates (Uganda Ministry of Health, 2006, p. 14).

As we can see, the interventions did not include focusing on increasing malaria awareness among the population. Hopefully this study can bring awareness to the surface as a possible strategy in malaria prevention and control.

### **The Goal of malaria control**

The goal of malaria control in malaria-endemic countries like Uganda is to reduce as much as possible the health impact of malaria on the population, using the resources available while taking into account other health priorities. Malaria control does not aim to eliminate malaria totally. Complete elimination of the malaria parasite (and thus the disease) would constitute eradication. While eradication is more desirable, it is not currently a realistic goal for most of the countries where malaria is endemic. Generally, malaria control is carried out through the following interventions, which are often combined:

- Case management (diagnosis and treatment) of patients suffering from malaria
- Prevention of infection through vector control
- Prevention of disease by administration of antimalarial drugs to particularly vulnerable population groups such as pregnant women and infants (Lattice Pharmacy, 2009)

### **Case Management**

Persons who are sick with malaria should be properly diagnosed, treated promptly and correctly. Malaria is often a debilitating disease that when caused by *P. falciparum*, can be fatal. In addition, treatment eliminates an essential component of the cycle (the parasite) and thus interrupts the transmission cycle (Holy Rosary Hospital, 2010)

The World Health Organization recommends that anyone suspected of having malaria should receive diagnosis and treatment with an effective drug within 24 hours of the onset of symptoms. Kakai, Nasimiya, and Odero (2011) found that when the patient cannot have access to a health care provider within that time period, as is the case for most patients in malaria-endemic areas, home treatment is acceptable.

### **Prevention of Infection**

Infection is prevented when malaria-carrying *Anopheles* mosquitoes are prevented from biting humans. Vector control aims to reduce contact between mosquitoes and humans. Some vector control measures (destruction of larval breeding sites, insecticide spraying inside houses) require organized teams (for example, from the Ministry of Health) and resources that are not always available. An alternate approach, insecticide-treated bed nets (ITNs) combines vector control and personal protection. This intervention can often be conducted by the communities

themselves and has become a major intervention in malaria control (Holy Rosary Hospital, 2010).

### **Prevention of Disease**

Administration of antimalarial drugs to vulnerable population groups does not prevent infection, which happens through mosquito bites. But drugs can prevent disease by eliminating the parasites that are in the blood, which are the forms that cause disease. Pregnant women, infants (1-5 years) and people with low immunity due to whatever condition are considered high risk. Pregnant women, being a vulnerable group, are most frequently targeted in prevention of the disease. They may receive, for example, "intermittent preventive treatment" (IPT) with antimalarial drugs given most often at antenatal consultations during the second and third trimesters of pregnancy (Holy Rosary Hospital, 2010).

### **Activities for Malaria Control**

The main activities necessary for carrying out malaria control interventions include the following:

- Health education (also called Information-Education-Communication, IEC), where the communities are informed of what they can do to prevent and treat malaria. This is still lacking especially in the rural areas, and thus the necessity of this assessment which will provide some recommendations for strategies
- Training and supervision of health workers, to ensure that they carry out their tasks correctly.

- Provision of equipment and supplies (e.g., microscopes, drugs, bed nets) to allow the health workers and the communities to carry out the interventions (Holy Rosary Hospital, 2010)

## **Partnerships for Malaria Control**

Successful malaria control activities require coordinated actions by:

- National authorities (especially the Ministry of Health)
- International organizations (such as the World Health Organization and UNICEF)
- Governmental and nongovernmental agencies
- The private sector
- The communities

Some identified bodies taking part in malaria control include; Malaria Control program, Ministry of Health and Malaria consortium, Ugandan Ministry of Health, Ugandan Malaria Surveillance Project (UMSP), the Northern Uganda Malaria AIDS and Tuberculosis Program (NUMAT).

## **Malaria Control Programme**

The National Malaria Control Programme (MCP) was established in 1995 by the Ministry of Health to direct and guide the day to day implementation of the National Malaria Control Strategy whose overall objectives include:

- To go to national scale with a package of effective and appropriate interventions to promote positive behavior change and to prevent and treat malaria

- To rapidly achieve and sustain high coverage levels for this intervention package.

The Malaria Control Programme (MCP) is responsible for instituting activities to check epidemics principally in three distinct phases: *before, during and after the epidemic*. Before and during the epidemics, these strategies involve increasing information and awareness of epidemics at national and district level and ensuring adequate mobilization of funds and resources including drugs and supplies. After epidemics, MCP is responsible for reviewing and documenting its experiences and evaluating the impact the response had on malaria prevalence. The role of the MCP at central level is to support the implementation of the National Malaria Control Strategy through policy formulation; setting standards and quality assurance; resource mobilization; capacity development and technical support; malaria epidemic control; coordination of malaria research; and monitoring and evaluation. The MCP improves its outreach to districts through zonal Roll Back Malaria (RBM) and Integrated Management of Childhood Illness (IMCI) teams which work closely with the district malaria focal persons. RBM is not an implementing agent but rather a forum of all stakeholders in Malaria Control with a goal to halve the burden of malaria by 2010, a target that could be reached if there is universal access to mosquito nets and medicine. The countries of Southern and Eastern Africa are represented in this partnership.

