CAREGIVERS' HOME-BASED MANAGEMENT OF FEVER IN UGANDA

by

RICHARD SERUNKUMA BBOSA

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Supervisor: Professor VJ Ehlers

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DEDICATION

To my family; Kevin, Flavia, Peggy, Timothy, relatives and friends.

Student number 3494-553-9

DECLARATION

I declare that CAREGIVERS HOME-BASED MANAGEMENT OF FEVER IN MUKONO DISTRICT, UGANDA is my own work and all the sources that I have used or quoted have been indicated and acknowledged by means of complete references and that this work has not been submitted before for any other degree at any other institution.

……

Bbosa Richard Serunkuma.

Date: 10th February, 2010.

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Student number: 3494-553-9
Student: RICHARD SERUNKUMA BBOSA
Degree: Master of Public Health (MPH)
Department: Health Studies, University of South Africa
Supervisor: Professor VJ Ehlers

ABSTRACT

Malaria is endemic in Uganda. The study attempted to determine how Ugandan caregivers managed home-based care of fever. Structured interviews were conducted with sixty caregivers of children under five. In 15 (25.0%) out of the 60 interviewed households, at least one child had reportedly died from malaria.

Caregivers' decisions were influenced by health education, family members, community leaders and other caregivers. Most caregivers knew about malaria, but lacked knowledge about its danger signs, and about the services of village drug distributors. Most caregivers initiated treatment for fever at home before taking the children to health units. Mosquito nets, indoor residual spraying and other malaria preventive measures were rarely used due to lack of funds.

The recommendations include that anti-malaria drugs should always be available and accessible, the services of village drug distributors should be improved, health education should be enhanced, malaria preventive measures should be implemented and sustained.

Keywords:
Caregivers of children younger than five, home-based management of fever, malaria, Uganda, village drug distributor

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LIST OF ABBREVIATIONS

ACT	-	Artemisinin-based Combination therapy
ACTELLIC	-	Pirimiphos-methyl
AIDS	-	Acquired immune deficiency syndrome
CIA	-	Central interagency agency
Coartem®	-	Artemether (20mg) and lumefantrine (120mg).
CQ	-	Chloroquine
DDT	-	*Dichlorodiphenyltrichloroethane*
FENDONA	-	Alpha-cypermethrin
FICAM	-	Bendiocarb
GDP	-	Gross domestic product
HBMF	-	*Home Based Management of Fever*
HC	-	Health Centre
HOMAPAK®	-	Chloroquine and Sulfadoxine-Pyrimethamine
HSD	-	*Health Sub-District*
ICON	-	*Lambda-cyhalothrin*
IEC	-	Information education and Communication
IRS	-	*Internal Residual Spraying*
K-Otab	-	Deltamethrin
LLIN	-	Long-lasting insecticidal nets
MOH	-	Ministry of Health
MUK	-	Makerere University Kampala
Q	-	Semi-interquartile range
R	-	Range
RDTs	-	Rapid diagnostic tests for Malaria
SD	-	Standard deviation
Shs	-	Shillings
SP	-	Sulfadoxine-Pyrimethamine ‘
SSA	-	Sub-Saharan Africa
UBOS	-	Uganda Bureau of Statistics
UNISA	-	University of South Africa
WHO	-	World Health Organization

CHAPTER 1

ORIENTATION TO THE STUDY

1.1 INTRODUCTION

Malaria is one of the most important infectious diseases in the tropical world. This research was done to study how caregivers do home-based management of fever for children under five years in Uganda. This chapter discusses the orientation to the study and the general research context. It discusses the Ugandan government strategy of home-based management of fever. It presents the background to the study and provides the problem statement. The study also discusses research objectives and significance of the study. The chapter defines key concepts and the foundation to the study based on Bandura's social cognition theory. The chapter discusses application of the theory to this study.

1.2 BACKGROUND

The Abuja Declaration of African Heads of States in April 2000 addressed the "Roll back Malaria" initiative. The Ministry of Health (MOH) in Uganda implemented a policy on home-based management of fever in 2002 (MOH 2002:2). The policy was intended to avail quality pre-packed anti-malaria drugs at village level by village drug (medicine) distributors. These drugs were intended to be distributed among children younger than five years within 24 hours of a fever episode. This was expected to reduce morbidity and mortality due to malaria in children below five years and also reduce out-patient attendances in health

facilities by this age group. However, a review of out-patient data involving this age group indicated that the expected significant reduction in out-patient attendance at health facilities in the district did not materialise, prompting this study.

A quantitative descriptive study was done to investigate how caregivers do home-based management of fever for children below five years in Uganda. The study also intended to identify factors that influence these caregivers to manage childhood fevers in specific ways. The study was conducted in Mukono district, central Uganda.

1.3 THE RESEARCH CONTEXT

1.3.1 Information about Uganda

1.3.1.1 Geographic information

Uganda is a land locked country in central Africa, often referred to as the heart of Africa (refer to figure 1.1). It lies on the equator. It is bordered by Sudan to the North; Kenya to the East; the Democratic Republic of Congo to the West; and Rwanda and Tanzania in the south. Uganda shares Lake Victoria with Kenya and Tanzania. Its total surface area is 236 040 km^2. It is generally a raised plateau. It has a tropical climate which is warm and wet throughout the year. The vegetation includes tropical forests near the equator, but most of the country is generally tropical savannah grassland (MOH 2005a:3).

1.3.1.2 Demographic profile of Uganda

According to the Uganda Bureau of Statistics (2007:3) the population size of Uganda is 30.9 million. The total fertility rate is 6.9 and the annual population growth rate is 3.4%. This growth rate is one of the highest in the world (MOH

2006b:2). The population comprises ethnic Africans (99.0%); Asians, Europeans and Arabs make up the remaining 1.0%. The life expectancy is 45.3 years. The maternal mortality rate is 354 per 100 000 live births and the infant mortality rate is 86 per 1 000 live births (Uganda Bureau of Statistics 2007:4).

1.3.1.3 The economy of Uganda

According to the World Bank (2006), Uganda is classified as a low income country in the sub-Sahara African region. The economy is largely based on small scale agriculture. It is classified as a developing country with poor infrastructure and limited resources. The average gross domestic product (GDP) growth between 2000 and 2006 was 5.4% per annum and the inflation has been stable at an annual average of 6.5% (World Bank 2006:14). This means that the country's economy is small, stable and steadily growing. However, it is estimated that 35.0% of the population lived below the poverty line in 2007 (CIA World Fact Book 2008:3).

According to Index Mundi (2008:1-6), agriculture, is the most important sector of the country's economy. This sector employs about 80.0% of the work force with coffee as the major export commodity. The labour force distribution by occupation is agriculture 82.0%; industry 5.0%; and services 13.0%. This means that agriculture is a mass employer but contributing modestly to the economy since most people are subsistence farmers (CIA World Fact Book 2008:3). Uganda also has natural resources including fertile soils due to regular rain fall, and sizable mineral deposits of copper, cobalt, gold, oil and other minerals. The Index Mundi (2009:5-6) puts the gross domestic product per capita at $1 000 (2007 estimates) and the CIA World Fact Book (2008:3) puts it at $1 100 (2007 estimates).

1.3.1.4 Burden of disease

According to the Ugandan demographic and health survey report (2006:2), the major causes of disease in the country were: peri-natal and maternal conditions (20.4%); malaria (15.4%); respiratory tract infections (10.5%); AIDS (9.4%) and diarrhoeal diseases (8.4%). It is clear that malaria is an important health problem in Uganda. Most of these conditions, including malaria, are preventable.

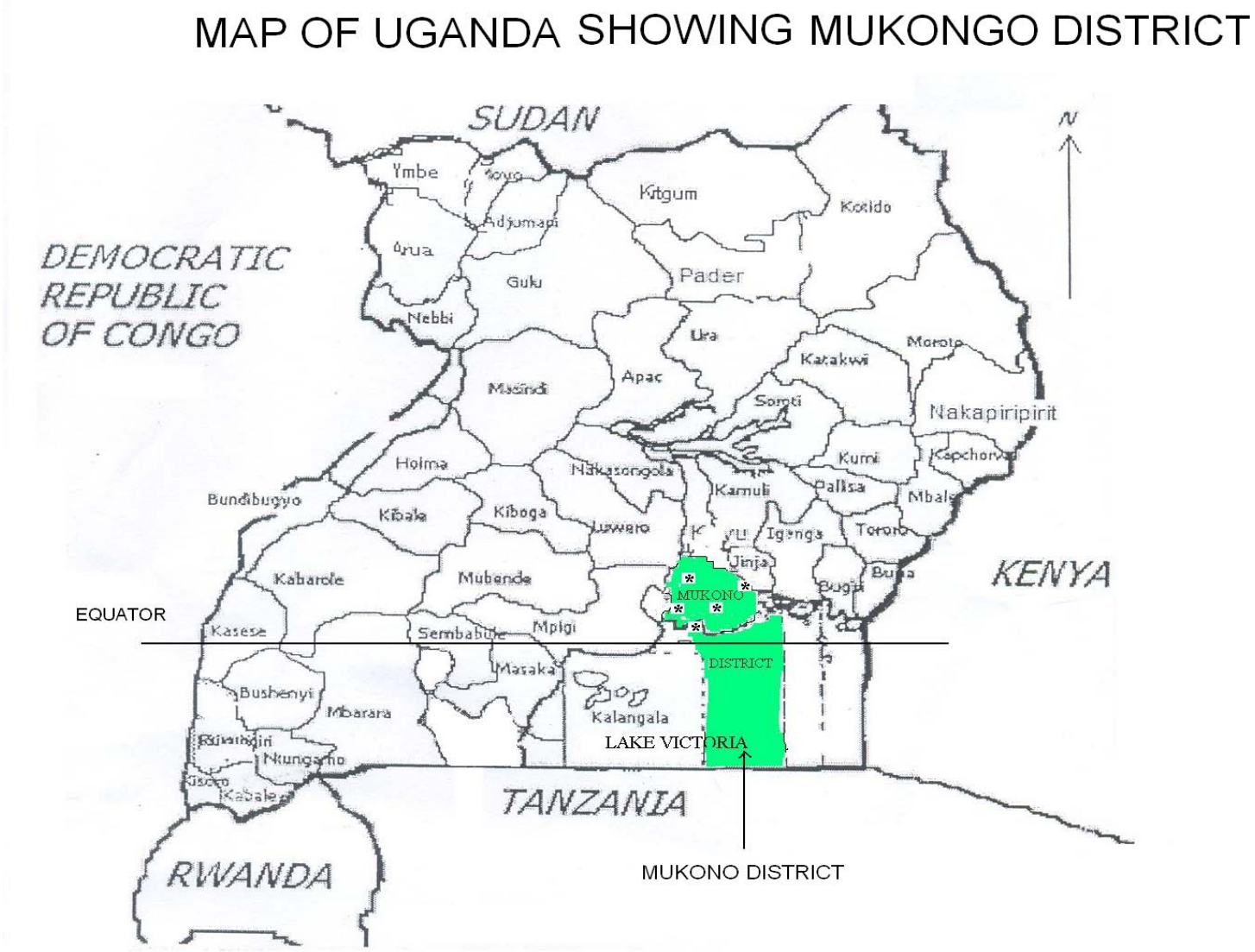

Figure 1.1: Map of Uganda showing the research site

(Adapted from Mukono District Council 2008)

1.3.2 Information about Mukono district, south-eastern Uganda

The study was conducted in Mukono district, located in south-eastern Uganda.

1.3.2.1 Geographic information

The shaded area in figure 1.1 is Mukono district where the research was conducted. The district is located in the south-eastern part of Uganda, on the equator, and has a land area of 11,764 km^2 (District Health Plan 2007/08:5). According to the Mukono District Council Report (2005:1), the district lies at an altitude of 1 000 – 1 300 meters above sea level. It lies on the shores of Lake Victoria, which comprises 68 islands. Mukono town is the district headquarters. It is located 21km to the east of Kampala, the capital city of Uganda.

There are many forest areas in this district. It has heavy rainfalls throughout the year. According to the District Health Plan (2007:5), the mean annual rainfall is 1 100 millimetres distributed over an average of 106 rainy days. The peak rainy seasons are between March to May, and September to November. Mukono district has a warm climate throughout the year. The temperatures range between 16^0C and 28^0C. These are excellent conditions for the breeding of mosquitoes that transmit malaria.

1.3.2.2 Demographic information

According to the District Health Plan (2009:6), the projected population of the district in the year 2008 was 929 000 people. The annual population increment rate was 3.4% per annum (Mukono District Council 2009:8). The number of children younger than five years was estimated to be 178 406 in 2008. This amounts to 19.2% of the total population of the district. It is estimated that, on

average, each child suffers from one episode (attack) of fever every two months (MOH 2005a:17).

1.3.2.3 The economy

In line with the national trends, most people in the district are peasant farmers practising subsistence farming. (Mukono District Council 2009:9). Since most of the people are small scale farmers, this means that the majority of the people are poor with limited sources of income.

1.3.2.4 Burden of disease

According to the Mukono District Council (2009:13), the top ten major causes of morbidity in the district are: malaria, respiratory infections, diarrhoeal diseases, intestinal worms, skin infections, dental diseases, anaemia, gastro-intestinal diseases, ear diseases and eye infections. Furthermore, the five major causes of death in the district are; malaria, peri-natal deaths, AIDS, diarrhoeal diseases and pneumonia. Malaria is thus an important health problem in the district.

1.3.3 Structure of Uganda's health care system

There are health facilities from the village level to the national level. The available health facilities include 104 hospitals of which 57 are government owned and 47 are private institutions (MOH 2006b: 18). Two of these hospitals are national referral hospitals and 11 are regional referral hospitals (MOH 2008a:6).

Apart from hospitals, health facilities also include health centres. There are 1 692 health centres of which 1 226 are government and 466 non-government health centres of various categories (MOH 2007a:1). The health centres (HC) are graded as health centre I, II, III and IV. The grading depends on the

administrative zone served by the health facility. These are the established (structurally) health units.

Health centre I:

This type of health centre has no structural establishment. Local village members who deal with health-related activities comprise what is referred to as the health centre I (MOH 2007a:3). Every village has community health care practitioners, community volunteers and community drug distributors who offer basic health education and health-related services to communities in their respective villages. They report health-related problems to health centre II. It is at this village level that the home-based management of fever is rendered.

Health centre II:

This type of health care centre serves a parish (MOH 2007a:3). A nurse, midwife and two nursing assistants render health care. This health facility is headed by the nurse. It provides basic health services for the parish including out-patient care, ante-natal care and immunisation.

Health centre III:

This type of health centre serves a sub-county (MOH 2007a:4). The workforce at this level includes one medical clinical officer, a laboratory assistant, two nurses, a midwife and a nursing assistant. This health care facility is headed by the medical clinical officer. It provides all the services of health centre II, plus in-patient care and environmental health. It has a maternity unit where normal deliveries are conducted. It conducts outreach activities within the sub-county.

Health centre IV:

This type of health centre serves a health sub-district (HSD). A health sub-district is an equivalent of a political constituency with an average catchment population of about 100,000 people (MOH 2007a:4). A medical officer, two medical clinical officers, one anaesthetic officer, two midwives, three nurses, and one public

dental officer render health care at this health centre. There are also one records officer, a driver and two support staff members. It is headed by the medical officer. A health centre IV offers all services of a health centre III, plus minor surgery since it has an operation theatre with ambulance services. It supervises all activities in health centres II and III within that health sub-district. A health centre IV serves as a mini hospital for a health sub district (MOH 2007a:2).

General hospital (district hospital):

According to the national hospital policy, (MOH 2005a:3) a hospital is defined as a registered health care facility, public or private organisation devoted to providing curative, preventive, promotive and rehabilitative care through out-patient, inpatient and community health services. It should have at least 60 beds. It serves a population of about 200 000 people. A district hospital is a rural health facility with both in-patient and out-patient services which serves as a referral hospital for patients from smaller health centres within the district, who suffer from health problems which can be managed by general medical practitioners (MOH 2007b:1). In the current study, Kawolo hospital is a district hospital in the Mukono district.

Regional and national hospitals

Above the district hospital, there are the regional, then the national referral hospitals. These hospitals offer specialised services in addition to other general services similar to those offered at general hospitals. They are also teaching hospitals for health sciences students (MOH 2005b:3). This forms Uganda's health care system.

Mukono district has a total of six hospitals. Kawolo hospital is the district hospital. It is the only government hospital in the district. There are also five private hospitals, namely Nyenga, Naggalama, Nkokonjeru, Buikwe and Scoul hospitals (Mukono District Council 2006:7). The district has other smaller health facilities

like health centres ll, health centre lll, and health centre lV. Other clinics are commonly managed by private practioners.

Malaria treatment takes place at all health care levels. At the health centre l level (community level), treatment of fever and uncomplicated malaria takes place. Here community medicine distributors take centre stage. Diagnosis is based on history taking and basic examination of the child. At health centre ll level, there is treatment of uncomplicated malaria and other common community health problems. At this level, diagnosis is by history taking and physical examination. At Health centre lll, the presence of a laboratory means that proper diagnosis by microscopic examination of blood is possible. This is done after history taking and physical examination. From this level, complicated malaria can be managed. Services like blood transfusion can be accessed at the hospital level.