The MCP interventions to reduce the burden aim at prompt and effective treatment which must be complemented by the prevention of new infections. The two ways it uses to achieve this are: interventions that give individual protection from mosquito bites, and interventions that reduce the abundance of malaria transmitting mosquitoes at community level and thereby reduce transmission of malaria. The Malaria Control Strategy concentrates on three key interventions:

- 1) Insecticide treated mosquito nets (ITNs)

- 2) Indoor residual spraying (IRS) in areas with unstable (epidemic prone) and low malaria transmission, as well as certain institutions such as boarding schools, hospitals etc. IRS is one of the main malaria control strategies in Uganda. IRS has been proven as one of the most effective methods for controlling malaria transmission quickly, with a large scale impact and at an affordable cost.
- 3) Environmental Management so as to deny mosquitoes breeding sites where this is feasible and can be expected to have a significant impact on transmission (e.g. urban areas) (Malaria Control Programme, 2006).

### **Ministry of Health**

The Ministry of Health (MoH) over-looks and monitors the trends of diseases that affect Ugandans, including malaria, with a big focus on prevention and case management. The mission of the MoH is to ensure the attainment of a good standard of health by all people in Uganda in order to promote a healthy and productive life (Uganda Ministry of Health, 2011).

Because of the impact malaria has on morbidity and mortality in Uganda, effective malaria treatment is a top priority of the MoH. If uncomplicated malaria is not diagnosed early and treated promptly, it deteriorates into severe malaria which can lead to death. Early diagnosis and prompt treatment of malaria cases are important to effective malaria case management. In Uganda, chloroquine is still the drug of choice as first-line treatment of malaria. Chloroquine is cheap and readily accessible to most of the population but there is increasing resistance to it. The MoH emphasizes the importance of effective malaria case management for everyone and particularly for children under five and pregnant women who are more at risk of complications of malaria. The National Anti-Malaria Policy stresses the importance of recognizing symptoms



of malaria and treating within 24 hours after the onset of symptoms or a positive malaria test to prevent the development of severe or “complicated malaria” (Malaria Control Programme, 2006).

Malaria in pregnancy is always a serious disease and must be treated promptly. It can lead to abortion, still birth, premature delivery and low birth weight of the baby. It also leads to maternal ill health such as aggravation of already existing anemia (Republic of Uganda, 2004). The Ministry of Health Guidelines for malaria in pregnancy includes Intermittent Preventive Treatment (IPT) which, in addition to use of ITNs, has been proven as a safe and effective method for reducing malaria among pregnant women. The current IPT policy states that all pregnant women - even if they do not have fever or other signs of malaria- should take 3 tablets of Sulfadoxine-Pyramethamine (SP) once between 4 and 6 months of pregnancy and 3 SP tablets between 6 and 9 months. Pregnant women infected with HIV should take 3 doses of SP 1 month apart or stay on cotrimoxazol (e.g. Septrin) (Malaria Control Programme, 2006).

### **Malaria Consortium**

The Malaria Consortium (MC) is an international organization dedicated to the control of malaria and other communicable diseases throughout Africa and Southeast Asia. The Africa office based in Kampala, Uganda, provides support to seven country offices in Africa as well as implementing work in many more countries. The MC works closely with Ministries of Health and other development and technical partners in African countries at policy, strategy and implementation levels. The MC works in partnership with communities, health systems, government and non-government agencies, academic institutions and local and international organizations to ensure good evidence supports delivery of effective services. They work to ensure that groups most at risk have access to prevention, care and treatment of malaria and other

communicable diseases. This study will benefit from the malaria consortium because they conduct research, test new approaches and assess new technologies to strengthen the delivery of effective interventions based on evidence and experience from the country programmes.

Malaria prevention is through increasing coverage of effective malaria prevention tools by distributing long-lasting insecticidal nets (LLINs) to those who need them and training people to use them properly. Malaria control is also achieved by responding to humanitarian emergencies and increasing delivery of services to hard-to-reach populations and vulnerable groups, especially in the rural areas. They are able to control malaria also by improving access to diagnosis and effective treatment (Malaria Consortium, 2010).

### **Uganda Malaria Surveillance Project (UMSP)**

Collaborating partners include Uganda's Makerere University Institute of Public Health, Uganda's Ministry of Health, MU-UCSF (Makerere University-University of California San Francisco) Malaria Research Collaboration, and University of California Berkeley School of Public Health. The Malaria Consortium was established as a partner in 2006.

The UMSP's objectives are to do the following:

- Build and implement a multi-surveillance system in Uganda to evaluate: (1) Efficacy of available and new antimalarial therapies (2) Potential antimalarial-related adverse events (3) Malaria-related morbidity and mortality
- To integrate results of research into policy by linking researchers, policy-makers, and districts
- To create a sustainable network of research activities and contribute to malaria control in Uganda

The UMSP current activities include; pharmacovigilance (on-going monitoring and surveillance of antimalarial drugs), distribution of insecticide-treated nets, study of rapid diagnostic tests for malaria, and training in facility-based management and diagnosis of malaria. The UMSP composition allows for demand-driven research that feeds directly into policy and access to sentinel sites all-over the country, which would allow us to maintain contact at the community level. Even though this is the case, there are still resource constraints. Funds and equipment are insufficient to multiply studies at all sites (Makerere University – University of California San Francisco Research Collaboration, 2009).

### **Northern Uganda Malaria AIDS and Tuberculosis Program (NUMAT)**

Northern Uganda has a history of armed conflict, now more than two decades old, which has resulted in the deaths of thousands of children, women and men and has led to displacement of huge numbers of people who now live in camps of internally displaced persons. Although there has been some recent improvement in the security situation in most parts of Northern Uganda, the armed struggle in the region has resulted in a situation whereby districts have not fully benefited from the overall impressive national progress made by HIV, tuberculosis (TB), and malaria programs in other parts of Uganda.