1.3.4 Human resources for health

The health sector faces a major challenge of human resource training, deployment and management. According to the health sector strategic plan 2005-2010, the overall objective of Uganda's health care system is to achieve appropriate quantities and mixes of human resources, infrastructure, essential medicine and health supplies in order to support the delivery of the Ugandan national minimum health care package in an efficient and equitable manner (MOH 2005b:52). As of 2005, the overall national deployment of health care practitioners in all health units of the country was 68.0% of all available established posts in these health units. A specific objective of the strategic plan is to achieve 90.0% coverage of motivated health care practitioners in health units by the end of 2009 (MOH 2005b:53). This means that the health sector faces challenges of providing sufficient human resources countrywide. In order to ensure adequate health care coverage in Uganda, community-based village drug distributors are used to render care in their local communities. They are

important role players in the management of fever in children younger than five years of age.

1.3.5 Accessibility of the health care facilities

Like other developing countries, Uganda has limited health facilities. Though treatment in government health units is basically free, geographic access to health units is still low at 72.0%. This means that 72.0% of the population can access a health facility within a walking distance of five kilometres (MOH 2006b:55).

Malaria fever is the most significant health challenge in children younger than five years in Uganda. Home-based management of fever ensures improved access to medical care of fever in this population as this service is rendered at village level and is fee of charge. Home-based care therefore promises to be a solution to this problem of inadequate access to the health care services.

1.4 MALARIA AS A PUBLIC HEALTH PROBLEM

1.4.1 Malaria in the global and continental context

Malaria, a parasitic tropical disease, is a notable public health problem in 90 countries inhabited by 2.4 billion people, comprising 40.0% of the world's population. It is estimated that 300-500 million people worldwide are affected by malaria annually. Worldwide, malaria is responsible for about 1.5 million deaths a year (WHO 2006:13).

Malaria is the leading cause of morbidity and mortality in developing countries, including African countries. Out of 530 million people in the sub-Sahara Africa (SSA) region, 275 million (more than a half) have malaria parasites in their blood

although they may never develop the disease (WHO 2005:3-6). Malaria kills about 1 million people in Africa per year, mostly children. Most of these deaths, about 60.0% of all deaths in Africa, occur in Sub-Saharan Africa, especially among children in the remote areas of SSA (Eldryd, Richard, Mabey & Gill 2006:284-286; WHO 2005:3-6).

1.4.1.1 Malaria and poverty

Malaria is a major factor contributing to poverty in Africa. The World Bank (2006:15), estimates that the total annual economic burden in Africa is about US$ 12 billion. This is compounded by a huge direct cost (prevention and treatment) and indirect cost (labour time lost when sick and caring for the sick). In Uganda, the direct cost for treatment of a malaria episode averages US$ 4.10 in urban settings and US $1.80 in rural setting (MOH 2008b:160-161). The proportion of household expenditure on malaria may reach 34.0% in poor families. In Uganda, malaria is estimated to reduce the growth of the gross domestic product (GDP) by 1.3% per annum.

1.4.2 Malaria in the Ugandan context

In Uganda the hot and wet climate provides ideal conditions for the breeding and growth of mosquitoes (MOH 2005a:3). The disease is endemic in almost all districts in the country except in the mountainous areas of southwest and eastern Uganda where the altitude is above 2 000 meters above sea level. Generally, all people living in Uganda are at risk of malaria infection (MOH 2008b:159). Plasmodium falciparum is the most common cause of the disease in Uganda. Since it causes the most severe form of malaria, Ugandans are at risk of the most dangerous form of malaria. Malaria is the leading cause of morbidity and mortality of children under five years in Uganda. It accounts for 46.0% of illnesses in children, 20-40.0% of out-patient visits, 25.0% of hospital admissions and 14.0% of in-patient deaths in Uganda (MOH 2007b:1). According to the

service assessment survey report of the MOH (2008b:160-161), about 25-30.0% of deaths among children younger than five years in Uganda were due to malaria. This means 70 000 to 100 000 deaths per year. In addition to that, malaria has long term consequences for child development including chronic anaemia, physical and mental complications leading to poor academic performance. Similarly, malaria is the leading cause of morbidity and mortality in the Mukono district. This can be demonstrated by data from the Kawolo district hospital as indicated in Table 1.1.

Table 1.1 Most commonly diagnosed diseases among children younger than five years treated at the out-patient department at Kawolo hospital for 2004-2008

YEAR	2004	2005	2006	2007	2008
Diagnosed malaria	5 630 (57.4%)	6 237 (57.3%)	8 188 (58.4%)	6 845 (40.8%)	7 782 (52.0%)
Respiratory tract infection	1 377 (14.0%)	1 927 (17.0%)	2 957 (21.0%)	2 071 (12.3%)	2 068 (13.8%)
Intestinal worms	102 (1.0%)	90 (0.8%)	113 (0.8.0%)	158 (0.9%)	134 (0.9%)
Diarrhoeal diseases	26 (0.26%)	30 (0.27%)	121 (0.86%)	51 (0.3%)	71 (0.5%)
Total patients younger than five years	9 809	10 889	14 030	16787	14 947

(Source: Kawolo Hospital 2008)

Table 1.1 shows the top four diseases in children younger than five years at Kawolo hospital's out-patient department. It should be noted that the out-patient department is the entry point of all patients to the hospital. The data indicates that between the years 2004-2008, malaria was the leading cause of disease in children younger than five years in the Kawolo hospital catchment area. Malaria alone was responsible for more than half (57.0-58.0%) of all children reporting to the out-patient department of the hospital for that period. This means that malaria caused more morbidity than all other diseases combined in children younger than five years in this hospital. The second most common condition was respiratory

tract infections responsible for 14-21.0% of all cases reporting to this hospital during that time. Malaria is therefore a significant public health problem in the catchment area of the hospital which is the Mukono district. As such, much of the district resources for health care go towards managing malaria-related conditions.

Table 1.2 In-patient mortality statistics of children younger than five years

YEAR	2004	2005	2006	2007	2008
Total admissions	2 831	2 673	2 173	2002	2574
Total deaths compared to the total admissions (<five years)	115 (4.1%)	128 (4.8%)	96 (4.4%)	77 (3.8%)	69 (2.7%)
Malaria related deaths compared to the total deaths (<five years)	58 (50.4%)	71 (55.5%)	45 (46.9%)	33 (42.9%)	34 (49.3%)

(Kawolo Hospital 2008)

Table 1.2 indicates that malaria was responsible for about half of all deaths in children younger than five years at Kawolo Hospital. This means that malaria is the leading cause of in-patient deaths in children younger than five years in the hospital.

1.4.3. The Home-based Management of Fever Strategy in Uganda

1.4.3.1 The initiation of the strategy

According to Rugemalila, Wangi and Kilama (in World Bank 2006:5-102) the African Heads of State met at the 'African Roll Back Malaria Summit' in Abuja, Nigeria on 25th April 2000. This was in recognition of the significance of malaria as a public health problem in SSA. They called upon the United Nations to declare the period 2001 to 2010 a decade for Malaria. They passed the Abuja declaration of April 2000 where they pledged to:-

- increase access to prompt and appropriate treatment of malaria
- promote the use of personal protective measures including insecticide treated mosquito nets
- increase malaria chemoprophylaxis in pregnant women to 60.0% by 2005

(WHO 2004:10).

In accordance with the Abuja Declaration of April 2000, the Ugandan Ministry of Health set similar targets for the Health Sector Strategic Plan One (HSSP I) for the period 2001 – 2005 and beyond. As a means to achieve the stated targets, the Ministry of Health and its development partners established the home-based Management of Fever Strategy. In Uganda, the implementation of the strategy was launched in 2002.

The Strategy was expected to contribute to the reduction of morbidity and mortality due to malaria in children younger than five years through key elements, namely:

- communication for behaviour change
- distribution of free pre-packed anti-malaria medications at village level
- strengthening of health facilities to manage children referred from communities

The implementation of the Home-based Management of Fever Strategy started in Mukono district during May 2005. According to the Mukono District Council (2006:11), at least two drug distributors were initially appointed in each of the 1 119 villages within the district and they underwent the malaria training course. It was after that training that these drug distributors were given the responsibility of treating simple fevers at community level.

1.4.3.2 The nature of the strategy

The Home-based Management of Fever Strategy involves the training of community drug distributors, sensitisation of caregivers and the distribution of free anti-malaria medications. The purpose of this Strategy was to enable most of the children in the country to receive early treatment for fever with recommended medications at community level. In Uganda, malaria is common to such an extent that it can be assumed that most fevers in that age group are actually due to malaria. The government policy was to manage all children between two months to five years with fever as malaria cases, unless confirmed otherwise. Anti-malaria drugs were distributed to communities for the treatment of all fevers in that age group. This anti-malaria treatment should be given within 24 hours of the first fever attack (MOH 2006a:27).

The community drug distributors are selected by the members of each village. The community drug distributors work on voluntary bases. About two drug distributors are selected per village. They attend a two-day training course. The course includes information on the nature, cause and prevention of malaria. They acquire basic skills of identifying children with fever, administering anti-malaria medications and detecting cases of complicated malaria. Their basic training enables them to identify children who need to be referred to health facilities and to advise the mothers accordingly (MOH 2005b:41-42).

The major role of the community drug distributors is to give malaria treatment to children with fever. They record the treatment given and its outcomes, and submit reports to the nearest health facility. The community drug distributors are issued with anti-malaria medications. They work with the community to collect the medications from the health distribution centre. They are expected to safely store the collected medications. They are also supposed to educate the community on malaria prevention, the importance of prompt treatment and compliance to medications /prescriptions (MOH 2005b:41-42).

1.4.3.3 Medications for the home-based management of fever

The anti-malaria treatment comprises malaria medications which are distributed free of charge to all the children who presented with fever. They are packaged and named the HOMAPAK®. The packages were colour coded. The colour codes were intended to help the community drug distributors to easily identify the appropriate dosage based on age. The red pack was intended for children between two months and two years and the green pack for those between two and five years of age (MOH 2002:16).

Initially (2002-2006) this pack, (HOMAPAK®) contained Chloroquine [CQ], (150mg base tablet) and Sulfadoxine-Pyrimethamine [SP], (500mg; 25mg). However, because of resistance to Chloroquine-based combinations, the treatment guideline for malaria has changed. Malaria is currently treated using artemethersin-based combinations (MOH 2006a:4). The drug currently used for home-based management of fever is Coartem® - an anti-malaria drug which is a combination of artemether (20mg) and lumefantrine (120mg). This is in line with the current WHO recommendation for first-line treatment of malaria (WHO 2006: 1-2).

1.4.3.4 Importance of the home-management of fever

Since malaria is the major cause of disease in children in Uganda, (refer to table 1.1), this disease places a high burden on health care institutions in general, and health care practitioners in particular. Effective home-based treatment of fever could result in a general reduction in out-patient clinic attendance and hospital admissions of children younger than five years. The in-patient load to already overburdened health facilities could be reduced. The other benefit is the possibility for early referrals to health units of children with complicated malaria.

The strategy would then reduce morbidity and mortality levels due to malaria. Significant public health gains have been achieved through home-based management of fever. It is capable of reducing the progression of fevers into severe disease by 40-50.0% (MOH 2002:26). A study done in Ethiopia revealed that home-based management of fever reduced mortality in children younger than five years by 40.0%. The researchers concluded that shopkeepers, medication vendors, village drug distributors and school teachers can be effective and acceptable channels of the home-based management of fever. They recommended training of these persons in order to equip them with the necessary knowledge and skills in the management of fever (Kidane & Morrow 2000:550-555).

A study done in Malawi by Kazembe, Appleton and Kleinschmidt (2007:14-16), revealed that caregivers found it easier to manage malaria at the community level compared to taking children to established health units. This implies that early case detection and management was possible in community-based fever management. These researchers then recommended that more effort should be put into improving the quality of malaria home treatment. This could be achieved through the provision of appropriate medications and accurate doses for home-based treatment of fever.

A study by Malimbo, Mugisha, Kato, Karamagi and Talisuna (2006:120-124), in Uganda, revealed that caregivers' perceived treatment failure were lower (15-23.0%) in formal health facilities and in cases where home-based management of fever medications were applied compared to alternative informal sources of treatment. That particular study found higher caregiver perceived treatment failures among those caregivers who used traditional herbs (56.0%), compared to caregivers who obtained medicines from drug shops (55.0%), and medical care from private clinics (38.0%). These researchers concluded that home-based management of fever was a good strategy which should be sustained.

1.5 RESEARCH PROBLEM

1.5.1 Overview of the research problem

Malaria is a major public health problem in Uganda. The Home-based Management of Fever Strategy was established to reduce the morbidity and mortality associated with malaria in children younger than five and to reduce the burden placed on the health care institutions due to out-patient clinic attendances and hospital admissions. However, despite the implementation of the Home-based Management of Fever Strategy, the numbers of children younger than five years who received malaria treatment at the out-patient department of Kawolo hospital appeared to show no significant reduction at the time when this study was conceptualised.

Studies done in other countries, like Burkina Faso, revealed that the Home-based Management of Fever Strategy led to a reduced prevalence of severe forms of malaria by 50.0%. Studies done in Ethiopia revealed reductions in deaths due to malaria in children aged five years and younger by 40.0% (MOH 2002:26). The reasons why these reductions did not materialise in the Mukono district were unknown at the time when this study was conceptualised.

Table 1.3 Children younger than five years diagnosed with malaria in 2002-2008 at the Kowolo district hospital

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2002	485	231	313	331	330	430	480	329	269	316	349	309
2003	422	317	324	338	507	475	469	371	325	322	441	379
2004	500	365	461	494	579	557	424	316	335	432	575	592
2005	455	612	489	556	752	832	643	390	310	355	457	386
2006	424	410	513	770	1519	1045	597	651	580	518	600	605
2007	840	724	488	480	455	552	535	682	504	488	655	425
2008	499	578	492	828	784	843	978	766	465	451	582	506

(Kawolo Hospital 2009)

Table 1.3 indicates that the expected significant reduction in the number of children reporting to the hospital with malaria did not materialise. In fact there was a slight increment from 2002 to 2008.

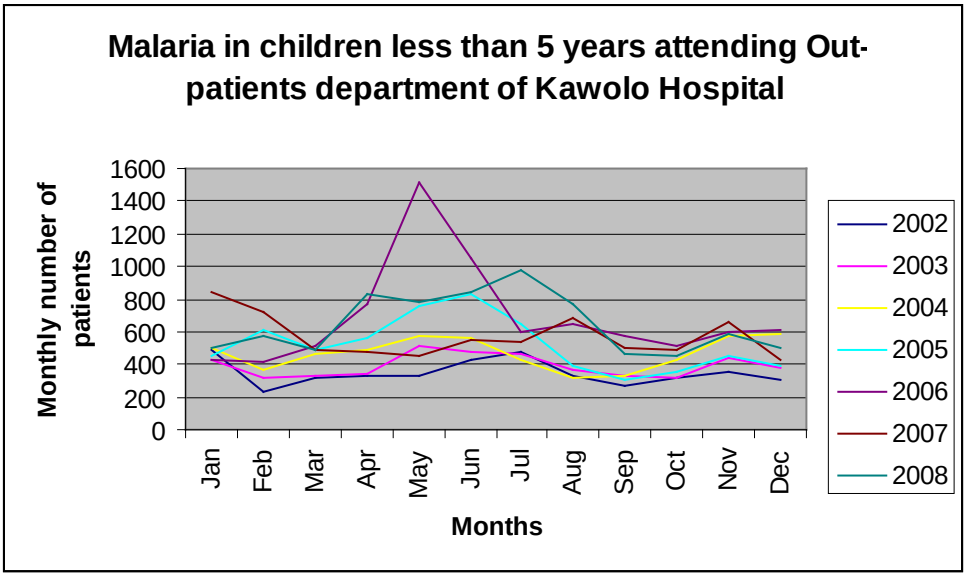

Figure 1.2 Graphical presentation of children younger than five years diagnosed with malaria in 2002-2008 at the Kawolo Hospital, Mukono district, Uganda (Source: Owori 2009)

Figure 1.2 indicates the monthly number of out-patient malaria cases at the Kawolo Hospital covering the period between 2002 and 2008. A close look at the graph shows no significant differences between the periods before the introduction of Home-based Management of Fever Strategy (January 2001 - June 2005) and afterwards (July 2005 up to December 2008). There was a slight reduction in such cases between September 2005 and March 2006. However, there was a significant increment in the number of malaria cases from April 2006 to December 2006. The increment was sustained through 2007 to 2008. This was so despite the introduction of the strategy in the district. The expected reduction in malaria cases presenting at the out-patient department was not

significant and was not sustained. One would have expected a significant reduction in the number of malaria cases reported at the health facilities since a large number of these cases could have been effectively managed at home.

1.5.2 Problem statement

A problem statement identifies the nature of the problem that is being addressed in the study and its context and significance (Unisa 2005:6). Despite the implementation of the Home-based Management of Fever Strategy in June 2005, Mukono district did not achieve the expected decline in the number of children with fever attending Kawolo hospital. The reasons for this were unknown when this study was conceptualised.

Caregivers are important determinants for the success of the Home-based Management of Fever Strategy. They play a key role in the early detection of fever in children younger than five years and their decisions determine whether they will seek help from community medicine distributors and utilise the available drugs at community level (MOH 2005a:14). The researcher recognised the necessity to have insight into the health seeking behaviours of caregivers and the reasons behind their behaviour in order to understand the reasons why the number of diagnosed cases of malaria had not declined since the implementation of the Home-based Management of Fever Strategy.

The researcher speculated that various factors, or a combination of factors, might have hampered the expected outcome of the Home-based Management of Fever Strategy. The following factors were intuitively considered to influence the health seeking behaviours of the caregivers and it was necessary to test this by means of research:

- Caregivers might not have been aware of the availability of the free anti-malaria medications at community level.