The Northern Uganda Malaria AIDS & Tuberculosis Program (NUMAT) is a five-year USAID-funded program that was designed in consultation with the Ministry of Health, Uganda AIDS Commission, international agencies, non-governmental organizations, community-based organizations, and People Living with HIV and AIDS (PLA) networks. The program began in August 2006 with the goal of expanding access to and utilization of HIV, tuberculosis, and malaria prevention, treatment, care and support activities in Northern Uganda. NUMAT will expand the geographic coverage and populations served through strengthening local government

responses, expanding the role of communities in planning implementation and monitoring activities, and building upon existing networks (John Snow Incorporated, 2011).

Intervention programs of all kinds will rarely take interest in Northern Uganda because of the war going on there, and that means that the local population is left behind on up-to-date researches. With the help of the Ministry of Health and international organizations, the people in this area will benefit from this study and implementation of malaria awareness interventions.

### **Summary**

The worldwide background of malaria, its magnitude in Uganda, and its effect on the people placed an emphasis on the need to act to reduce morbidity and mortality. There is much work that has been done, but malaria awareness is still lacking. The programs currently in place are focusing on other prevention and treatment control methods, but are willing to participate in this study with an emphasis on malaria awareness especially in the rural areas.

## CHAPTER THREE – Methodology

### **Introduction**

Uganda suffers from high levels of malaria transmission. Children and pregnant women are most affected; malaria causes almost half of all deaths in under-fives and almost a third of deaths during pregnancy. There are many interventions that have been carried out to control malaria, and many of them include things, such as encouraging the use of mosquito nets, insecticides, and prompt treatment when ill. None of these have focused on prevention through increasing awareness among the people. The aim of the current study ultimately is to promote awareness. One way is to target students in schools by making malaria part of their school curriculum. Also, encouraging young people's participation in malaria community projects would help with involving those that can't afford to be in school.

A needs assessment in Uganda through the eyes of malaria control administrators from five local organizations through one-on-one interviews helped us to determine if any awareness interventions had been carried out so far, what challenges were encountered, and what barriers were expected in implementing awareness projects.

### **Target population and sample**

The target population consisted of experts in the field of malaria control in Uganda. The sample population comprised 30 key informants who currently participate in malaria control at the time of the study. All participants had to be over the age of 18, and were administrators from five malaria control organizations in Uganda including: Malaria Control Program, the Malaria

Consortium, the Ugandan Ministry of Health, Ugandan Malaria Surveillance Project (UMSP), and the Northern Uganda Malaria AIDS and Tuberculosis Program (NUMAT).

Ten letters were sent out to the heads of ten local malaria programs explaining the study and asking if they would be willing to participate, with five responding to the study. The heads or assistants of these programs assisted with recruitment by identifying who would be eligible to participate. Sampling for key informants was conducted by random sampling of people participating in malaria control in each of these programs. Consent letters (Appendix A) explaining the study were sent to the participants, and their signature showed their voluntary willingness to participate, but they had an option to withdraw at any time. The letter also explained that there would be no personal identifiers, and names would not be published. There were also no personal benefits, no compensation, and no foreseeable risks associated with participation. None of those who had agreed to participate withdrew from the study. The principal investigator (PI) and co-investigator also made sure that all of these terms of the study were reviewed with the participants just before starting the interview. Participants were also informed that information given to the research team would be used for research purposes only and that tapes used during recording would be kept in a locked secure location and destroyed at the end of the study. All participants were also given Emory University IRB contacts, and the PI's contact information in case of any questions or problems.

Participants were assigned a two digit code as identification and for data analysis, at the beginning of the interview. This further illustrated the fact that names were of no significance to the interviewers.

## **Research Design and Procedures**

The needs assessment employed both qualitative and quantitative methods to capture the malaria awareness deficiency in Uganda through the eyes of program administrators. The research proposal was reviewed by the SSP committee chair, field advisor, and others on the SSP committee (including a Ugandan committee member). Emory University's Institutional Review Board (IRB) approved the study and its protocol.

Structured face-to-face interviews were conducted from a questionnaire that had both closed and open-ended questions (Appendix B). Appointments were made with the participants to conduct interviews at their offices, at their convenience. Some participants re-scheduled at the last minute, but all of the interviews were completed. Interviews were conducted in English and lasted 15-20 minutes each. If participants still felt like talking, or had any side information that they wanted to share after the interview, time was allowed for them to do that as long as it did not run into another time slot. All interviews were recorded on tapes for reference at data entry, and were to be destroyed after the study had been published.

## **Instruments**

Interviews were conducted inside the office of the participant using a written questionnaire. Interviewers were usually offered a sit and drink, and always re-assured participants that the interview should take 15-20 minutes, although some lasted at least 30 minutes if the respondent was talkative. Prior to beginning the interview, a tape recorder was turned on, and then the interviewer gave the participant a summary of the goal of the study once again. Consent letters had been signed and returned prior to scheduling a date for the interview. A need to identify the gaps in malaria awareness was explained to participants, along with a need

for education-based interventions as a strategy to fight malaria in Uganda. Demographics were also collected including Age, Tribe, Highest Level of Education, Socio-economic Status (SES), Marital status, and Number of Children. The researcher used the initials of the names since the participants were going to be identified by 2-digit numbers which were written at the top right corner of their questionnaire. The date for the interview was also recorded.

Recorders were used to record all interviews in case there was a need to refer to the interviews during analysis. Participants had been assured that the recorders would be destroyed once publication was completed and would not be used for any other purposes. The questionnaire addressed malaria as a public health problem in Uganda, its severity, the areas affected, intervention programs that had been used, schools' curricular inclusion, student participation in projects, and barriers that had hindered potential inventions. The questionnaire used for the interviews was designed to specifically address the research questions in Chapter 1. Questions in the questionnaire were both open and closed-ended, and the investigator either checked off the appropriate bubble or carefully summarized the participant's response. Following the interview, the researcher re-assured the participant again that there were no risks anticipated and gave them contact information for the researchers and Emory University's IRB in case of any questions. Once the participants left the office, the researcher often made some side notes describing the tone and attitude of the participant.

### **Data analysis**

Some of the data collected were quantitative (e.g. demographic data), and some of it was qualitative (e.g. attitudes, beliefs, insights, opinions). Previously collected secondary data for national census or research purposes was also reviewed. A trend analysis would be helpful for



comparison to determine if there had been any changes over a five year period. The researcher entered all the data as it was collected into an Excel spread sheet, where all information pertaining to a particular person (including tribe, marital status, organization, etc.) was entered against their ID. Then another spread sheet was prepared for importation into SAS, a statistical software program, for analysis. This Excel spread sheet was named MALARIA AWARENESS IN UGANDA, 2009. For this one, the researcher entered all information in codes with assigned variable names in each column for each of the relevant questions, and the observations which were the two digit-codes for the participants on each row. The variables were put in a code book (Appendix C) where a more detailed description of each concept was given.

After importation into SAS, the file was stored in a temporary library, where all manipulations and corrections within the dataset were possible. The file had 30 observations and nine variables. Quantitative data analysis consisted of descriptive analysis and these will also be presented in a narrative and tables. The implications of the data analysis pointed the principal investigator towards possible strategies for implementing education-based programs.

### **Limitations and Delimitations**

Potential weaknesses & limitations of the study beyond the researcher's control might arise from:

- a) The participant survey was not being tested for validity and reliability. Self-report may create inaccuracies because of forgetfulness.
- b) The participant survey was based on self-reported data therefore possible errors due to forgetting.

- c) The study focused on young people and yet malaria affects people of all ages. This is why there are recommendations to involve the public in awareness programs.
- d) Data for this study were collected from organizations that are in the capital city therefore the respondents who do not live in the villages may not know all the barriers or problems encountered by people in these areas.
- e) The sample size was small; therefore the responses may not be representative of the population.
- f) There are numerous methods of malaria prevention, but a lot of people may not know about them even though they may be accessible to them.
- g) Interviews had to be carried out during the mornings or afternoons, and in the office to maximize interviewer safety. This means that some people who had multiple tasks and were very busy were hard to schedule. Sometimes they found evenings more convenient, which made the researcher feel like an intruder during the day.
- h) The study involved only five organizations. More organizations would have ensured more accurate data.

The one survey delimitation was because the survey sites were restricted based on interviewer safety. Northern and eastern parts of the country are war-torn.

## **Summary**

A needs assessment of malaria awareness was conducted in Uganda through interviews of malaria control administrators in July – August of 2009. This was carried out in anticipation of implementation of malaria prevention programs, especially those that involved student participation. Six key informants from each of the five malaria control organizations had

scheduled interviews with the investigator or co-investigator. The actual interview lasted about 20 minutes on average and was conducted in English. The interviews were recorded, and the data later entered into an Excel spreadsheet. The trend analysis revealed no changes in the magnitude of malaria as a health problem, or age as a risk factor. This data were later imported into, and analyzed by SAS. The results from the analysis will form the basis for the strategies to implement education-based interventions like Malaria Foundation International's SLAM (Student Leaders Against Malaria) project.

## CHAPTER FOUR – Results

### **Introduction**

This section presents the findings of a malaria needs assessment survey from data collected in 2009, which assessed the research areas related to the prevalence of malaria, awareness of malaria, and the malaria control program implementation. The participants included 30 members from five local programs: the Malaria Consortium, Malaria Control Program, Ugandan Ministry of Health, Ugandan Malaria Surveillance Project (UMSP), and the Northern Uganda Malaria AIDS and Tuberculosis Program (NUMAT). The participants' ages ranged from 31 to 52, with an average of 36 years. The majority of the participants (80%) were married. All of them were graduates and had a masters' degree, except for three people who also had a PhD. A total of 20 participants were Baganda (from Central Uganda), five were Banyankole and three were Batoro (from Western Uganda), one was a Mudama (from Eastern Uganda), and one was a Mucholi (from Northern Uganda). All of the participants were middle-class, very fluent in English and seemed sociable.

### **Research Questions**

The following questions were used to obtain insight into the current malaria status in Uganda, its awareness, and the possibility of implementing a student awareness-oriented malaria control program.

1. What are the main needs for implementing malaria control programs in Uganda?

2. What are barriers to implementing malaria control programs in Uganda?

3. What strategies and resources are available for malaria control in Uganda?

This section presents overall findings, as well as specific findings of different variables from the survey. Participants answered all questions, the data were analyzed using SAS, and proc frequencies of the different variables are reported in this section. The programmes used to obtain the data are also shown with the variables used each instance.

### ***Findings***

*Research Question 1: What are the main needs for implementing awareness malaria control programs in Uganda?*

There were a total of 30 participants and out of these, 17 were male and 13 were female.

See Table 4.1 below.

Table 4.1 - Participants by gender

Gender	Frequency	Percent
Female	13	43.33
Male	17	56.67
Total	30	100

Interviewees all agreed that, “.... malaria is a health problem in Uganda...”, and their opinions on the magnitude of the problem are summarized in Table 4.2 below. The participants were asked to rate malaria as a public health problem on a scale of 1-3, where 3 was Very Severe, 2 was Severe, and 1 was Not Severe. Out of the 30 participants, 22 (73%) rated malaria as a severe

public health problem, 8 (27%) thought it was not severe. This means that currently none of the participants rated malaria as 1, which is Not Severe. As adults, all interviewees recalled having at least five bouts of malaria of varying severity since childhood. Some of them had even lost some relatives to malaria. One participant contributed that “*chances of dying from malaria depended on age and region.*”

Table 4.2 - Magnitude of malaria as a health problem

Malaria severity	Frequency	Percent
Not Severe	8	26.67
Severe	22	73.33
Total	30	100

Age and Region were perceived predictors of risk of getting or dying from malaria.