- Caregivers might have had a lack of trust in the effectiveness of locally available medications.
- There might have been a periodic unavailability of the medications because of irregular stocking of the drugs at community level.
- A lack of trust in the competence of the drug distributors might have prevailed among the caregivers.
- Caregivers might have preferred to have their children medically treated after laboratory tests confirmed a malaria diagnosis rather than instituting symptomatic treatment.
- Caregivers might have considered that drugs administered at hospitals, including injectable medications, to be more effective than those administered at community level.
- Caregivers might have preferred to utilise traditional health care services, including herbal medications rather than opting for the anti-malaria medications provided by the village drug distributors.

A study conducted in Uganda, by Nsabagasani, Nsungwa, Kallander, Peterson, Pario and Tomson (2007:13) sought to determine why the utilisation rate of HOMAPAK® was at the low level of 25.0%. The study revealed that the caregivers attributed treatment failures to the use of inferior drugs at community level. They consequently did not give the drugs again to children who had not responded to previous treatments. The researchers concluded that the acceptability of home-based management of fever strategy depends on the availability of medicines which are effective. It is therefore important that high quality medicines are used in the home-based management of fever to ensure the successful implementation of the Home-based Management of Fever Strategy.

With reference to this current study, it was necessary to determine the reasons for the lack of progress towards reducing the number of children younger than five in the Mukono district despite the implementation of the Home-based

Management of Fever Strategy. The central question that guided this research was therefore: *How do caregivers in Uganda manage fever at home in their children younger than five years and what are the reasons which underpin their practices?*

1.6 PURPOSE AND OBJECTIVES OF THE STUDY

1.6.1 Research purpose

The purpose of the study was to describe caregivers' practices in the management of fever in children younger than five years and the reasons for the apparent under-utilisation of the services rendered by the community drug distributors, and specifically the available anti-malaria medications which are distributed free of charge as part of the Home-based Management of Fever Strategy.

1.6.2 Research objectives

The study had three specific objectives. These were to:

- Describe the environmental factors which influence health care-practices of caregivers.
- Describe the intrapersonal characteristics which influence health care-practices of caregivers.
- Describe the health care-practices including care-seeking behaviours of caregivers in home-based management of fever in children.

1.7 SIGNIFICANCE OF THE STUDY

The study is of significance for health policy makers, planners and implementers in improving child health through case management of malaria at community

level. The study identified barriers against the utilisation of services for home-based Management of fever. The study also identified how caregivers manage fever at home in children under five years. Then, the researcher proposed recommendations, which could contribute towards improved management of fever in children. This could lead to reduction in morbidity and mortality in children due malaria. This means that the number of patients going to health units could be reduced therefore, availing more health facilities including health care practitioners to provide quality health care to the rest of the population. This finally could contribute towards a decrease in the morbidity and mortality levels of children younger than five years and the general population.

1.8 DEFINITIONS OF KEY CONCEPTS

1.8.1 Caregiver

The Merriam-Webster's Collegiate Dictionary (2004:187), defines *care* as paying close attention. The Merriam-Webster' Collegiate Dictionary (2004:530), defines *giver* as one who offers. This means that a caregiver is a person who offers protection, or pays close attention to, somebody else. In this study, a caregiver means a mother, or a father, or guardian or any other person taking care of a child who suffers from fever and/or malaria.

1.8.2 Care practice

The Merriam-Webster's Collegiate Dictionary (2004:974), defines *practice* as making a habit or a custom of something. In this study, the phrase *care practice* means the caregivers' habits and customs related to in managing childhood fever and malaria.

1.8.3 Child

The Merriam-Webster's Collegiate Dictionary (2004:214), defines the term *child* as a boy or a girl before puberty. In this study, *child* is used to refer to girls and boys younger than five years of age. A *reference child* refers to that child who was sampled so that child's caregiver was interviewed for the study.

1.8.4 District

The Merriam-Webster's Collegiate Dictionary (2004:364-5), defines a district as a geographical or a political division made for a special purpose. In this study it will mean an administrative sub-unit of a country (Uganda), specifically the Mukono district.

1.8.5 Fever

The Merriam-Webster's Collegiate Dictionary (2004:464), defines fever as a state of abnormally increased body temperature. Eldryd et al (2004:104) define fever as a rise in the internal (core) body temperature. In this study, fever means raised internal body temperature that can be detected by the caregivers and drug distributors at home by touch.

1.8.6 Home-based Management of Fever Strategy

Home-based management refers to the diagnosis and treatment occurring outside the clinical setting (WHO 2004:6). In this study, the *Home-based Management of Fever Strategy* refers to the Ugandan government's policy of managing fever at home using free anti-malaria medications available at community level.

1.9 FOUNDATIONS OF THE STUDY

This study was based on metatheoretical assumptions and Social Cognitive Theory.

1.9.1 Meta-theoretical assumptions

Assumptions are statements or principles which are taken for granted or considered true based on logic or reason, even though they have not been scientifically tested (Polit & Beck 2008:748). Assumptions or presuppositions are hypothetical statements that researchers choose not to submit to empirical testing. The assumptions which underpinned this current study were as follows:

- Each child younger than 5 years is cared for by a caregiver.
- Caregivers' health seeking behaviour is influenced by personal and environmental factors.
- Humans are proactive, self-reflective and self-regulating beings thus caregivers choose how to utilise available health care services.

1.9.2 Theoretical framework

The Social Cognitive Theory formed the basis of this study. According to Bandura (1977:22), the Social Learning Theory, explains human behaviour in terms of continuous reciprocal interaction between cognitive, behavioural and environmental influences. The theory has also been applied to many aspects of development, such as gender and morality.

1.9.2.1 Theoretical roots

The Social Cognitive Theory originated in the United States of America in the 1940s and 1950s. It is an interpersonal health behaviour theory evolved from

research based on the Social Learning Theory (Croyle 2005:19). The latter theory asserts that people learn not only from their own experiences, but by observing the actions of others and the benefits of those actions. Bandura updated Social Learning Theory by adding the construct of self-efficacy and renaming it the Social Cognitive Theory. ”Though the Social Cognitive Theory is the dominant version in current practice, it is still sometimes called the Social Learning Theory” (Croyle 2005:20).

1.9.2.2 Purpose and application of the Social Cognitive Theory

The Social Cognitive Theory explains how people acquire and maintain certain behavioural patterns while providing a basis for intervention strategies. It provides explanations on how cognitive, psychosocial and environmental factors influence behaviour and behavioural change. This theory can be used to investigate the factors that determine health behaviour and devise strategies to promote behavioural change with regard to health (Bandura 1997: 20). Thus the Social Cognitive Theory is relevant to mass media, education, marketing, health education and health behaviour programmes. In this study, the theory was used as the basis to develop the data collection tool.

1.9.2.3 The key theoretical concepts

According to Croyle (2005:20), the Social Cognitive Theory integrates concepts and processes from cognitive, behaviourist and emotional models of behavioural change. Such concepts include reciprocal determination, behavioural capability, expectation, self-efficacy, observational learning (modelling) and reinforcement. For a better understanding of the Social Cognitive Theory, these concepts will be discussed in more detail.

- ***Concept of reciprocal determination***

According to Croyle (2005:20), the concept of reciprocal determination is defined as the dynamic interaction of the person, behaviour and environment in which the behaviour is performed. These three factors influence one another in various ways (see figure 1.3). Personal factors are influenced by the environmental factors to determine personal behaviour. However, peoples' behaviours influence the environment and are actually part of the environment (Beckmann & Zentner 2001:246). Behaviour partly creates the environment and the resultant environment in turn influences the behaviour of people who stay there. This forms the basis of the Social Learning Theory (Hodder 2005:618).

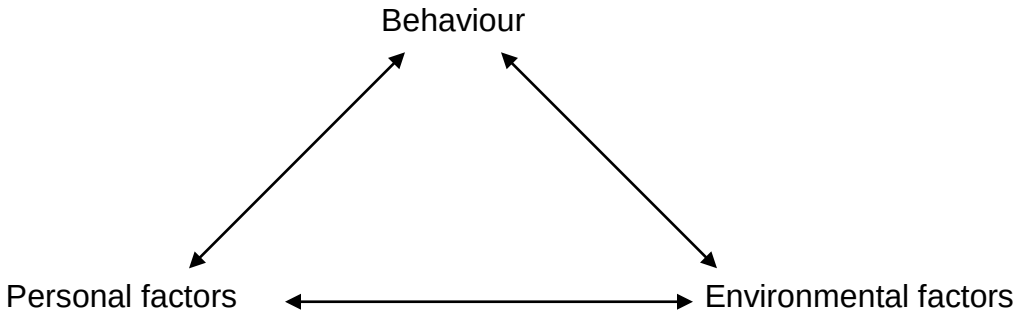

Figure 1.3 Conceptual model of reciprocal determination (Adapted from Croyle 2005:21).

Behaviour

Behaviour refers to one's observable conduct in a society (Hodder 2005:78). Peoples' behaviour will determine aspects of their environment to which they are exposed, and behaviour in turn, is modified by that environment. This implies that an individual's behaviours influence and are influenced by environmental and personal factors. This theory stresses the need for personal, social, and behavioural skills development to enable individuals to put into practice their convictions regarding health-related decisions (Croyle 2005:19-20).

According to Beckmann and Zentner (2001:246), behaviour choices may be expressed in the form of observable conduct like verbal statements, behaviour actions, and trial and error experiences. Such observable conduct depends on a person's decision to behave the way they do and is unique to that individual. In thus study, behaviour is viewed in terms of the caregivers' practices in the home management of fever. Caregivers have choices of seeking health care from neighbouring health units, village drug distributors or traditional healers; or they can just buy drugs from local drug shops.

The concept of behavioural capacity states that, "to perform a behaviour, a person must know what to do and how to do it" (Croyle 2005:21). Thus, one must know the required behaviour and have skills to perform it (Glanz, Rimer & Lewis 2002:16). This gives the educational or training dimension of this concept. People require clear instructions and training about what to do and how to do it.

Environmental factors

According to Glanz et al (2002:169-177), environment includes physical and social environment. Physical environment includes living conditions, infrastructure and all circumstances that surround an individual while social environment includes family members, friends and colleagues. Environment refers to external factors that can affect a person's behaviour. In this study, environmental factors include community drug availability, community drug distributors, availability of health facilities, community opinion leaders and other social economic conditions of the community.

Personal factors

Beckmann & Zentner (2001:246) describe personal factors as perceptions, beliefs, feelings, attitudes, values, expectations, goals and intentions. Beckmann

and Zentner (2001:246-250) further describe perception as a personal attribute that means how such a person understands or perceives ideas. Beliefs are one's convictions or acceptance that certain things are true. Feelings are expressions of emotions or sympathy. Attitudes are personal feelings or thinking that shows one's disposition or mental state. Values are personal standards or one's intrinsic worth. Expectations are personal prospects for the future or looking forward to something in the future. Goals are the objectives or the ends that one strives to attain. A person's intentions are specific things that one intends to do or aim at. All these factors are unique to an individual and characterise individuals and influence their behaviours. These personal factors influence the way an individual responds to health related programmes. However, they are modified by environmental factors like the availability of facilities and drugs at the community level. Caregivers may have good health seeking attitudes but inaccessibility may hinder their health seeking endeavours.

Self-efficacy refers to ones' ability to take action and persist in pursuing that action (Croyle 2005:20). People do not simply react to external influences. They exercise self-control by assessing their skills and their capabilities to translate those skills into action. They select, organise and transform impinging stimuli. In this way, they exercise influence over their personal behaviour (Beckmann & Zentner 2001:246).

1.9.2.4 Observational learning

The concept of observational learning is the behavioural acquisition that occurs by watching the actions and outcomes of others' behaviours (Croyle 2005:20). This concept suggests that people learn from each other by observing what others do and following their example. Observational learning can also be referred to as modelling (Croyle 2005:20). A model is the one who is being watched. This is usually a senior and respected person in the community (Beckmann & Zentner 2001:246). Modelling usually occurs spontaneously with

no deliberate effort by the learner to emulate the model or any intention by the model to teach anything. The mere exposure to the model is sufficient for learning to occur (Hodder 2005:246).

Imitation is when one tries to behave or act in the same way as the model. It is a kind of observational learning. It is one of the most effective forms of learning. Babies learn to speak by imitating the sounds of their parents. Older children learn a number of behaviours by watching teachers, parents and peers. Adults too learn and imitate from others particularly those considered to be models (Beckmann & Zentner 2001:246).

Reinforcements are responses to a person's behaviour that increase or decrease the likelihood of reoccurrence (Croyle 2005:20). People learn through such responses or the outcomes of their behaviours. This means that peoples' previous experiences may determine whether they will repeat or abandon a particular action. When the outcomes of a particular action are positive, people are likely to repeat the action. However, negative outcomes are likely to lead to the abandonment of the practice. In this study, caregivers will be asked if they have role models from whom they imitate in the management of fever at home.

1.9.3 Application to this study

The Social Cognitive Theory served as a point of reference for this current study. The caregivers' practices, including their health seeking behaviours were investigated. Factors that influenced their behaviour were also investigated. The interview schedule included a section on the caregivers' personal characteristics like age, gender and educational level. In addition to this, it included a section on the personal factors which influenced the participants' behaviours. This section covered aspects such as behaviour capacity, self-efficacy, beliefs, attitudes and expectations. The interview schedule also addressed the knowledge of the caregivers on the Home-based Management of Fever Strategy and the influence

of their past experiences of the consequences of their health seeking behaviours on their current practices.

The interview schedule also sought to probe the influence of environmental factors like economic factors, distance from the health unit, availability of alternative health care and other factors related to caregivers' environment. The tool also assessed the extent to which, caregivers' health-seeking behaviours were influenced as the result of observing and imitating models. The influence of health education and training received from community drug distributors and other health care practitioners on appropriate ways of management of fever in children younger than five was analysed.

1.10 RESEARCH DESIGN AND METHODS

A quantitative descriptive study was done to investigate how caregivers did home-based management of fever for children below five years in Uganda. The study was based on Bandura's Social Cognitive Theory. Stratified sampling of caregivers (n=60) was done at the community level in Mukono district. Data collection was done using a structured interview schedule.

1.11 SCOPE AND LIMITATIONS OF THE STUDY

Since the researcher intended to meet respondents at the community, the caregivers of all children younger than five in the community, including all who had utilised the home-based management of fever strategy, had a chance of participating in the study. The researcher faced limited resources. A sample of 60 respondents was interviewed. This meant that the researcher was unable to access a larger sample for the findings to be more representative of the study population. The children's names were not selected in a truly random manner, but the first and every third child were selected from each of the six participating

villages. Moreover, children were selected and their caregivers were interviewed because no census of caregivers per se existed. This meant that one caregiver might have been selected more than once, if he/she looked after more than one child. No caregiver was interviewed more than once.

Only structured interviews were used to collect data and the children's health files could not be accessed to check the caregivers' information. Only the caregivers were interviewed, not the children. Qualitative in-depth interviews might have revealed information unobtainable through structured interviews only.

1.12 STRUCTURE OF THE DISSERTATION

Table 1.4 presents the structure of dissertation.

Table 1.4: Structure of the dissertation

CHAPTER	TITLE	CONTENT DESCRIPTION
1	Introduction and overview	Information is given on Uganda and the specific research context. The research problem, the research purpose and the significance of the study are outlined. The key concepts are defined and the foundations of the study are outlined.
2	Literature review	The literature review centres on malaria according to the biomedical perspective.
3	Research design and methods	This chapter describes the research design and methods, and the ethical principles which the researcher applied during the empirical stage of the study.
4	Research findings	The research findings are presented and interpreted in this chapter.
5	Conclusion	In this chapter, the research findings are summarised, and conclusions and recommendations are supplied.

1.13 SUMMARY

This chapter discussed malaria as a global public health infectious disease which especially affects developing countries in tropical and subtropical areas. The

chapter discussed how fever in children younger than five is managed on the basis of the home-based Management of Fever Strategy in Uganda. The chapter discussed the problem statement, significance of the study objectives of the study. The chapter discussed Bandura's Social Learning Theory which formed the foundation of the study. The next chapter reviews available scientific literature on malaria from a biomedical perspective.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

The previous chapter provided an overview of the subject of home-based management of fever strategy in the Ugandan perspective. This chapter deals with malaria from the scientific aspect. The literature review presents a scientific discussion of malaria and related research. This chapter deals with epidemiology of malaria, its transmission and factors that determine its distribution. The pathophysiology, clinical presentation, complication and current management of the disease are discussed. Malaria prevention and control measures are also discussed. The chapter also covers ethical issues complied with during the literature review process.

2.2 MALARIA

2.2.1 Definition

“Malaria is a disease caused by infection of the red blood cells by a protozoa organism called plasmodium of which there four types” (Schull 2007:55). It is an acute febrile illness caused by a single celled malaria protozoan parasite (Malaria Consortium 2007:6).

2.2.2 Transmission

2.2.2.1 The agent

There are four types of malaria parasites which infect humans. The four types are *plasmodium falciparum, plasmodium vivax, plasmodium ovale* and *plasmodium malariae*. Of these, *Plasmodium falciparum* is the sole cause of the most dangerous form of malaria (Schull, 2007: 55). Plasmodium falciparum is the most common type of the disease in Uganda (MOH 2005a:2). Plasmodium falciparum is responsible for over 95.0% of malaria episodes in Uganda (MOH 2007c:2). Malaria is as a result of infection by one or more of the four plasmodium parasites. This means that, one can contract malaria infection involving more than one of the plasmodium species.