Participants were asked which age group was thought to be most at risk of dying from malaria.

The options they were given were:

- (a) less than 1 year (b) 1-5 years (c) 6-18 years (d) 19-20 years

Table 4.3 - Malaria sufferers with age as a risk factor

Ages	Frequency	Percent
1-5 years	23	76.67
Less than 1 year	7	23.33
Total	30	100

23 (77%) of the participants thought that out of the general population, people in the 1-5 year age group were the ones at most risk of dying from malaria, and 7 (23%) thought those who were less than 1 year were at most risk (See Table 4.3 on previous page). This confirmed age as a risk factor because children, especially those in the 1-5 year age group, were significantly more at risk of getting or dying from malaria compared to adults.

When asked about which of the four regions of Uganda was the hardest hit by malaria, the participants' responses are that people in the northern region of the currently were the most affected, and many of the participants blamed this on the long on-going war in that part of the country (See Table 4.4). Out of the 30 participants, 24 (80%) said that the northern region of the country was most hard hit by malaria, 3 (10%) said it was the eastern region, and the other 3 (10%) said it was the western region. Also most of the people in the north were perceived to be poor and therefore not able to use preventive methods like insecticides, mosquito nets, etc.

One of the participants said, "*People in Kampala are rich.*" The central part of the country was not mentioned at all, which is probably because the capital city is located there, and most of the well-to-do people live there.

Table 4.4 - Malaria sufferers by region

Regions	Frequency	Percent
East	3	10.00
North	24	80.00
West	3	10.00
Total	30	100

This point is further illustrated on the next page in Table 4.6 (Page 33) which is related to levels of intervention in the different parts of the country. Out of the 30 participants, 25 (83%) thought that the region with the least malaria control interventions to date was the north, and 5 (17%) thought it was the east. The respondents say that these are both areas whose residents are considered poor, and the north is also war-torn so people who may want to implement preventive interventions are hesitant to risk their lives going there.

*Research Question 2: What are barriers to implementing awareness malaria control programs in Uganda?*

Challenges during implementation of interventions

Interviewees were asked, “*What are the three biggest challenges you have encountered during implementation of those interventions?*” This would be useful in planning future interventions and ways of eliminating these same hazards.

Table 4.5 - Challenges during implementation of interventions

Challenges	Frequency	Percent
Lack of funds	11	36.67
Political instability	14	46.67
Poverty	5	16.67
Total	30	100

Table 4.5 shows that 14 (47%) of the participants thought it was political instability, 11 (37%) thought it was due to lack of funds, and 5 (17%) thought it was due to poverty.



*Research Question 3: What strategies are available for awareness malaria control in Uganda?*

Public health organizations forward to the ministry of education a list of public health issues that need to be taught in schools every year, and the ministry of education chooses some and lets them know. This means that public health officials are aware what is being taught in schools every year.

Least Intervention by region

Table 4.6 - Least intervention numbers by region

Intervention by region	Frequency	Percent
East	5	16.67
North	25	83.33
Total	30	100

The issue of awareness about malaria, which is the main theme of this survey, was mentioned by asking whether malaria was taught in schools as part of school curriculums. The responses are summarized in Table 4.7 on the next page. Out of the 30 participants, 17 (57%) said that “No” malaria was not taught in schools as part of school curriculum, 7 (23%) said “Yes” it was, and 6 (20%) did not know. Since implementation of interventions will be based on awareness, this is a key issue. The fact that over 50% of participants say that malaria is not taught in schools demonstrates the fact that a lot of people do not know about all the available methods they could use to prevent malaria, or how they can access them. Teaching about malaria in schools would definitely be a way to start increasing awareness, which in turn enhances

prevention, and would ultimately reduce morbidity and mortality rates. Making key topics part of school curricular would be a good way to achieve this.

### Malaria in school curriculums

Table 4.7 - Responses to malaria taught in school curriculum

Response	Frequency	Percent
I don't know	6	20.00
No	17	56.67
Yes	7	23.33
Total	30	100

### Key topics to teach in schools

Table 4.8 - Key topics to include in school curriculums

Topic	Frequency	Percent
Participation in prevention projects	1	3.33
Prevention methods	12	40.00
Risk factors	7	23.33
Transmission	5	16.67
Treatment	5	16.67
Total	30	100

Participants gave their opinions, in an opened ended question, on which five key topics that needed to be taught in schools in order to equip students with the tools they need to curb infection rates and they are highlighted in Table 4.8 on the previous page. For the five key topics to be taught to the students, 12 (40%) of the participants advised prevention methods, 7 (23%) advised risk factors, 5 (17%) advised transmission methods, another 5 (17%) advised treatment methods, and 1 (3%) advised participation in prevention projects.

#### Student involvement in malaria interventions

When asked whether their organization's malaria control interventions have involved student participation, 25 (83%) of the participants said no, and 5 (17%) did not know. The responses are shown in Table 4.9.

Table 4.9 - Students involvement in malaria interventions

Involvement	Frequency	Percent
I don't know	5	16.67
No	25	83.33
Total	30	100

#### Partnership of Ugandan interventions and international health projects

When asked whether some of their organization's malaria control interventions have been in partnership with international organizations, 20 (67%) of the participants said yes, 5 (17%) said no, and 5 (17%) said they did not know. These responses are shown in Table 4.10 on the next page. The intervention implementation plan in this case would involve an international organization, and obviously this will not be a new idea with the local organizations.

Table 4.10 - Numbers in organizations with international partnership

Response	Frequency	Percent
I don't know	5	16.67
No	5	16.67
Yes	20	66.67
Total	30	100

### Summary

Out of the 30 interviewees, 73% rated malaria as a severe public health problem which means that it is definitely an issue that needs urgent attention. Everyone reports having suffered from malaria a couple of times, especially during childhood. Some of them had lost relatives to the disease, and again, most of them in their childhood. This means that age was considered one of the risk factors for people dying from malaria. A total of 77% of the respondents agreed that people who were aged 1-5 years were more at risk, while the other 23% thought that those who were less than one year were more at risk. Another predictor of risk mentioned was region. A total of 80% of them thought that the northern region was the hardest hit by malaria, and this region also had the least malaria control interventions because of war, lack of funds and poverty.

Malaria is not necessarily taught in all schools as part of the school curriculum so this is a strategy that could be used to increase awareness among young people, as well as letting them participate in malaria control interventions throughout the country. Their participation could also encourage involving even young people who are not in school.

## CHAPTER FIVE – Discussion

### Introduction

The goal of this study was to review malaria awareness status, review current and past efforts of other malaria intervention programs in Uganda and justify the need to implement education-based interventions like SLAM (Student Leaders Against Malaria) which is a MFI's (Malaria Foundation International) program as a strategy to fight malaria in Uganda. While there are numerous methods of malaria prevention, the interviewees feel that quite a number of people may not know about them even though they may be accessible to them. In addition, it is vital that not only the older people are aware of these methods, but the younger people too. Given the variety of their experience in malaria control, a needs assessment from the perspective of 30 interviewees working in five malaria control programs (the Malaria Consortium, Malaria Control Program, Ugandan Ministry of Health, Ugandan Malaria Surveillance Project (UMSP), and the Northern Uganda Malaria AIDS and Tuberculosis Program (NUMAT)) will be used as a base for implementation of malaria control programs on malaria awareness in Uganda. The three areas of research assessed on the questionnaire include the prevalence of malaria, awareness, and malaria control program implementation.

### Summary of study

Malaria is a leading cause of death in lower-income countries and for children worldwide. More than 80% of cases and more than 90% of deaths occurred in Africa in 2006, mostly among children under five years old. Malaria costs Africa more than \$12 billion annually. Children under 2 years of age and pregnant women are particularly at high risk for contracting

malaria. These children have not developed sufficient immunity and pregnant women have a reduced immunity (World Health Organization, 2008). Given the magnitude of this problem in Uganda, it is highly important to increase awareness in a bid to reduce morbidity and mortality. To determine where the deficiencies are and how to go about addressing them, 30 key informants were randomly chosen from 5 malaria control organizations in Uganda (the Malaria Consortium, the Northern Uganda Malaria AIDS and Tuberculosis Program (NUMAT), Ugandan Ministry of Health, Ugandan Malaria Surveillance Project (UMSP), and the Malaria Control Program) to answer relevant questions on a questionnaire. The three research areas addressed in the questionnaire included the prevalence of malaria, awareness of malaria, and malaria control program implementation. The data collected were analyzed and overall, it was confirmed that pregnant women and children who were five years old or less were most at risk, and therefore should be a target group when fighting malaria.

## **Conclusion**

Designed as a needs assessment, this study offers a glimpse at how study participants view malaria awareness. Using the results of this study, as well as the data reviewed in the literature, awareness malaria control programs should be designed and implemented. Important findings include the age groups and regions most affected by malaria, because if targeted, those would have a great effect on public health morbidity and mortality statistics. While malaria awareness is lacking, the implementation of a malaria control program would have a positive impact, especially if taught in schools and young people are encouraged to participate in intervention projects. Since students and young people are not usually involved in malaria control interventions, this program would increase malaria awareness. Encouraging involvement with international organizations and global projects would be another way to enhance awareness.

Age and Region were the perceived predictors of risk of getting or dying from malaria. A frequency of 77% confirmed age as a risk factor. Especially those in the 1-5 year age group were significantly more at risk of getting malaria or dying from the disease compared to adults. A total of 80% of the respondents agreed that the northern region of the country was most hard hit by malaria. Many of the people in northern Uganda are poor and not able to go to school. They were unaware of, or unable to afford preventive measures, such as insecticides, mosquito nets, etc. This would be a region to target when implementing the awareness and other malaria control programs. If the government could provide security and work with local and international programs to implement malaria control programs, this would go a long way to reduce the mortality in that part of Uganda.

## **Implications**

### **Program Policy: Targeting Students**

This study has major implications for program policy targeting students. Many studies have been done on malaria control in Uganda but none have focused on the fact that an enhancement of malaria awareness may actually help in reducing the morbidity and mortality rates. Making sure that malaria is taught in schools is vital to lowering the incidence and prevalence rates. In order to make sure that students are educated about malaria topics such as transmission, treatment, and prevention should be mandatory as part of every school's curriculum. Encouraging students to participate in community malaria prevention projects would make the implementation of the awareness malaria control project even more successful. Students who are not able to attend school due to a lack of funds would also benefit from participating in community projects such as those and thus become aware of malaria and how to prevent it. While funds/ resources may be a challenge for local programs, partnering with

international programs that are interested in malaria control is always an option. The Malaria Foundation International (MFI), which is a US-based outreach program with global initiatives has been identified as one such program and is interested in partnering. The MFI already has a similar project called SLAM (Student leaders against malaria), where students participate in malaria control projects.