2.2.2.2 The vector

According to the Malaria Consortium (2007:7), malaria is transmitted from one person to another by the female *anopheles* mosquito after sucking blood from an infected person. In order for malaria to be transmitted, there must be a bite from a previously infected female *anopheles* mosquito. This is the only type of mosquito capable of transmitting the malaria parasite. The anopheles mosquitoes which most often transmit malaria in Uganda are: *anopheles*

gambiae, anopheles arabiensis, anopheles bwambae and *anopheles funestus* (MOH 2008b:2). Malaria transmitting mosquitoes tend to bite at night when people are indoors and asleep. This kind of feeding is referred to as endophagy. Anopheles mosquitoes are attracted to their host (humans) by a number of stimuli like carbon dioxide, warmth, moisture, lactic acid and other odours from the hosts. In addition to mosquito transmission, malaria can also be transmitted by blood transfusions. Mother-to-child malaria transmission through the placenta might also possible but such transmission is uncommon.

- **Lifecycle of a mosquito**

According to the Malaria Consortium (2007:11), a mosquito has four main stages of life. These are the egg, larvae, pupa and adult life stages. Each female is fertilised once and lays 70 to 200 eggs in a few days. These eggs are laid in water. After two to three days, these eggs hatch into larvae. The larvae feed by filtering algae and other materials from the water. During the three days' larval stage, they undergo three moults to become pupae. The pupa develops at the end of the third moult of the larva. It becomes the mobile pupa.

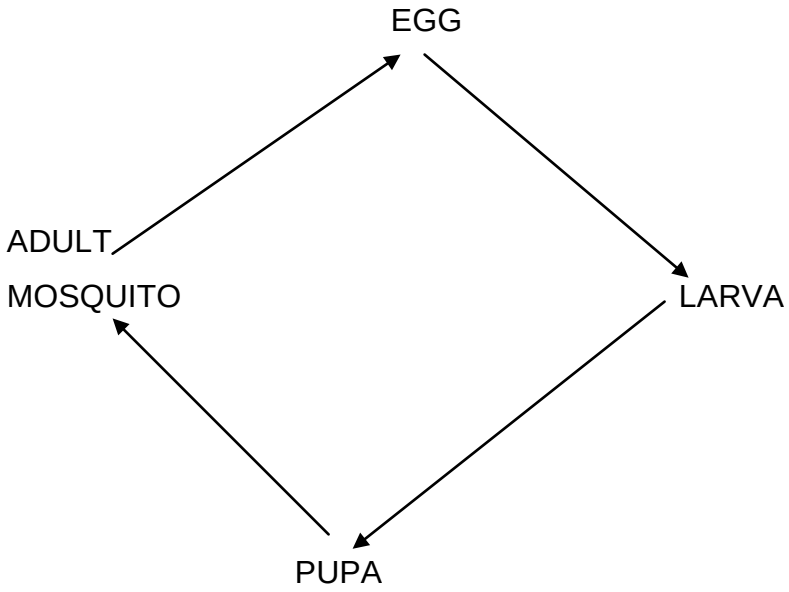

Figure 2.1: Lifecycle of a mosquito (see 2.2.2.2)

(Adapted from MOH 2005a:4)

The pupa does not feed. It breathes through two air trumpets while the adult develops internally. After two to three days of the pupa stage, the pupa splits and the adult climbs out, dries, hardens and flies off. So the cycle from egg to the development of the mosquito takes about one week (MOH 2005a:3-5). The average lifespan of a mature female *anopheles* mosquito in favourable conditions is 10 to 14 days. However, male mosquitoes live for a shorter time (Malaria Consortium (2007:12).

2.2.2.3 Environmental and climatic conditions

For transmission of malaria to take place, there should be adequate basic optimal factors of temperature, humidity and water, which provide ideal conditions for the breeding of mosquitoes. According to Schull (2007:55-56), environmental temperatures should be above 15^0C. The ideal temperature is 20-30^0C. This temperature is attainable in the tropical and subtropical regions below an altitude of 1600 metres. The second important factor is the relative humidity of higher than 60.0%. In addition to this, water is vital to provide the conditions for the breeding of mosquitoes, especially stagnant water (Malaria Consortium 2007:3-12). Conditions for the breeding of mosquitoes become more unfavourable the further one moves away from the equator.

2.2.2.4 Host

'Man is the only host of the four malaria parasites' (Schull 2007:55). The incubation period of malaria in man is the time from the bite of an infected mosquito until the start of signs and symptoms of malaria. It is usually about two weeks (Schull 2007:511). However, it's often much longer but cannot be shorter than eight days.

2.2.3. Pathophysiology

The pathophysiology of malaria is related to its life cycle in man. According to the Malaria Consortium (2007:8-10), when a mosquito injects sporozoites into a person's blood, many are destroyed by the host's immune system. The surviving sporozoites enter the liver cells within about a half an hour. They develop asexually into thousands of merozoites in the liver cells. This marks the liver stage also called the exo-erythrocytic schizogony (see figure 2.2). It is referred as exo-erythrocytic schizogony because it takes place outside the red blood cells. This takes six to sixteen days depending on the species. After maturing, the liver cells burst to release thousands of merozoites into the blood stream.

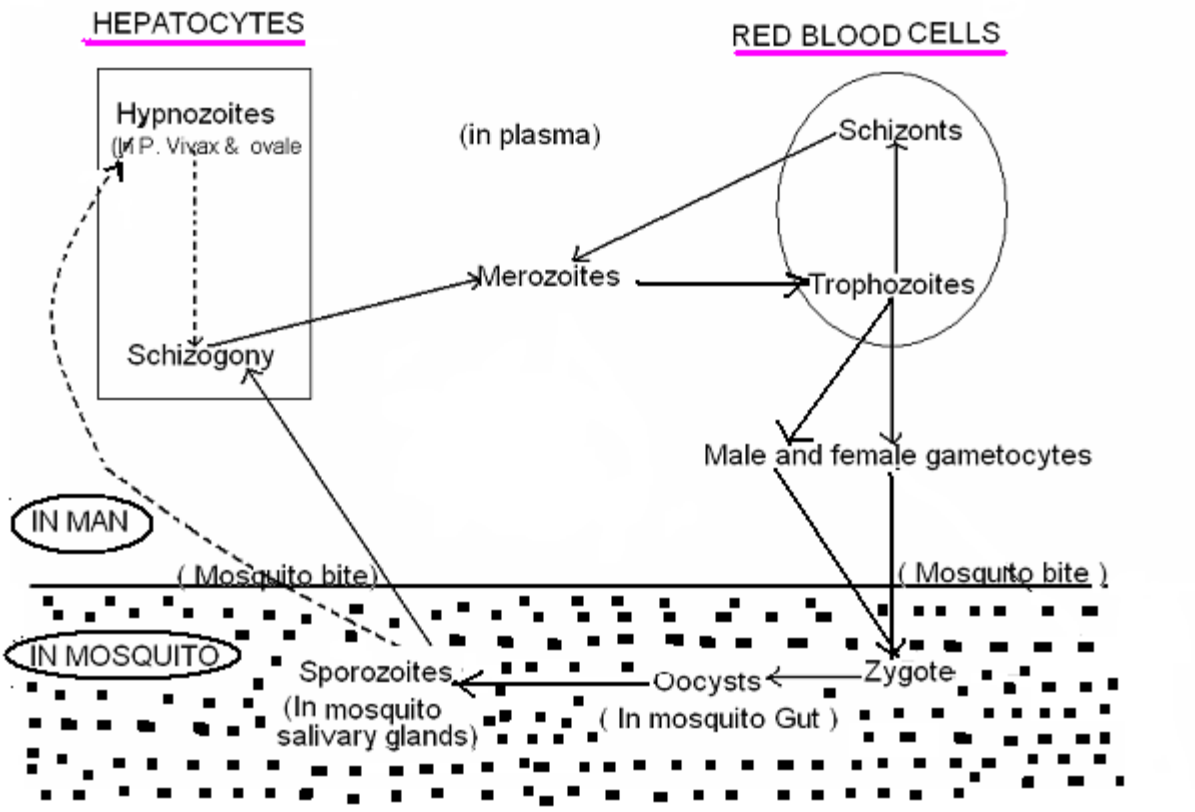

Figure 2.2: Life cycle of malaria parasites in humans and mosquitoes
(Adapted from Eddleston et al 2007:10-11)

It should be noted that plasmodium ovale and plasmodium vivax infections have persistent liver parasites called hypnozoites (literally: sleeping animals) which develop directly from sporozoites (Eddleston, Davidson, Wilkinson and Pirason 2007:10-11). According to Schull (2007:55-57), once in the blood, the merozoites enter the red blood cells to begin the erythrocytic cycle. Once merozoites enter the red blood cells, they become trophozoites. These trophozoites develop into schizonts which multiply asexually into three to five schizonts (see figure 2.2). When the schizonts rupture, a new generation of merozoites are released into the blood stream for another round of attack of the red blood cells. The multiplication and development of parasites inside these blood cells inevitably destroy the red blood cells (haemolysis). Each erythrocytic cycle takes 48 hours in the case of *plasmodium ovale* and *plasmodium vivax*. This results in 'tertian' fever meaning that the body temperature rises on alternative days. However, it takes 72 hours in the case of *plasmodium malariae*. This results into 'quartan' fever meaning that the body temperature rises after three days (Eddleston et al 2007:10-11). However, in the case of *plasmodium falciparum*, the erythrocytic cycle takes less than 48 hours. This results in less synchronised fever attacks to produce a more constant fever.

Whenever a new generation of merozoites is released into blood, there is a bout of fever. Fever is particularly serious when plasmodium falciparum is involved. Because of the number of red blood cells destroyed, the patient ends up with anaemia, the extent of which also depends on the species. *Plasmodium falciparum* invades red blood cells at all stages especially the young red blood cells. *Plasmodium falciparum* thus causes the most severe cell destruction and consequently also the most severe levels of anaemia compared to the other malaria species. It therefore causes the severe form of the disease with more complications as compared to the other three species of malaria (Eddleston et al 2007:11). On the other hand, *plasmodium vivax* and *plasmodium ovale* invades reticulocytes. Reticulocytes are the old red blood calls which are normally about

to be removed from circulation. *Plasmodium malarie* invades normoblasts (mature red blood cells).

In the case of plasmodium falciparum malaria, the red blood cells containing schizonts adhere to the lining of the capillaries in the brain, kidneys, liver, lungs and gut. They become congested and the organs become anoxic. The rupture of schizonts liberates more toxic and antigenic substances which cause further damage (Boon, Colledge & Walker 2006:342-345). The main effects of malaria are therefore haemolytic anaemia and widespread organ damage.

2.2.4 Immunity

Some in-born factors of resistance against malaria have been documented. Repeated exposure is a source of some resistance against malaria (Eddleston et al 2007:12-13).

2.2.4.1 Innate immunity

According to Eddleston et al (2007:12), certain genetic variants of red blood cells like sickle cell trait, glucose 6-phosphate dehydrogenase (G6PD) deficiency and thalassaemia, may partially protect a person against severe attacks of malaria. Red blood cells with haemoglobin AS (sickle cell trait) do not favour proper development of *plasmodium falciparum* in such blood cells. This is protective for individuals who are carriers of the recessive sickle cell gene. This means better survival of carriers of sickle cell disease in tropical Africa where malaria is a major killer disease. However, victims of sickle call disease are not protected. In fact, individuals with sickle cell disease are more vulnerable to malaria disease.

The Duffy antigen is the receptor for merozoites of *plasmodium vivax* on red blood cells. The lack of the Duffy antigen on red blood cells offers protection against this infection. This explains why certain individuals are less vulnerable to

malaria than others in the same West African communities and among black Americans (Eddleston et al 2007:12-13).

2.2.4.2 Acquired immunity

According to Eddleston et al (2007:12), repeated exposure to malaria eventually leads to the development of some degree of immunity to malaria parasites. However, this immunity is never complete. This is because of the fact that, even adults in highly endemic areas continue to be susceptible to malaria (Eldryd, Richard, Mabey and Gill 2006:287). So, adults in malaria endemic areas are considered to be semi-immune. Without re-infection, the acquired immunity wanes after about five years.

Children, however, obtain passive immunity from maternal antibodies that last about six months from birth. After six months, many children tend to get waves of severe malaria attacks. This happens because immunity to severe forms of malaria is slowly acquired (anti-disease immunity). By the age of ten years, malaria attacks are much less severe than malaria attacks involving younger children and babies This explains why, apart from pregnant mothers, adults in endemic areas tend to get less severe attacks of malaria than children (Eddleston et al 2007:12-13). Pregnancy and severe illness lead to reduced immunity. However Eddleston et al (2007:13), point out that research has not established a strong relationship between the severity of malaria disease and malnutrition or HIV.

The most vulnerable groups include children, pregnant women, the elderly, non-immune travellers, and individuals with sickle cell disease. Because of reduced immunity, pregnant mothers have a special risk of developing severe forms of malaria (Eldryd et al 2006:287. More effort should be invested in the prevention and prompt treatment of malaria in these vulnerable groups, particularly children and pregnant women.

2.2.5 Epidemiology

Epidemiology is the study of the distribution, frequency and determining factors of health problems and disease in humans (Malaria Consortium 2007:21). Malaria is common in the tropical and sub-tropical regions of the world. It affects many of the people living between latitudes of approximately 60^0N and 40^0S (Schull 2007:55). It therefore occurs in Africa, Asia, Oceania and South America. Plasmodium falciparum is the most common species in regions where malaria is highly endemic (Malaria Consortium 2007:21-23).

Almost two billion people in endemic areas are at risk of malaria. It is estimated that each year, 250 million clinical cases occur (Eddleston, et al 2007:10). However, the Malaria Consortium (2007:5-7), puts the annual number of malaria clinical cases at between 300 to 500 million cases worldwide, 90.0% of which occur in SSA. Over a million deaths occur, particularly among African infants and young children (Eddleston et al 2007:10).

2.2.6 Clinical presentation

2.2.6.1 Uncomplicated malaria in children

The symptoms of malaria, particularly fever are related to the rupture of parasitised red blood cells (erythrocytes). This releases toxic substances which, in turn, cause a rapid onset of fever plus other symptoms and complications (Malaria Consortium 2007:43-44). It should be noted that malaria fever is intermittent. This means that it comes and goes many times. The body temperature may be normal during visits to the health facility, but it may rise later. A typical malaria attack has three phases.

- A **cold stage**. This is when the patient feels cold and shivers. After rupture of red blood cells, pyrogenic substances (fever initiating agents) are

released into the blood stream. Then physical mechanisms generate heat for the body that quickly rises to 40^0C. This stage takes about half an hour (Eddleston et al 2007:14). Vomiting is often troublesome and severe headaches occur during this stage.

- The **hot stage**. This is when the patient feels hot. It follows the physiological actions in the cold stage that lead to generation and conservation of body heat. At this stage, the patient feels burning hot and may be delirious. The hot stage takes one to six hours (Eddleston et al 2007:14).
- The **sweating stage.** This follows the hot stage. This stage is associated with profuse sweating and then relief of symptoms. After this stage the patient feels reasonably well until the next attack the next day or alternate day depending on the type of the plasmodium species (see sec. 2.2.3).

The majority of malaria patients initially present with mild or uncomplicated disease. However, if the disease is poorly treated or untreated, it can become severe. Uncomplicated malaria presents with a sudden onset of fever, loss of appetite, headache, generalised weakness, haemolytic anaemia and jaundice (Malaria Consortium 2007:43-45). Depending on one's immunity level (see section 2.2.4), these clinical manifestations can be mild in uncomplicated malaria. However, for *plasmodium falciparum* malaria, these manifestations may worsen and become life-threatening if not attended to in time. This is particularly true for children and non-immune adults (Eddleston et al 2007:14-15).

According to the Malaria Consortium (2007:43-46), in order to avoid progression of the disease to the severe form, proper treatment should be within twenty-four hours of the first signs of malaria. This treatment can be rendered in community settings. This is particularly important in children because they are likely to develop the severe form of the disease if not managed properly.

2.2.6.2 Complicated malaria in children

Complicated malaria in children usually occurs as a result of poorly treated or untreated malaria. According to Eddleston et al (2007:15-16), complicated malaria is the severe form of the disease, involving extensive multi-systems and is seen particularly in *plasmodium falciparum* malaria. It is recognised by the presence of life-threatening signs in addition to the initial signs which are associated with the uncomplicated form of the disease. Signs of complicated malaria include convulsions, an altered mental state, severe vomiting, severe respiratory distress, severe anaemia and severe dehydration. Management of complicated malaria cannot be done in community settings. Depending on the severity of the condition, its management should occur at established health centres and hospitals.

Table 2.1: Danger signs of severe malaria

Signs	Comments
Convulsions (fits) within the last two days or at present	A medical emergency
Un able to drink or breast-feed	-
Vomiting everything	-
Altered mental state	Includes lethargy, drowsiness, unconsciousness or confusion
Prostration /extreme weakness	Unable to stand or sit without support
Severe respiratory distress or difficult breathing	
Severe anaemia	Severe pallor of palms and mucous membranes
Severe dehydration	Sunken eyes, coated tongue, lethargy, inability to drink

(Source: MOH 2005a:8)

The signs, reflected in table 2.1, should always be looked for in children. In case they occur, they must be managed at health facility level and not at community level.

2.2.6.3 Chronic malaria

According to Eddleston et al (2007:15), the persistence of low levels of malaria parasites in the blood may lead to chronic malaria. Symptoms include recurrent acute attacks of malaria, anaemia, diarrhoea, weight loss, and an enlarged liver and spleen. It may resolve with the onset of partial immunity or persist with further complications. Plasmodium Falciparum malaria is associated with increased incidence of Burkitts lymphoma. This is due to the fact that there is impaired T-cell immunity. Hyper reactive malaria splenomegaly (formally called tropical splenomegaly syndrome) is characterised by massive splenomegaly, profound anaemia, secondary infections, fever and jaundice. There is hypersplenism that results in increased destruction of red blood cells with subsequent anaemia and jaundice.