Locally, the MFI will be collaborating with the Uganda Malaria Surveillance Project (UMSP) which was established in 2001 especially since they can help with integrating the current study results into policy. The UMSP's collaborating partners include the Uganda Ministry of Health, Malaria Consortium, Makerere University Institute of Public Health, Makerere University-University of California San Francisco Research Collaboration (MU-UCSF), UC Berkeley School of Public Health, and the Institute of Infectious Diseases. UMSP prioritizes training of public health leaders in Uganda, and so this collaboration should be a beneficial since its objectives include the following:

- Build and implement a multi-site surveillance system in Uganda to evaluate;  
(1) Efficacy of available and new antimalarial therapies (2) Potential antimalarial-related adverse events (3) Malaria-associated morbidity and mortality.
- Enhance local capacity and existing infrastructure to strengthen malaria control.
- Integrate results of research into policy by linking researchers, policy-makers, and districts.
- Create a sustainable network of research activities and contribute to malaria control in Uganda.



The most important recommendation is to identify as much as possible the areas that do not have adequate malaria awareness in order to identify where there is the greatest need for further services, and what is required. In addition, designing awareness programs that are specific to young people is important for the national growth of malaria control.

### **Implementation of malaria control**

Mosquitoes having their breeding grounds in wet, swampy areas found usually outside. Given that much of the population's time is spent outdoors, emphasis on education and prevention is important. Destroying the breeding grounds on the outside, using insecticides and mosquito nets on the inside are simple concepts that, if encouraged, would help in controlling the morbidity and mortality rates. Although they are practiced by some people, these are concepts that remain elusive, especially in the villages.

A total of 83% of the participants said that the northern part of Uganda has had the fewest malaria control interventions. For organizations that have not attempted to have any interventions in this region, it is because they have either met some challenges (especially the northern region) while attempting to do so, or they have some needs before they can undertake such a project. When asked to mention the three biggest challenges encountered during implementation, 47% of the participants reported political instability, 37% reported lack of funds, and 17% reported poverty. All the organizations said that money was the main resource needed to implement any project, and if this was available it was not a problem to come up with human resources to carry out the intervention.

Since the focus is on increasing student awareness, the participants were asked to mention five key things that needed to be included in school curriculums on malaria in order to

reduce incidence and prevalence rates. A total of 40% of the participants stated prevention methods (e.g. use of bed nets and insecticides), 23% stated risk factors, 17% thought of transmission methods, another 17% thought of treatment methods, and 3% stated participation in prevention projects (e.g. draining of swamps). However, a lack of mention by any participant does not necessarily indicate lack of an important topic.

### **Interventions and Recommendations**

Some informants mentioned that age is one of the things that put people at risk of malaria infection with 77% of infections occurring among children ages 1-5 years. Parents need to be encouraged to use mosquito nets, insecticides, and repellants for children in this age group, especially when they go to sleep at night. Dressing children up in full gear that will leave minimal skin exposure for mosquito bites in the evenings is also a helpful idea. For the older children in schools, this is when they have a chance to learn about malaria for themselves and engage in any malaria-related projects like SLAM, which was started by the Malaria Foundation International (MFI). Some malaria control programs have a lack of funds to get their intervention programs under-way. Partnering with international programs is encouraged to help with the implementation of local malaria control programs.

Malaria Foundation International (MFI)'s mission is to facilitate the development and implementation of solutions to health, economic, and social problems caused by malaria. SLAM is an educational program designed to engage students in both understanding and fighting malaria. SLAM's mission is to build a global network of student leader partnerships with the slogan "Kids Advocating for Kids". SLAM pilot projects involve students in the United States partnered with students in Africa and Asia. If different schools could partner with SLAM or

other similar projects, this would serve the purpose of increasing malaria awareness. Programs like SLAM need to be encouraged in all schools where students get physically involved in malaria control programs. This is a good way for the students to practice what they are being taught in school. For young people who are not enrolled in school, this is an opportunity to learn, understand malaria and its control. Public health officials in collaboration with the ministry of education need to monitor what public health issues are being taught in schools every year.

Many respondents indicated that another big predictor of risk was the region, and the northern region had an 80% response. This region is most hard hit by malaria and also has the least malaria control interventions. Below are the reasons why, in order, according to the respondents:

1. The on-going war in northern Uganda. Political insecurity does not encourage any programs operating out of this region
2. Poverty
3. Lack of funds. Most well-to-do people lived in the capital city and this is where most programs are likely to take place because of availability of funds and resources

Partnering with international programs seems to be the best way to deal with the problems listed above. The government should be encouraged to protect its people in the north so that this area can grow economically and interventions can be encouraged.

Other ways to increase awareness include:

- Place posters in public areas
- Develop brief educational programs which can be offered within 30 minutes in the work places

- Design malaria control awareness websites

## **Summary**

Results from the data analysis are going to be used to encourage awareness interventions that will involve student participation, especially since the majority of interviewees (83%) show that students are not involved in malaria interventions. If the results of this study can be integrated into policy, this will enhance awareness programs. When implementing these programs, researchers will visit a variety of schools, churches, children's projects, etc. in the districts, and enroll students to help place posters or visit homes and give brief lessons on malaria. Acknowledgement that malaria is a crucial public health problem compared to other ailments makes implementation of malaria control interventions worthwhile.

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## ***Appendix A***

### Sample of letter sent to survey participants

2/10/09

Dear Colleague,

**RE: A STRUTURED INTERVIEW FOR PROGRAM STAFF AND ADMINISTRATORS IN  
MALARIA CONTROL PROGRAMS**

This interview was designed for a research study which I am doing as a requirement for my studies for an MPH degree at the Rollins School of Public Health, Emory University. The research aims at assessing the needs associated with implementing programs aimed at fighting malaria in Uganda. This study will involve researching malaria awareness, looking at what interventions are already in place, and this will help us identify the gaps that need filling in the fight against malaria in Uganda. There are organizations like MFI (Malaria Foundation International) that have global initiatives like SLAM (Student Leaders Against Malaria) which is a program designed to engage students in both understanding and fighting malaria. MFI would be interested in intervening if the results of this research show a need implementation of such programs.