2.2.7 Diagnosis of malaria

2.2.7.1 Blood examinations

In general, proper diagnosis of malaria, particularly in hospital settings, must be confirmed by blood examinations and other specialised investigations like blood cultures to rule out the presence of other conditions (Birrell & Birrell 2007:41; Eddleston et al 2007:21-22). Proper diagnosis of malaria at institutional level requires microscopic examination of a thin and a thick blood film. According to the MOH (2005:11), the ‘gold standard’ in malaria diagnosis is the examination of blood smears for malaria parasites. A thick film is important to diagnose low levels of parasites in blood. On the other hand, a thin film is important in confirming the diagnosis, identifying the species of malaria and quantifying the parasites. This is done by counting the percentage of red blood cells infected by malaria parasites (Boon et al 2006:345-346). The percentage of infected blood

cells helps to monitor the patient's response to treatment with repeated during treatment and tests.

The malaria rapid diagnostic tests (RDTs) are used to detect the presence of antigens from malaria parasites in blood using antibodies. In highly endemic areas like most parts of Uganda, the use of these tests is of limited importance since most of the people have anti-malaria antibodies in their blood. According to the MOH (2005a:12-13), the RDTs are, however, important in verifying epidemics in areas where malaria is of low endemicity. RDTs may be important in detecting infections in children under four months.

2.2.7.2 Differential diagnosis

"Malaria is a great mimic and must enter differential diagnosis of several clinical presentations" (Eddleston et al 2007:21). The presentation with fever needs to be differentiated from other endemic bacterial and viral diseases like typhoid fever, brucellosis, dengue fever, influenza, measles, Ebola fever, acquired immune deficiency syndrome (AIDS). It should also be differentiated from infections of the respiratory tract, urinary tract infections, and infections of the ear like otitis media. Other conditions that should be distinguished from malaria are meningitis, tonsillitis, abscesses and skin infections. Since malaria is the major cause of fever in tropical areas, including Uganda, it should be suspected first whenever there is a fever attack in tropical settings.

According to Eddleston et al (2007:21), anaemia due to malaria should be differentiated from anaemia due to other tropical diseases like hookworm infestations, heamoglobinopathies, iron and vitamin B12 deficiency. The jaundice due to malaria must be distinguished from that of viral hepatitis A, B and C, yellow fever, biliary disease and drug-induced diseases (including alcohol). Cerebral malaria should be differentiated from encephalitis, TB meningitis, brain abscess and other coma-inducing conditions. However, it should also be noted

that the diagnosis of malaria doesn't rule out the possibility of the occurrence of other diseases, as malaria can co-exist with other infections/diseases.

2.2.8 Management of malaria

2.2.8.1 Pharmacological treatment

According to Eddleston et al (2007:28), all patients will normally require anti-malaria chemotherapy. A drug of choice should have few side effects and should be cost-effective considering local resistance. Until recently, the drug of choice for simple malaria was chloroquine. However, by 2005, resistance to chloroquine had increased to above 50.0% in many areas of the world. This meant that, after a full dose of chloroquine, malaria parasites were not eliminated from the blood in more than a half of all malaria patients (Schull 2007:71-73). Malaria is considered resistant to anti-malaria drugs, when symptoms due to the disease either fail to subside or if they recur within two weeks of anti-malaria treatment (Birrell & Birrell 2007:44-46).

- ***Single malaria drugs***

Artemisinin alone is 95.0% effective but there is a high likelihood of the development of resistance against this drug. In light of this, the WHO recommended that all pharmaceutical companies should discontinue marketing of single drug artemisinin in order to stop the development of resistance to this important drug (WHO 2005:3). Other single anti-malaria drugs include primaquine, amodiaquine, mefloquine and quinine. In accordance with WHO recommendations, those single anti-malaria drugs are no longer recommended for treatment of malaria in Uganda. The only exception is quinine which is a second line anti-malaria drug.

- ***Combination malaria drugs***

According to the Malaria Consortium (2007:79-89) in 2006, the WHO recommended the use of artemisinin combination therapies (ACT) in the treatment of malaria. According to Eddleston et al (2007:30-31), in this era of resistance to chloroquine and Fansider®, artemisinin combination drugs like COARTEM® (*artemether*-20mg plus *lumefantrine*-120mg) are the recommended first line drugs for uncomplicated malaria.

- **Information on COARTEM®**

COARTEM® is a combination anti-malaria drug of *artemether (*20mg) plus *lumefantrine* (120mg). Artemether is derived from extract of a plant *Artemisia annua*. Lumefantrine is an aryl-amino alcohol similar to quinine. It is currently the first choice WHO recommended first line treatment for uncomplicated malaria. It is taken orally twice a day (twelve hourly) for three days. There is no injectable form of this combined drug. The safety of artemether during pregnancy and lactation has not been established and therefore artemether is contraindicated in the first trimester and children below 5 kg body weight.

Table 2.2 WHO recommended dosages for COARTEM®

AGE	**WEIGHT (Kg)**	**DOSE (to be given twelve hourly for 3 days)**	**COLOUR CODE**
From 4 months to 3 years	5-14	1 tablet (total: 6 tablets)	Yellow
Above 3years to 7years	15-24	2 tablets (12 tablets)	Blue
Above 7 years to 12 years	25-34	3 tablets (18 tablets)	Brown
Above 12 years	More than 35	4 tablets (24 tablets)	Green

(Source: MOH 2005a:15). Note: Management for children below 4 months should be done at health facility level

A ‘first line’ anti-malaria drug is the medicine recommended by the national health policy makers in line with the WHO recommendations for treatment of uncomplicated malaria (MOH 2005a:15).

An alternative combination drug is artesunate plus amodiaquine. According to the MOH (2005a:16), artesunate and amodiaquine combination drug is the alternative first line anti-malaria drugs in situations where artemether plus lumefantrine combinations are not available. Other combined anti-malaria drugs include artesunate plus sulfadoxine-pyrimethamine; artesunate plus mefloquine and amodiaquine plus sulfadoxine-pyrimethamine. These drugs are taken orally (WHO 2008:4). These oral drugs are suitable for cases of uncomplicated malaria.

Table 2.3: WHO recommended dosage for Artesunate and Amodiaquine

AGE	Artesunate			Amodiaquine		
	Day 1	**Day 2**	**Day 3**	**Day 1**	**Day 2**	**Day 3**
5-11 months	25 mg (1/2 pill)	25 mg (1/2 pill)	25 mg (1/2 pill)	76 mg (1/2 pill)	76 mg (1/2 pill)	76 mg (1/2 pill)
1-6 years	50mg (1 pill)	50mg (1 pill)	50mg (1 pill)	153 mg (1 pill)	153 mg (1 pill)	153 mg (1 pill)
7-13 years	100mg (2 pills)	100mg (2 pills)	100mg (2 pills)	306 mg (2 pills)	306 mg (2 pills)	306 mg (2 pills)
Above 13 years	200mg (4 pills)	200mg (4 pills)	200mg (4 pills)	612 mg (4 pills)	612 mg (4 pills)	612 mg (4 pills)

(Source: MOH 2005a:16)

- **Anti-pyretic treatment**

The major presenting complaint of malaria is fever. It is often the first and at times the only sign of the disease. It is therefore important to manage fevers. This is particularly vital in children. Tepid sponging with luke-warm (tepid) water is very important in reducing the body temperature in children. In children

younger than five years, paracetamol can be used (Eddleston et al 2007:30-31), because aspirin is contra-indicated in this age group.

Table 2.4: Recommended dosages of paracetamol

Age group	Number of tablets (paracetamol, 500 mg)	Maximum number of tablets per day
From 2 months to 3 years	125 mg (1/4 tablet)	0.75
Above 3 years to 7 years	250 mg (1/2 tablet)	1.5
Above 7 years to 10 years	500 mg (1 tablet)	3
Above 10 years to 15 years	750 mg (1&1/2 tablet)	4.5
Above15 years	1000 mg (2 tablets)	6

(Source MOH 2005a:17)

- ***Second line anti-malaria drugs***

A 'second line drug' is a drug only given when the first line drug has failed to cure malaria or when it is contraindicated (MOH 2005a:16). According to the WHO malaria treatment guidelines adopted by the Uganda malaria control programme, quinine is the second line drug for the management of complicated malaria (Eddleston et al 2007:28-30). Oral quinine is the second line drug for uncomplicated malaria. However, for complicated malaria (see section 2.2.6.2), parenteral quinine is the drug of choice (Schull 2007:70-71). The dose for oral and parenteral quinine is 10mg per kg body weight (maximum 600mg). It is given eight hourly for five to seven days (Eddleston et al 2007:30).

In cases where quinine is contra-indicated, parenteral artemisinin derivatives may be used. It should be noted that oral first line drugs are not recommended in cases of complicated malaria. This is because this form of the disease in children is often accompanied by severe vomiting and convulsions. Proper management of complicated malaria should be done in the hospital and it involves the management of associated complications.

Table 2.5: Recommended dosages of quinine tablets (containing quinine 300mg salt)

AGE	WIGHT (KG)	DOSE (to be given every 8 hours for 7 days)
3 months up to 1 year	5 to 10	75 milligrams (mg), (1/4 tablet)
Above 1-5 years	Above10 to18	150 mg (1/2 tablet)
Above 5-7 years	19 to 24	225 mg (3/4 tablet)
Above 7-10 years	25 to30	300 mg (1 tablet)
Above 10-13 years	31 to 40	375 mg (1&1/4 tablet)
Above 13-15 years	41 to 50	450 mg (1& ½ tablet)
Above 15 years	51 and above	600 mg (2 tablets)

(Source MOH 2005a:17)

2.2.8.2 Community or home-based care

According to Birrell and Birrell (2007:40-41), fever is best treated by treating the cause. Therefore, all patients in malaria endemic areas must be treated with recommended anti-malaria medications unless it can be proved that they do not have malaria. This is particularly necessary in the case of children younger than five years and pregnant woman (Schull 2007:61). This forms the basis of the *Home-based Management of Fever Strategy*.

In addition to the pharmacological treatment, fever (38.5^0C or more under the arm) should be attended to by tepid sponging and giving a dose of paracetamol (Birrell & Birrell 2007:41). This lowers the patient's body temperature and helps to reduce many possible complications like convulsions which could result from high body temperature.

2.2.8.3 Out-patient care

Uncomplicated malaria can be managed on an out-patient basis. This is particularly important when a patient has had anti-malaria medication without improvement in the previous 14 days (MOH 2005a:13). Sometimes, when a

patient takes anti-malaria treatment and fails to fully recover from the disease or the disease reappears before two weeks have elapsed, this may be the sign of resistance to that particular first line anti-malaria drug.

When such a situation occurs, treatment occurs in a health care facility and second line anti-malaria drugs are prescribed. The second line drug of choice in such cases is oral quinine. Tepid sponging and giving a dose of antipyretic drugs like paracetamol is an important aspect of malaria management at this level (Birrell & Birrell 2007:41).

2.2.8.4 Institutional malaria strategies

Patients presenting with severe or complicated malaria are admitted and managed in health care institutions. This is because health facilities are equipped with trained personnel and facilities to manage the disease and its complications. After confirming the disease, the management of complicated malaria requires the use of second line anti-malaria drugs. After patients have improved, then they can take oral forms of those drugs (Eddleston et al 2007:29-30).

The management of complicated malaria involves the treatment of complications related to the disease. Complications include severe anaemia, vomiting and dehydration, convulsions, as well as respiratory distress. Failure to properly manage malaria could have disastrous results to the patient and the community. Severe malaria is life-threatening, particularly in children younger than five years. It may result in permanent physical and mental disabilities or death. This happens in many developing parts of the world due to poor health care (MOH 2005a:1-2).

The second problem of poorly treated malaria is the public health problem of the development of resistant strains of the disease. When available drugs are not effective, it is necessary for policy makers to recommend alternative efficacious

drugs. This has already happened in the case of chloroquine. Chloroquine is no longer recommended for the treatment malaria due to resistance in most parts of the world (Eddleston et al 2007:36).

2.2.8.5 Anti-malaria resistance patterns

Table 2.6 shows treatment failures with at least 14 days follow-up at various sentinel sites in Uganda. The table shows that chloroquine had the highest resistance levels of up to 81.2% in some centres and artesunate combinations with lowest resistance levels. The resistance levels lead to the fact that chloroquine became a failing drug. In June 2000, Uganda adopted a change of chloroquine monotherapy which was replaced by chloroquine plus sulfadoxine-pyrimethamine (CQ+SP). Over time, CQ+SP clinical failure levels exceeded 15.0% (MOH 2007b:20-21). Then it was necessary to change to artemisinin-based combinations therapy (ACTs).

Table 2.6: Anti-malaria resistance patterns in Uganda (2000-2004)

(Source: MOH 2007:21)

Antimalaria	Study years	Number of studies	Treatment failure % range		
			Median	Low	High
Chloroquine	2001	18	29.3	7.5	81.2
Sulfadoxine /Pyrimethamine (SP)	2002	25	11.4	0.0	25.0
Amodiaquine	2002	5	8.8	0.0	14.5
Chloroquine +SP	2003	15	12.0	0.0	37.0
Amodiaquine+ SP	2003	12	1.6	0.0	13.0
Artesunate+ Amodiaquine	2003	5	1.0	0.0	4.0
Artesunate+ SP	2000	1	0,5	-	-

2.2.9 Prevention of malaria

Malaria can be prevented by controlling the malaria vector, namely the mosquito. According to the Malaria Consortium (2007:142-164), mosquitoes can be

controlled by either reducing the mosquito population or protecting humans from mosquito bites. The most effective strategy is a combination of the two malaria control methods. According to the MOH (2008a:4), the recommended strategies for controlling malaria in Uganda are:

- Prevention of contact between mosquitoes and humans
- Reduction of mosquito density and longevity
- Reduction of malaria parasites
- Use of information. Education and communication (IEC) and other strategies

2.2.9.1 Reducing the mosquito population

The mosquito population can be reduced by killing adult mosquitoes. The most commonly used method of killing mosquitoes is the use of chemical insecticides. This may be done by *internal residual spraying* (IRS) of residential houses. The walls of residential houses are sprayed with long lasting insecticides like *dichlorodiphenyltrichloroethene* (DDT), *lambda-cyhalothrin* (ICON), bendiocarb (FICAM), pirimiphos-methyl (ACTELLIC) and others (Malaria Consortium 2007:142-146). The major factors considered when selecting these insecticides are: safety, cost effectiveness, mosquito susceptibility to the insecticide and duration of action of the insecticide. Most of these insecticides are safe to humans, domestic animals and wildlife if they are used in recommended doses. When sprayed in their recommended doses, they kill mosquitoes but their durability of action is short (two to six months). DDT, an *organocholine* is cost effective and has a prolonged duration of action of more than six months (Malaria Consortium 2007:152). DDT has, however, acquired a very bad reputation because of its heavy use in agriculture that resulted in harmful accumulation of the insecticide in wild birds and fish. The Stockholm Convention on Persistent Organic Pollutants, signed in 2001, contains an amendment which authorises the use of DDT specifically for vector control. The WHO has continued to recommend its use for household spraying against malaria mosquitoes (Malaria

Consortium 2007:152-155) *Insecticide treated mosquito nets* also help to kill mosquitoes (see 2.2.9.2).

Insecticide hand sprays can also be used to repel and kill mosquitoes. These insecticide hand sprays can be used indoors before bedtime. This method is not very effective. The method works for a short time because it has no residual activity. According to the Malaria Consortium (2007:152-153), mosquitoes' resistance to insecticides are common. This resistance is due to an inherited mutant gene or genes. Spraying with a particular insecticide will kill most of the mosquitoes that do not have the mutant gene/genes. This means that those mosquitoes with mutated genes will survive the insecticide while the population of susceptible mosquitoes decreases.

Table 2.7: insecticides used for internal residual spraying of houses

Chemical	**Class**	**Trade name**	**Dose (gm ai/sq m)**	**Persistence (in months)**	**Toxicity Problems**
DDT	Organo-chlorine	-	1-2	6 or more	Residues in breast milk
Malathion	Organo-phosphate	-	2	2-3	Odour; can be contaminated
Fenitrothion	Organo-phosphate	Sumithion	2	3-6	Attacks cholinesterase
Pirimiphos-methyl	Organo-phosphate	Actellic	1-2	2-3	None known
Bendiocarb	Carbamate	Ficam	0.1-0.4	2-6	Toxic, available in sachets
Deltamethrin	Pyrethroid	k-Othrin	0.01-0.025	2-3	Irritant
Lambda-cyhalothrin	Pyrethroid	Icon	09.02-0.03	3-6	Irritant

(Source: Malaria Consortium 2007:152)

This implies that the proportion of mutated mosquitoes that survive the insecticide increases. When this population of mosquitoes with mutated resistant genes continue breeding, the insecticide-resistant mosquito population will increase to 100%.

2.2.9.2 Prevention of mosquito bites

Actual mosquito bites can be prevented by the use of mosquito bed nets. In tact mosquito nets prevent mosquitoes from reaching a person who sleeps under them. They are hanged around beds to act as barriers against mosquitoes. To increase their effectiveness, bed nets are usually treated with insecticides. Such mosquito nets are referred to as insecticide treated mosquito nets. When these mosquito nets are manufactured with insecticide incorporated into the fibre at the factory, such mosquito nets are referred to as long-lasting insecticidal nets (LLIN). Good quality long-lasting insecticidal nets (LLIN) will remain effective against mosquitoes after more washes than the conventional dipped mosquito nets (Malaria Consortium 2007:150). Such insecticides include *lambda-cyhalothrin* (ICON), deltamethrin (K-Otab), alpha-cypermethrin (FENDONA) and others (Malaria Consortium 2007:142-146).

Insecticide treated mosquito nets provide more protection than non-treated nets since they have an additional action of repelling mosquitoes and killing those which rest on these nets. The treated nets serve as physical and chemical barriers resulting in a dual effect against mosquitoes. It is recommended that all people, particularly children younger than five years and pregnant women, should always sleep under treated mosquito nets (MOH 2005a:21). Screening of houses by putting wire mesh in the windows, doors and ventilators reduces the entry of mosquitoes and other insects into houses. This reduces contact between mosquitoes and humans (MOH 2005a:22).

Table 2.8: Insecticide used for treatment of mosquito nets

Chemical	Trade name	Formulation	Target dose	Concentrate per net (15m^2)
Permethrin 10.0%	Imperator /Peripel	Emulsifiable concentrate	200-500 mg/m^2	75 ml
Deltamethrin 1.0%	K-othrin	suspension concentrate	15-25 mg/m^2	40 ml
Deltamethrin 25.0%	K-Otab	Wettable tablet	15-25 mg/m^2	1 tablet (1.6 g)
Lambda-cyha-lothrin 2.5%	Icon	Micro-encapsulated	10-20 mg/m^2	10 ml
Cyfluthrin 5.0%	Solfac	Oil-in-water emulsion	50 mg/m^2	15 ml
Etotenprox 10.0%	Vectron	Emulsifiable concentrate/ Oil-in-water emulsion	200-500 mg/m^2	30ml
Alpha-cyper-methrin 10.0%	Fendona	suspension concentrate	20-40 mg/m^2	6ml

(Source: Malaria Consortium 2007:148)

2.2.9.3 Environmental and sanitation control measures

There are known environmental and sanitation practices that reduce breeding of mosquitoes. According to the Malaria Consortium, (2007:142-145), these practices aim at reducing the occurrence of water stagnation near homesteads and urban areas in order to prevent mosquitoes from breeding. This is done by filling and leveling of ground with soil, gravel or concrete.

Another environmental control measure is the construction of small dams with automatic siphons or stoppers that periodically open to release water suddenly. The mosquito larvae which settle on the grass and other objects are periodically washed downstream. This interferes with the life cycle of the mosquitoes and prevents them from breeding (Malaria Consortium 2007:165-169).

Destruction of malaria larvae can be achieved by spraying oil on stagnant water. This prevents oxygen from reaching the mosquito larvae therefore killing them.

Mosquito larvae may also be controlled biologically. A vector-eating fish like *gambusa affinis* eat the larvae of mosquitoes therefore controlling the population of mosquitoes (Malaria Consortium 2007:142).

2.2.9.4 Pharmacological prevention

Chemoprophylaxis is recommended for non-immune residents and all visitors from malaria free areas who travel to areas where malaria is endemic. Regular prophylactic anti-malaria drugs prevent the development of malaria parasites (trophozoites) in the blood (Schull 2007:66-67). This means that clinical malaria can be prevented. The Maloprim combined tablet (Pyrimethamine 12.5mg plus dapsone 100mg) is the drug of choice in malaria prophylaxis. This combination drug is given one tablet once a week (Schull 2007:67). According to Eddleston et al (2007:34), other alternative malaria prophylactic drugs are mefloquine and proguanil. For prophylactic purposes, mefloquine is used at the dose of 5mg per kilogram body-weight weekly. Prophylactic proguanil in children 1-4years is given at the dose of 50mg per day.

Schull (2007:67), points out that chemoprophylaxis prevents the development of semi-immunity to malaria. The constant use of anti-malaria prophylaxis for about one year will cause the loss of any existing semi-immunity to malaria. Pharmacological prophylaxis is therefore not recommended for people, excluding pregnant women, who have naturally developed semi-immunity to malaria (see section 2.2.4.2).

2.3 SUMMARY

This chapter dealt with literature review related to malaria from the biomedical point of view. In this chapter, malaria was scientifically discussed based on recent scientific information.

The focus of this study was on the home management of fever and how it could contribute to the reduction of morbidity and mortality due to malaria. The next chapter deals with research methods adopted during this study.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

In the previous chapter, scientific information and recent research on Malaria were discussed. This chapter describes the data collection instrument, the sample and sampling processes, as well as the reliability and validity of the research tool used. Ethical issues concerning the research process are also discussed.

3.2 AIM OF THE STUDY

The aim of this study was to describe care practices of caregivers in the management of fever in children younger than five years. It also aimed at finding out reasons for the apparent under-utilisation of anti-malaria facilities at community level in Mukono district, Uganda. The specific objectives of this study are detailed in section1.5.2.

3.3 RESEARCH DESIGN

Research design refers to the overall research approach or strategy taken in a study. Kisilu and Tromp (2006:70) refer to a research design as the ‘glue’ that

holds all elements of the research together. It is the plan or blueprint of how a researcher intends to conduct the research.

A quantitative, descriptive study was conducted to describe the care practices of the caregivers in the management of fever of children younger than five years and the reasons for the apparent under-utilisation of the services rendered by the community drug distributors, and specifically the available anti-malaria medications which are distributed free of charge as part of the Home-based Management of Fever Strategy.

Quantitative research was considered to be appropriate because it enabled the researcher to provide statistical evidence on how the research variables were interrelated. This study was limited to a number of pre-specified variables. The study attempted to measure the relationships between the health seeking behaviours of caregivers of children younger than five years, and certain personal, environmental and learning factors. Respondents were selected at household level to obtain a sample of adequate size, enabling generalisation of the results. Structured data collection tool was used which was analysed statistically. Control was imposed by pre-testing the data collection instrument and keeping the conditions of data collection constant. Bandura's Social Learning Theory and the literature review guided the development of the data collection instrument.

3.4 RESEARCH METHODS

3.4.1 Population

According to Joubert and Ehrlich (2007:94), a population is the entire group that a researcher intends to study and make conclusions about them. This is also referred to as the study (target) population. Burns and Grove (2005:366) define an accessible population as "… the portion of the target population to which the

researcher has reasonable access". Such a population should be clearly defined in terms of place, time and other factors relevant to the study. The study population in this study comprised caregivers of children younger than five years at the time of data collection in Mukono district. The exact number of caregivers of this category of children could not be established from available records at the district, although records existed about the number of children younger than five, putting the number of children in this age bracket at 155 072 (Mukono District Council 2008:2). All these children had caregivers. However, a caregiver might have looked after one or more children. This means that there would be fewer caregivers than children in the district.

3.4.1.2 Sample and sampling procedure

A sample is a group of individuals or units chosen for the study from the accessible population (Enarson, Kennedy, Miller & Bakke 2001:52). A sample is a subset or a subgroup of individuals of the study population to be studied. It should be representative of the study population. Considering logistical constrains faced by the researcher, a sample of 60 caregivers was selected from the community (at household level) to participate in the study. The larger a sample, the higher is the possibility that the sample is representative of the study population, provided that the sample has been selected randomly (Enarson et al 2001:53). A sample during the current study was selected from the existing registers of children younger than five (in the Makono district).

Eligibility criteria

To be eligible for inclusion in the study, caregivers had to conform to specified criteria. Such criteria included:

- Respondents had to be caregivers for children younger than five years at the time of data collection
- Such caregivers had to be residents of Mukono district
- Such caregivers had to be able to communicate in English or Luganda, the local language of the district. The research tool was available in these two languages only.
- Respondents had to be willing to be interviewed

This means that caregivers who could not fit those eligibility criteria were not selected for the study. Such ineligible caregivers included non-residents of the district and caregivers with language barriers since the interview schedule was only available in two languages (English and Luganda). Caregivers who were not willing to consent for the study were not coerced to participate. Individual caregivers were not interviewed more than once, even if they cared for more than one child, who could have been separately sampled. This happened because a registers of the children existed from which the sample was selected, but no census of caregivers existed.

Sample selection

Sampling is the process of selecting a sample from the study population (Sarantakos 2005:152). In this study, a stratified random sampling technique was applied to select the study sites. According to Joubert and Ehrlich (2007: 98), stratified random sampling, is about identifying strata in the population. Then, simple random sampling is conducted in each of the selected strata. In this study, stratification was done in three steps.

According to the Mukono District Council (2008:5), Mukono District is geographically divided into 28 sub-counties and town councils. A simple random sampling technique was used to select three sub-counties. First, all the names of these sub-counties were written on separate small sheets of paper, which were

folded and put in a box. After mixing them thoroughly, three sub-counties were randomly drawn by an independent person from the box (simple random sampling without replacement took place). These three sub-counties were Najjembe (21 villages), Lugazi (15 villages) and Kawolo (24 villages).

The second step was to select two villages per sub-county to get a total of six villages. This was done separately for each selected sub-county. The names of all the villages in each selected sub-county were written on separate papers. They were then folded and put in a box. After thoroughly mixing them, two villages were selected (without replacement) for each of the three sub-counties. The selected villages were as follows:

- Kasoga and Kikati villages from Najjembe sub-county
- Kitega and Kasaku villages from Kawolo sub-county
- Kikawula and Kinyolo villages from Lugazi sub-county

The third step was the selection of individual caregivers. For each of the six villages, 10 caregivers were selected to give a sample of 60 caregivers. It should be noted that all children younger than five years with their caregivers residing in the villages found in Mukono District were registered. Each child was registered plus the name of the guardian. This work was done by the vice-chairman of the village council. The village vice-chairman is the officer in-charge of children affairs for each of the villages. These registers served as sampling frames to complete step three of the sample selection process. Using these registers, systematic sampling was done. The first name on each list was selected then every third child was selected from the list. Such a selected child was taken as the *reference child* of that household participating in the study. Then, caregivers of these selected children (reference children) constituted the study sample of 60 caregivers. This method of systematic sampling of caregivers was adopted because a register of all the children (with their caregivers) was available in all six participating villages.

Retrospectively systematically selecting every third child from the list, might have compromised the randomness of the sample. Selecting every third child meant that every child had a random but an unequal chance of being selected (Burns & Grove 2005:373). The first child on the list was selected as the starting point for selecting every 3rd child – thus the initial starting point could be regarded as being non-random. The selected sample would have approximated the requirements of a random sample more closely if every child's entry had been numbered and if all children had been selected randomly, such as by using a table of random numbers to select every individual child. However, due to time pressures, the first and every third child on every list was selected until 10 children had been selected from each of the randomly selected six participating villages. In cases where the same caregiver had been selected more than one child had been selected from one household, only one interview was conducted with the caregiver concerned. Another caregiver was selected from the list of children's names by selecting the following third child's name on the list concerned.

3.4.2 Data collection

3.4.2.1 Data collection approach and method

A structured interview was conducted with every selected caregiver who agreed to be interviewed. Two research assistants, fluent in both English and Luganda, were trained by the researcher to conduct the structured interviews and to record the findings. The research assistants read each item from the interview schedule orally and recorded every response (Polit & Beck 2008:414). The researcher checked every completed structured interview schedule at the end of each day and queried any incomplete or ambiguous answers.

- ***Procedure followed during each interview***

The interview team comprising two research assistants, the village vice-chairperson and the researcher assembled at the caregivers' residence.

- Self-introduction of the team and the purpose of the visit were explained to the respondent (caregiver).
- Benefits out of the study to community and rights of respondent were explained to each respondent
- Respondents were informed that the study carried no risks and respondents were requested for their time to answer items on the interview schedule
- After proper information about the study, respondents were requested to participate in the study by signing a consent form.
- The research assistant read each item on the interview schedule and marked the respondent's answers or entered it verbatim on the interview schedule
- At the end of exercise participants were thanked and assured that a summary of results of the study would be supplied to the village vice-chairperson after it had been accepted by the authorities concerned.
- Then, the team moved to the residence of the next respondent.

3.4.2.2 Data collection instrument

Data were collected using a structured interview schedule, based on Bandura's Social Cognitive Theory and the literature review. The items were designed to address the specific study objectives (see 1.5.2). The tool had 101 items. Items 36, 62, 63, 66 and 101 were structured questions and others were closed-ended multiple-choice items. Figure 3.2 depicts the characteristics of the data collection instrument.

- ***Characteristics of the structured interview schedule***

Section A of the data-collection instrument contained 14 closed-ended multiple-choice items, which elicited biographical data of the respondents.

Section B contained 11 closed-ended multiple-choice and open-ended items requesting the respondent to supply an answer relevant to his/her circumstances. These items elicited data about the environmental factors that influenced actions of caregivers when a child under their care developed fever.

Section C contained 38 closed ended multiple-choice and structured items. These items elicited data on personal factors of the respondents and data on factors influencing learning. These items elicited data on caregivers' knowledge pertaining to malaria and home management of fever. These items also elicited data on how this knowledge was acquired. Ordinal level measurement applied for variables in this section.

Section D contained 38 items. These items elicited data on actions of caregivers in home management of fever. These items also elicited date on health seeking behaviour of the caregivers. Ordinal level of measurement applied for variables in this section.

Table 3.1: Characteristics of the data collection instrument

Section	Variable	Number of items (n = 101)
A	Social/biographical data of respondents	14
B	Environmental influencing factors	11
C	Personal influencing factors associated with learning and sources of that information	38
D	Health seeking behaviour	38

Answers to open-ended items were grouped and analysed quantitatively. (See Annexure B).

- ***Pre-testing of the instrument***

Pre-testing is the trial administration of newly developed instrument. It is intended to identify flaws in the tool and assess the required resources including time for actual data collection (Polit & Beck 2008:762).

Pre-testing helped to determine the strength and weaknesses of the item format, wording order and question pattern. In this study, pre-testing was done. Ten caregivers were randomly selected as described in section 3.4.1.3. Such caregivers had to conform to the eligibility criteria as described in section 3.4.1.2. However, pre-testing was done in Kibubbu village which had not been sampled for the actual study. Just as in the actual study, caregivers were interviewed at household level during pre-testing. During pre-testing, the data collectors got the opportunity to try out the technique that would be applied during the actual data collection time. It was established that data collection from 10 respondents of the same village was possible using three data collectors (the researcher and two research assistants). Suggestions were made and some adjustments were made on the data collection instrument. They included;

- Proper numbering of items which had been incorrectly numbered.
- Improved phrasing of questions that were perceived to be ambiguous by some interviewees during the pre-testing of the structured interview schedule.

Pre-testing the instrument helped to standardise data capturing and recording by the two data collectors and the researcher. This training was very important in equipping the data collection team with the necessary skills to conduct structured interviews to collect data for the study. It also helped the researcher and the two research assistants to understand/interpret each item in a similar manner.

- ***Reliability of the data collection instrument***

Reliability is a major criterion of assessing the quality of a data collection tool. According to Polit and Beck (2008:452-455), reliability of the data collection instrument is the consistency with which it measures the target attributes. It is the degree to which a data collection tool measures the same way each time. This implies that reliability is the repeatability of the measurement. This means that an instrument is considered reliable if one's score on the same test given twice is similar. According to Polit and Beck (2008:452), the reliability of an instrument also concerns its measure of accuracy. So, there are two interrelated ways of explaining the reliability of an instrument. These are consistency and accuracy. A reliable measure maximises the true score component and minimises the error component therefore an accurate measure ends up being consistent. This means that the two ways of explaining reliability (constancy and accuracy) are not as different as they might appear but they are interrelated (Polit & Beck 2008:452).

Reliability testing of an instrument is not measured but it is done statistically. According to Parahoo (2006:307), there are two well-known reliability measures, namely test-retest reliability and internal consistency. Internal consistency is the most widely used reliability approach among researchers (Polit & Beck 2008:455). Internal consistency estimates reliability by comparing grouped questions in the interview schedule that measure the same concept. In this study internal consistency was established by calculating the Cronbach's coefficient Alpha for each of sections C-D of the interview schedule.

Reliability coefficient (r) indicates the proportion of variance in a group of obtained scores that is attributable to true individual differences. It is expressed from 0.0 (no reliability) to +1.0 (perfect reliability). It therefore means that the closer it is to one, the higher the reliability of an instrument (Polit & Beck

2008:455). According to Polit and Beck (2008:454), a reliability coefficient above 0.80 usually is considered good. Less than that value indicates inadequate reliability. For instance, if r = 0.90 on the test, it means that 90% of the test scores are accurate while the remaining 10.0% could indicate a standard error. The calculated Cronbach alpha (α) for the tool was section C, α= .8416 (items 3.3.1-3.3.16) and section D, α=.7435 (items 4.1.15-4.1.25). This implies that, the tool had a good level of internal consistency.

- ***Validity of the data collection instrument***

Validity is the strength of our conclusions, inferences or propositions (Parahoo 2006:300). “Validity in measurement is the degree to which an instrument measures what it is intended to measure” (Polit & Beck 2008.768). The Social Cognitive Theory and literature review helped to focus the study so that the data collection tool captured all relevant aspects of the study subject. This ensured that the content of the tool was wide enough to cover issues of the study subject to cover content and construct validity (Polit & Beck 2008.458-461). Construct validity was also ensured by including items specified in the strategy for home-based management of childhood fevers. Face validity implied that two supervisors of the study also approved the apparent relevance of every item to the purpose of the study.

3.4.3 Data analysis and data management

According to Trochim (2006:2-3), data analysis involves three stages that include data cleaning, descriptive data analysis/statistics, and inferential data analysis/statistics. Statistics refer to the summary description of a given variable in a sample.