Your feedback will be of great use since the results are to be considered for program development and implementation as interventions to help in the fight against malaria.

You are one of six organizations that are participating in this research. No personal identifiers like names will be used in the study, or published. You will be given a 2 digit code to identify you personally.

This is a 15-20 minute recorded interview at the end of which you can ask some questions or give your contributions within the 20 minutes allocated to you. Let me assure you that any information given to me by you will be used for research purposes only, and tapes used during recording will be destroyed when the study ends.

Please sign the consent letter which will signify your willingness to participate in this study.

Thank you in advance for your invaluable contributions.

Dr. Agnes Mugerwa

Emory University, RSPH

[mugerwa@doctor.com](mailto:mugerwa@doctor.com)

**Name** .....

**Organization** .....

**Date** ..... (mm/dd/2009)



## ***Appendix B***

### **Questionnaire**

Participant # - 01

Instructions for completing the questionnaire

The interview will take approximately 20 minutes. Please answer every question carefully and I will check off the bubble that best represents your response. For those questions that do not have choices, I will carefully summarize your response.

Before we begin, let me give a brief summary of the study and why we are doing it.

These questions are being asked as part of a needs assessment study with a goal to identify the gaps in malaria awareness, and see if there is a need for education-based interventions as a strategy to fight malaria in Uganda.

Let us begin.

Participant Initials: \_\_\_\_\_ Organization/ Status: \_\_\_\_\_/ \_\_\_\_\_

Age: \_\_\_\_\_ Tribe: \_\_\_\_\_ Highest level of education \_\_\_\_\_

SES \_\_\_\_\_ Marital status \_\_\_\_\_ Number of children \_\_\_\_\_

Filled in by: \_\_\_\_\_ Date: \_\_\_\_\_

1. Does your work involve working on/ with anti-malarial programs?

- Yes  No  I don't know

2. Would you say that malaria is a big public health problem compared to others in Uganda?

- Yes  No  I don't know

(a) On a scale of 1- 3, how would you rate malaria as a public health problem in Uganda?

- Not severe  Severe  Very severe

(b) How many bouts of malaria do you recall having in your life time?

- Less than 5  More than 5  None

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(c) Have you lost any relative to malaria?

- Yes  No

3. In your opinion what puts people at risk of infection?

4. Which age group is the most at risk of dying from malaria?

- (a) < 1 year (b) 1 – 5 years (c) 6 – 18 years (d) 19 – 60 years (e) 60+ years

5. Which region would you say is most hard hit by malaria?

- Central  North  South  East  West

6. Which region would you say has had the least malaria control interventions to date?

- Central  North  South  East  West

(a) Why do you think there have been the least interventions in this region?

(b) Has your organization had or attempted to have any interventions in this region?

- Yes  No  I don't know

(c) If no, why not?

(d) Name 3 intervention programs that your organization has implemented in Uganda in the last 3 years?

(i)

(ii)

(iii)

7. Is malaria taught in schools as part of the schools' curriculum?

- Yes  No  I don't know

(a) If so, at what level(s) is it taught?

(b) Did you learn about malaria when you were in school?

- Yes  No

(c) What are 5 key things in your opinion that need to be taught in schools about malaria in order to equip students with the tools they need to curb infection rates?

(i)

(ii)

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(iii)

(iv)

(v)

9. What are the 3 biggest challenges you have encountered during implementation of those interventions?

(a)

(b)

(c)

10. Have any of these interventions involved students engaging in the fight against malaria?

Yes

No

I don't know

(a) If yes, how have students been involved?

11. Have some of your interventions been in partnership with international health projects?

Yes

No

I don't know

(a) If no, why not?

(b) If yes, what is your opinion about partnering with international programs in developing prevention methods involving students from Ugandan communities?

(c) Do you notice any difference in terms of reduction in morbidity and mortality rates when you work together with other groups on fighting malaria?

Yes

No

I don't know

(d) If your response is yes, why do you think this is the case?

That's the last question, I would like to say thank you for agreeing to be a participant in this study.

## ***Appendix C***

### **CODE BOOK**

**Rate malaria** = How they rate malaria as a public health problem in Uganda

*Not severe = 1, Severe = 2, Very severe = 3*

**Age Risk** = Age group at most risk of dying from malaria

*<1 year = 1, 1 – 5 years = 2, 6 – 18 years = 3, 19 – 60 years = 4, 60+ years = 5*

**Malaria by region** = Region most hard hit by malaria

*Central = 1, North = 2, South = 3, East = 4, West = 5*

**Intervention by region** = Region with least malaria control interventions to date

*Central = 1, North = 2, South = 3, East = 4, West = 5*

**Malaria in curriculum** = Malaria taught in schools as part of the school's curriculum?

*Yes = 1, No = 2, I don't know = 3*

**Five Key topics to teach** = 5 key things relating to malaria that need to be taught in schools to equip students with tools to curb infection rates (in their opinion)

*Risk factors = 1, Prevention methods = 2, Treatment = 3, Transmission = 4, Participation in prevention projects = 5*

**Three Challenges** = 3 biggest challenges encountered during implementation of interventions

*Political instability = 1, Poverty = 2, Lack of funds = 3*

**Students involved** = Any of these interventions involving students engaging in fight against malaria

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*Yes = 1, No = 2, I don't know = 3*

**International partnership** = Some of your interventions been in partnership  
with international health projects?

*Yes = 1, No = 2, I don't know = 3*