3.4.3.1 Data management

Data cleaning is performed by identifying outliers, incomplete data and errors during recording (Polit & Beck 2008:644-645). The interviewers recorded each caregiver's responses on one interview schedule. Data checking took place soon after data collection. This was done by the researcher at the end of the day. This helped the researcher to detect errors to be corrected before it was too late. The data were subsequently entered directly into a computer. To eliminate data capturing errors, a research assistant entered the data into the computer. Then the researcher was responsible to check for any errors in the entered data.

3.4.3.2 Data analysis

Data analysis is conducted to reduce, organise and give meaning to the data. Analysis techniques depend primarily on the research design and the level of measurement achieved by the research instrument. For this study, descriptive data analysis was done. Being a descriptive study with no hypothesis testing, inferential statistics were not calculated.

According to Trochim (2006:4), descriptive statistics describe essential features of data. The three main features that researchers use to describe and summarise data are frequency, measures of central tendency and measures of dispersion (Parahoo 2006:379). Frequency distributions organise data and clarify patterns existing among specific variables (Polit & Beck 2008:563). In this study, the frequencies for the research variables were calculated and displayed using tables, histograms and frequency polygons. Central tendencies for the research variables were calculated using the mode, median and mean. Only the mode can be used for nominal data, whereas both mode and median can be used for ordinal data and all three measures can be used at the interval level of

measurement. Dispersion was calculated using the range (R), semi-interquartile range (Q), variance and standard deviation (SD).

Correlation procedures describe relationship between two variables measured on the ordinal, interval, or ratio scale (Polit & Beck 2008:568). Correlation between variables is done using Pearson's (*r*) coefficient for interval and ratio scales. For ordinal level measures, Spearman's rho (*p*) coefficient is used (Polit & Beck 2008:568-571). The data analysis was done with guidance of a statistician using Epi-Info statistical computer programme and MS Excel 2003 (see Annexure F).

3.5 ETHICAL CONSIDERATIONS

Ethics in research is a system of moral values that is concerned with the degree to which research procedures adhere to professional, legal and social obligations to the study participants (Polit & Beck 2008:753). In reality, it attempts to distinguish between what is right and what is wrong. According to Parahoo (2006:111), ethical principles apply to each stage of the research process, including the research topic, research design and publication of the findings. In this study, the researcher complied with the following ethical principles:

3.5.1 Protecting the human rights of the respondents

The principles of the right to self-determination, privacy, confidentiality, anonymity, fair treatment and protection from harm were taken into consideration to protect the respondents in this current study.

3.5.1.1 Right to self-determination

The right to self-determination means that humans are autonomous and thus have a right to choose what is good for them without external control or risking

any penalty (Polit & Beck 2008:171-172). This was ensured by obtaining informed consent of respondents before every interview was conducted. The researcher provided explanations about the research and answered the respondents' questions. The respondents were informed of their right to voluntarily decide to participate, refuse participation or withdraw from the study. They were assured that non-participation would not deny them any rights of accessing treatment from the hospital. Then, consent forms were read to them in the local language (Luganda) or English, depending on their language preference. The respondents were then requested to sign the consent form. After giving that information, respondents freely committed themselves to the study by signing a consent form (appendix l). Although the research assistants and the researcher were fluent in both English and Luganda, the structured interview schedule was available in both languages. This helped to ensure that every interviewee was asked the same questions – preventing possible discrepancies in 'on-the-spot' translations by the interviewees. An expert in English-Luganda-English translations approved that the translations reflected the same meaning (see Annexure C).

3.5.1.2 Right to privacy

The right to privacy entails freedom of an individual to determine the extent, the time and general circumstance under which private information can be shared with or withheld from others. Anonymity and confidentiality are ingredients of privacy (Babbie 2007:71).

Anonymity is the protection of participants' confidentiality such that even the researcher cannot link individuals with the information provided (Polit & Beck 2008:747). Anonymity was ensured by not requesting respondents their names for the interview schedule (appendix ll). The consent forms where respondents signed were on separate paper from interview schedule. This meant that the

responses in the interview schedule could not be linked to any specific respondent.

Confidentiality is the protection of study participants so that data provided are never publicly divulged (Polit & Beck 2008:750). Confidentiality was ensured by conducting the interviews at the homes of respondents. No third party was requested to participate in the discussion between the interviewer and interviewee. The information given was not shared with any other person for non-research purposes.

3.5.1.3 Right to protection from harm

The right to protection from harm is about the researcher doing good and doing no harm. This right is based on the ethical principle of beneficence. This imposes a duty on researchers to minimise harm and maximise benefits (Polit & Beck 2008:170). This means that the risk/benefit ratio should be acceptable implying that the degree of risk to be taken by those participating in the study should never exceed the potential humanitarian benefits of the knowledge to be gained (Polit & Beck 2008:174).

Since this study did not involve invasive physical testing or drawing samples from respondents, there was no possibility of physical harm to respondents. There might have been a possibility of some emotional or social discomfort. Such discomfort might have involved the feeling of embarrassment during the data collection process. Respondents might have realised that they were not following the recommended practices. However, the benefits greatly outweigh the risks because respondents, children and the communities could benefit from the study's findings, and from potential enhanced education of caregivers.

3.5.2 The rights of the institutions

Academic institutions have committees to review ethical aspects of research (Polit & Beck 2008:191). After reviewing the proposal, the research instrument and the research methodology, the Ethics and Research Committee of the Department of Health Studies, Unisa, provided permission for the study to continue (see Annexure D). This permission was subject to obtaining the required permission from the healthcare authorities concerned, which was obtained (see Annexure E). Overall authorisation for the research was obtained from the Mukono district health officer, who is responsible for all health-related issues of the district. At the six villages where data collection took place, written authorisation was given by the respective local council chairman. All the conditions set by the institution/community were adhered to. A summarised report of findings and recommendations would be distributed to the community chairpersons, subsequent to the approval of the research report. A copy of the dissertation would be given to the district health officer.

3.5.3 Scientific integrity of the study

Ethical conduct in research involves efforts to maintain high standards of integrity and avoid any form of research misconduct as plagiarism, fabrication of results or falsification of data (Polit & Beck 2008:191). The integrity of the study was ensured by producing original data and authentic results. All consulted sources were acknowledged and listed in the list of references of the dissertation. The researcher ensured that there was no fabrication of data and the analyses were performed and interpreted accurately.

3.6 SUMMARY

Quantitative, descriptive research was done to answer the research question of how mothers in the Mukono district conducted home-based management of fever. The chapter discussed the research design and methods. The chapter also discussed the sampling processes, details of the data collection instrument, developed based on Bandura's Social Cognitive Theory and literature review. Reliability and validity of the research tool were also discussed. Details of the data collection process from sampled caregivers in the participating village were discussed as well as the ethical principles pertaining to this study. The next chapter presents the analysis and discussion of the collected data.

CHAPTER 4

DATA ANALYSIS AND DISCUSSION

4.1 INTRODUCTION

The previous chapter discussed the research design and methodology of this study. This chapter deals with data analysis and discusses the study findings. The chapter presents data that were collected at household level from 60 caregivers, selected from six sampled villages in Mukono district (refer to section 3.4.1.3). This meant a response rate of 100%. The study received this high response rate because of the good cooperation received from the village council officials and the fact that data were collected at the households where respondents lived. However, some respondents were unable to answer some questions on the interview schedule. The response rate for individual items might thus differ and will be presented alongside the results.

Descriptive data analysis was done using Epi-Info version 3.5.1 and MS Excel 2003 computer programs. Data were interpreted and presented in the form of tables and figures.

4.2 RESEACH OBJECTIVES

As mentioned in section 1.6, the main purpose of the study was to describe caregivers' practices concerning the management of fever of children younger than 5 years in Uganda. The specific objectives of this study were to:

- Describe the environmental factors which influenced health care-practices of caregivers.
- Describe the intrapersonal characteristics which influenced health care-practices of caregivers.
- Describe the health care-practices including care-seeking behaviours of caregivers in home-based management of fever in children.

4.3 RESEARCH RESULTS

The data were collected by conducting structured interviews with 60 caregivers of children who were younger than five years of age. The child whose name was selected during the sampling process, is referred to as the 'reference child' of each respondent, as one respondent might have taken care of more than one child. The structured interview schedule had four sections (A to D). Consequently the findings will be discussed in this chapter according to these four main sections:

- Section A: socio-demographic data of the respondents
- Section B: findings on environmental factors that influenced caregivers' home-based management of fever
- Section C: findings about personal factors that influenced respondents' home-based management of fever
- Section D: findings on health care-practices and care-seeking behaviours of caregivers of children younger than five

4.3.1 Socio-demographic data

This section dealt with socio-demographic data of respondents. This data included information on respondents' ages, gender, marital status, educational level, employment status and their estimated monthly incomes. The data in this section also included information on age, gender and history of episodes of fever of the reference child. The section also presents information on the relationship of the reference child to the caregivers (respondents).

Table 4.1: Socio-demographic characteristics of caregivers

Characteristic	Frequency	Percent
Age of respondent (n=60)		
Less than 25	16	26.7
25-34	21	35.0
35-44	13	21.7
45-54	6	10.0
55-64	3	5.0
65-74	1	1.7
Respondents gender (n=60)		
Male	8	13.3
Female	52	86.7
Marital status of respondent (n=59)		
Never married	11	18.6
Married	35	59.3
Divorced	3	5.1
Separated	5	8.5
Widowed	5	8.5
Highest level of education attained (n=60)		
No schooling	6	10.0
Primary school	22	36.7
Secondary school	18	30.0
Post secondary school	9	15.0
University	5	8.3
Employment status (n=60)		
Government employee	11	18.3
Non-government employee	7	11.7
Self employees	18	30.0
Student	3	5.0
Unemployed	9	15.0
Housewife	12	20.0
Average household income per month (n=58)		

0-14 999 Shs	18	31.0
15 000-29 999 Shs	9	15.5
30 000-44 999 Shs	12	20.7
45 000-59 999 Shs	3	5.2
60 000-74 999 Shs	3	5.2
75 000-89 999 Shs	4	6.9
90 000 Shs and more	9	15.5

4.3.1.1 Respondents' ages

The age of caregivers was categorised from those who were younger than 25 years to a 65-74 age group. Out of 60 respondents, 35.0% (n=21) were aged 25-34 years. However, 26.7% (n=16) were younger than 25 years of age, 21.7% (n=13) were 35-44 years old. Respondents who were between the ages of 55 to 74 years were only 6.7% (n=4). (Refer to table 4.1).

4.3.1.2 Respondents' gender

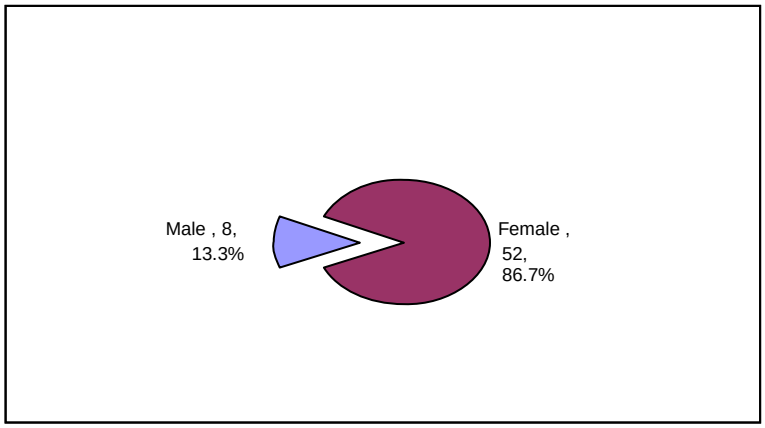

Figure 4.1 Caregivers' gender (n= 60)

Out of 60 respondents, 86.7% (n=52) were females. This implies that males were 13.3% (n=8)). This is graphically demonstrated by figure 4.1.

4.3.1.3 Respondents' marital status

Out of the 59 respondents, 59.3% (n=35) were married. However, a significant proportion of respondents, 40.7% (n=24) were not married (including never married, divorced, separated or widowed). This gives a significant percentage of single parent households.

4.3.1.4 Respondents' level of education

In reference to figure 4.2, respondents' educational levels ranged from no education to university education. Out of the 60 respondents, 36.7% (n=22) had primary school education, 30.0% (n=18) had secondary school education, and 8.3% (n=5) had university education, while 10% (n=6) had no formal education. Caregivers' education levels might be important influences determining their healthcare behaviours when children under five have fever attacks.

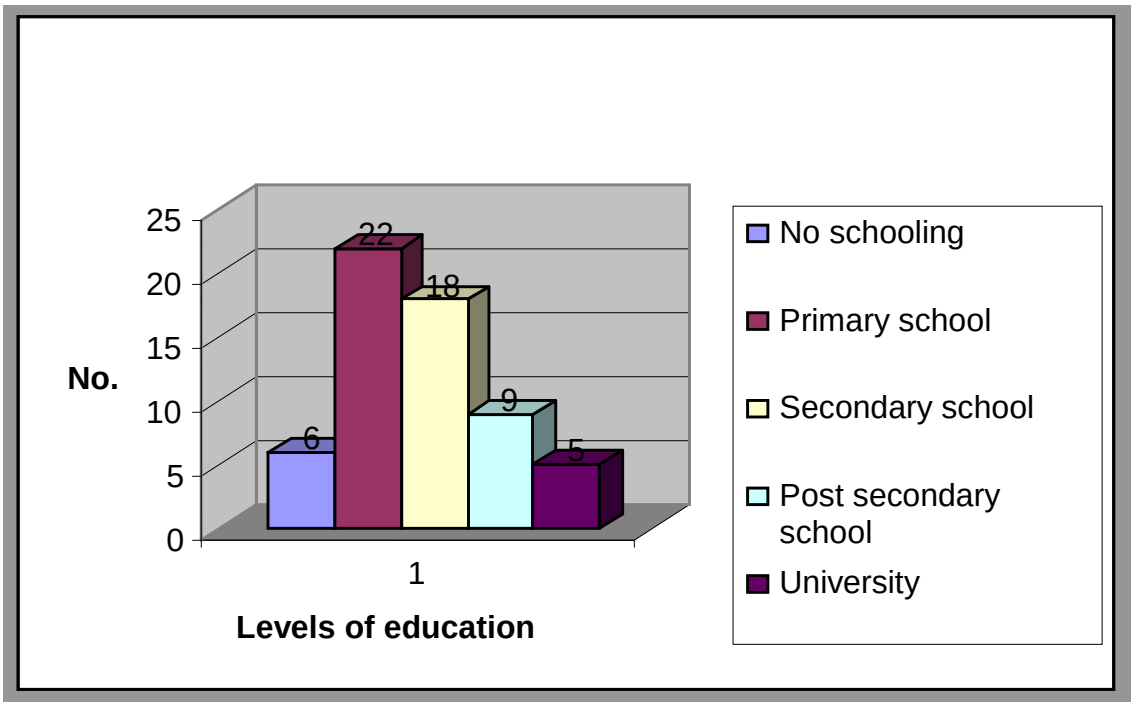

Figure 4.2: Caregivers' educational levels (n=60)

4.3.1.5 Employment status of respondents

Study findings show that out of 60 respondents, 30.0% (n=18) were self employed, 20.0% (n=12) were housewives, 18.3% (n=11) were government employees while 5.0% (n=3) were students and 15% (n=9) were unemployed (see table 4.1).

4.3.1.6 Respondent's average monthly household incomes

Out of 58 respondents, 31.0% (n=18) reported an average monthly income of less than 15 000 Shillings, 72.4% (n=42) of less than 60 000 Shillings, and 15.5% (n=9) of over 90 000 Uganda Shillings (see table 4.1). (During January 2010: US$1 was equivalent to 2 000 Uganda shillings; and R1 was equivalent to 260 Uganda shillings).

4.3.1.7 Characteristics of the 'reference' children under respondents' care

In each household, the research team selected a 'reference child' who was the basis of sampling respondents as described in section 3.4.1.3. Respondents were asked about the characteristics of this reference child under their care. These findings are summarised in table 4.2.

Table 4.2: Characteristics of the caregivers' 'reference children'

Characteristic	Frequency	Percentage
Age of the reference child under care (n=60)		
12 months or less	18	30.0
13-24 months	13	22.0
25-36 months	14	23.0
37- 59 months	15	25.0
Gender of the child (n=60)		
Male	32	53.3
Females	28	46.7
Relationship with the reference child under care (n=60)		

Mother/father	41	68.3
Grand parent	8	13.3
Sibling (Sister/Brother)	2	3.3
Relative	4	6.7
Guardian	4	6.7
Others	1	1.7
Number of children under 5 years who are under care (n=60)		
One child	26	43.3
Two children	21	35.0
Three children	7	11.7
Four children or more	6	10.0
Number of children born to the family (n=59)		
One child	11	18.6
Two to four	27	45.8
Five or more	21	35.6

4.3.1.8 Children's ages

According to eligibility criteria of the study, the sampled children were younger than five years of age. Findings of the study show that out of 60 'reference children', 30.0% (n=18) were aged up to 12 months, 22.0% (n=13) were aged 13-24 months, 23.0% (n=14) were aged 25-36 months and 25.0% (n=15) were 37-59 months old. These findings show that the age distribution of the reference children represented the full range of ages from younger than 12 up to 59 months, and that all complied with the inclusion sampling criteria. (Refer to table 4.2).

4.3.1.9 Children's gender

There was no significant gender difference in reference children. Out of 60 respondents, 53.3% (n=32) were males while 46.7% (n=28) were females, as portrayed in figure 4.3.

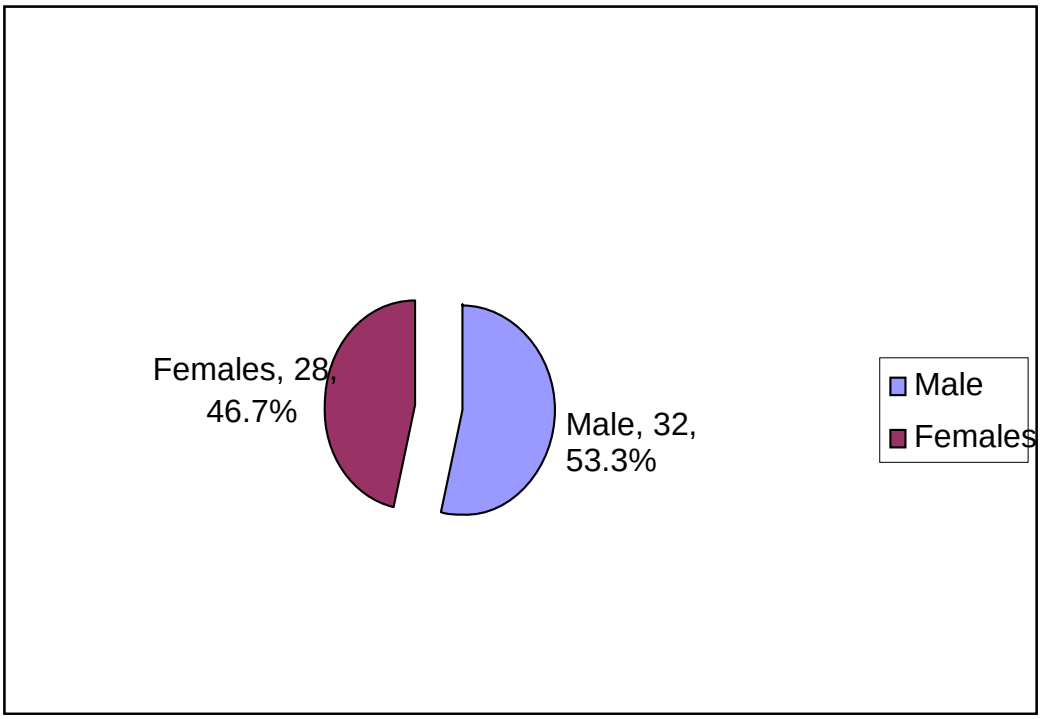

Figure 4.3: Children's gender (n= 60)

4.3.1.10 Respondents' relationships with the 'reference' children

According to the data presented in table 4.2, out of 60 respondents, 68.3% (n=41) were parents (mothers and fathers) of the reference children, 13.3% (n=8) were grand parents, and the other 18.4% (n=11) included siblings, relatives, guardians and others.

4.3.1.11 Number of children per household

Out of 60 households included in the study, 43.3% (n=26) had one child, while 56.7% (n=34) had two or more children younger than five years under their care. (Refer to table 4.2).

Table 4.3: Malaria history of children in surveyed households

Characteristic	Frequency	Percent
Number of episodes of fever in reference child in last 12 months (n=60)		
None	2	3.3
Once	15	25.0
Twice	11	18.3
Three times	14	23.3
Four times or more	18	30.0
Number of children under 5 years that have had malaria (n=58)		
None	4	6.9
All	36	62.1
Some	18	31.0
Children under respondents'care who had died of malaria (n=60)		
None	53	88.3
One	5	8.3
Two	2	3.3

4.3.1.12 Malaria history of the 'reference children' and other children in each household

Respondents were asked about the occurrence of malaria in the reference child and other children aged five years or younger in each household. They were also asked if any child in the household had died of malaria (see table 4.3).

Findings show that out of 60 respondents, 96.7% (n=58) agreed that they had at least one episode of fever in the reference children in the previous year and 30.0% (n=18) reported at least four malaria episodes in the reference children. In 62.1% (n=58) households, all children had had a malaria episode. However, in 8.3% (n=5) of all households, at least one child had died due to suspected malaria and 3.3% (n=2) of households had lost two or more children reportedly due to malaria-related complications.

Table 4.4: Environmental factors that influenced caregivers' anti-malaria actions

Characteristic	Frequency	Percent
Distance to nearest health unit/hospital (n=60)		
Less than 5 kilometres	47	78.3
More than 5 kilometres	13	21.7
Experiences on availability of anti-malaria drugs at the hospital (n=60)		
Always available	11	18.3
Often available	29	48.3
Rarely available	19	31.7
Never available	1	1.7
Experiences on availability of anti-malaria drugs with the village drug distributors (n=59)		
Always available	11	18.6
Often available	14	23.7
Rarely available	17	28.8
No longer available	15	25.4
Never available	2	3.4
Perceived effectiveness of drugs obtained from the village drug distributor (n=56)		
Very effective	25	44.6
Often not effective	26	46.4
Never effective	5	8.9
Availability of the village drug distributor (n=59)		
Always available	18	30.5
Not always available	21	35.6
Never available	20	33.9
Availability of traditional healers (n=60)		
Readily available	24	40.0
Not readily available	10	16.7
Never available	9	15.0
Not aware	17	28.3
Level of satisfaction with services at public health facilities (n=59)		
Services are satisfactory	25	42.4
Services are fairly satisfactory	33	55.9
Services are not satisfactory	1	1.7

4.3.2 Environmental factors that influenced caregivers' anti-malaria actions

4.3.2.1 Distance to the nearest health unit/hospital

Distance to nearest health unit or hospital is a criterion for determining 'geographic access' of the population to a health facility. As demonstrated in figure 4.4, out of 60 respondents, 78.0% (n=47) lived within five kilometres from clinics/hospitals (which most people could walk in the study areas) and 22.0% (n=13) were further than five kilometres from such sites. The MOH targets that by the year 2009-2010, the percentage of population residing within five kilometres of a health facility should be 85% (MOH 2006b:98). This target has not been realised in the study areas, but these areas are approximating the target percentage.

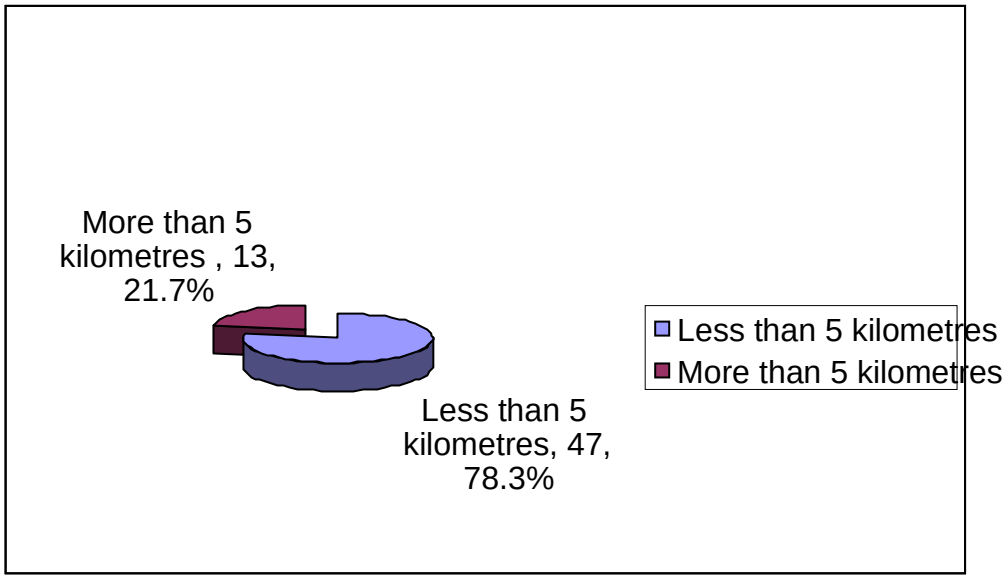

Figure 4.4: Distance to the nearest health unit/hospital (n=60)

4.3.2.2 Experiences concerning the availability of drugs at hospitals

Out of 60 respondents, 48.3% (n=29) indicated that anti-malaria drugs were often available at the hospitals (see table 4.4). Furthermore, 31.7% (n=19) believed that anti-malaria drugs were rarely available and one respondent (1.7%), mentioned that anti-malaria drugs were never available at hospitals. However, only 18.3% (n=11) respondents mentioned that anti-malaria drugs were always available at hospitals. This implied that, as far as the community was concerned, anti-malaria drugs were frequently out of stock at hospitals/health units. The MOH targets indicate that by the year 2009-2010, public health facilities with sustained anti-malaria drugs supplies should be 80% (MOH 2006b:98). This means that the MOH expects some shortages of first line anti-malaria drugs in some health facilities by the year 2010, but only 18.3% (n=11) participants in the current study reportedly experienced health services always to have anti-malaria drugs in stock.

4.3.2.3 Availability of anti-malaria drugs from village drug distributors

Out of 59 respondents, 28.8% (n=17) reported that anti-malaria drugs were rarely available but 25.4% (n=15) reported that anti-malaria drugs were no longer available, and 23.7% (n=14) reported that such drugs were often available from village drug distributors. Only 18.6% (n=11) respondents indicated that these drugs were available from the village drug distributors (refer to table 4.4).

4.3.2.4 Perceived effectiveness of drugs obtained at community levels

Of the 56 respondents who answered this item, 46.4% (n=26) thought that anti-malaria drugs with the village drug distributors were often ineffective, 8.9% (n=5) thought that these anti-malaria drugs were never effective, as indicated in table 4.4. However, 44.6% (n=25) of respondents thought that such medications were indeed effective against malaria.

4.3.2.5 Availability of the village drug distributors

According to table 4.4, out of 59 respondents, 35.6% (n=21), indicated that the village drug distributors were not always available at the community level, 33.9% (n=20) mentioned that village drug distributors were never available at community level. However, 30.5% (n=18) mentioned that village drug distributors were always available at community level. The MOH targets include that 'access to care' rendered by a village drug distributor for children younger than five years, should be available for 70% of their needs by 2010 (MOH 2006b:99). Reaching the 70% availability of village drug distributors poses some challenges, considering that only 30.5% (n=18) respondents considered this to be the case in their respective villages.

4.3.2.6 Availability of traditional healers

Some respondents (40.0%; n=24) mentioned that traditional healers were readily available at the community level, 16.7% (n=10) indicated that traditional healers were not available, and 15.0% (n=9) indicated that traditional healers were never available. Out of all respondents, 28.3% (n=17) mentioned that they were not aware of traditional healers' availability in their communities (refer to table 4.4).

4.3.2.7 Level of satisfaction with services at public health facilities

Out of 59 respondents, 55.0% (n=33) were fairly satisfied with services offered at public health facilities, 42.4% (n=25) were satisfied and only 1 respondent (1.7%) was not satisfied. This is demonstrated in figure 4.5. The MOH target on 'quality of service care delivery' states that the proportion of the population expressing satisfaction with the health services should be 80.0% by the year 2010 (MOH 2006b:99). However, these findings showed a lower level of satisfaction than the Ugandan MOH target.

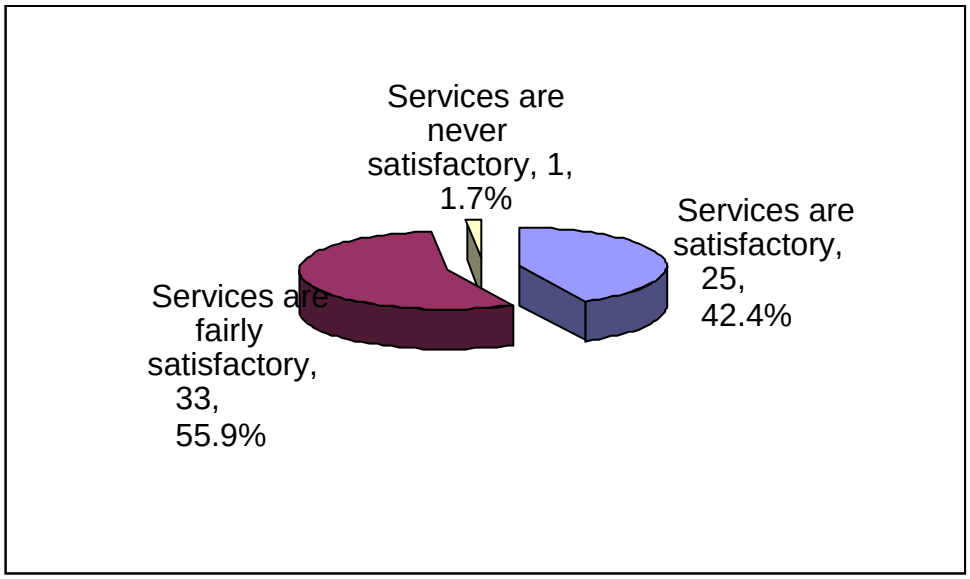

Figure 4.5: level of satisfaction with services at public facilities (n=59)

4.3.2.8 The influence of 'significant others' on caregivers' malaria treatment practices

Respondents were asked about the extent to which other people influenced their health seeking practices. These were evaluated on the basis of whether the caregiver always followed what the 'significant other' did, or only partly followed what they did. These findings are summarised in table 4.5.

Table 4.5: Influence of 'significant others' on caregivers' actions

Characteristic	Frequency	Percentage
How family members influenced respondents' health-seeking practices (n=60)		
Always followed what they did	36	60.0
Often followed what they did	20	33.3
Never followed what they did	4	6.7
How other caregivers/peers influenced respondents' health seeking practices (n=59)		
Always followed what they did	27	45.8
Often followed what they did	22	37.3
Never followed what they did	10	16.9
How community leaders influenced respondents' health seeking practices (n=59)		
Always followed what they did	35	59.3

Often followed what they did	17	28.8
Never followed what they did	7	11.9
How culture and customs influenced respondents' health seeking practices (n=59)		
Always followed culture and customs	16	27.1
Often followed culture and customs	10	16.9
Never followed culture and customs	33	55.9

- *Influence of family members*

Out of 60 respondents, 60.0% (n=36) always followed actions of family members, 33.3% (n=20) often did so and only 6.7% (n=4) never followed family members' actions. This means that family members exerted some influence upon caregivers' anti-malaria actions. (Refer to table 4.5).

- *Influence of other caregivers/peers*

Out of 59 respondents, 45.8% (n=27) agreed that they followed what their peers did regarding home-based care for children. Such findings indicate that other caregivers/peers influenced the actions of caregivers as only 16.9% (n=10) indicated that they never followed what their fellow caregivers' actions. (Refer to table 4.5).

- *Influence of community leaders*

Out of 59 respondents, 59.3% (n=35) agreed that they always followed community leaders' actions as regards home-based care for children, 28.8% (n=17) often did so and only 11.9% (n=7) never followed what their community leaders did. (Refer to table 4.5).

- *Influence of culture and customs*

Out of 59 respondents, 55.9% (n=33) were reportedly not influenced by culture and customs. Only 27.1% (n=16) followed culture and customs in home-based care for children under five years while 16.9% (n=10) often followed culture and customs in managing these children with fever. (Refer to table 4.5).

4.3.3 Personal factors that influenced caregivers' health seeking practices

Personal factors that influenced caregivers' health seeking practices were also explored. These included the level of diffusion of health education messages, the perceived importance of health education, and knowledge about malaria.

4.3.3.1 Diffusion and reported sources of health education messages

Caregivers were asked about their sources of health education messages regarding malaria and malaria prevention, as well as their perceptions on their most important information sources. They were also requested to indicate the number of times they had received health education messages on malaria during the preceding twelve months.

Table 4.6: Diffusion and sources of information on malaria

Characteristic	**Frequency (n=60)**	**Percentage**
Sources of information on malaria		
Health workers	51	85.0
Electronic media	49	81.7
From fellow caregivers, elders	45	80.4
Newspapers	37	61.7
Schools	37	61.7

Past experience	37	61.7
Locally organized seminars	30	52.6
Places of worship	31	51.7
Village drug distributors	24	40.0
Local NGOs/CBOs	22	37.3
Traditional healers	7	11.7
Most important source of information on malaria (n=41)		
Health workers	26	63.4
Electronic media	5	12.2
Schools	3	7.3
Drug distributors	2	4.9
Fellow caregivers	2	4.9
Local NGOs/CBOs	1	2.4
Other	2	4.9
Frequency of receiving health education messages on malaria in last one year (n=60)		
None	7	11.7
Once	14	23.3
Twice	7	11.7
Three times or more	32	53.3

4.3.3.2 Sources of information on malaria

Out of 60 respondents, 85.0% (n=51) indicated health workers as their source of such messages, 81.7% (n=49) said electronic media and 80.4% (n=45) agreed that their fellow care-takers were their major source of information on malaria. To a lesser extent newspapers (61.7%; n=37), schools (61.7%; n=37), local seminars (52.6%; n=30) and places of worship (51.7%; n=31) were also sources of such information. However, 61.7% (n=37) of the respondents indicated that they had received information and expertise on caring for children with malaria from past experience. (Refer to table 4.6). Only 11.7% (n=7) of the respondents indicated that traditional healers were their source of information on malaria.

4.3.3.3 Most important source of information on malaria

Out of 41 respondents who answered this question, 63.4% (n=26) agreed that health workers were the single most important source of malaria information, 12.2%

(n=5) indicated electronic media (radio and TV), 24.4% (n=10) indicated a variety of their important sources of information including schools, drug distributors, fellow caregivers local NGOs/CBOs and others. (Refer to table 4.6).

4.3.3.4 Frequency of receiving malaria health education messages during the last year

Out of 60 respondents, 53.3% (n=32) had received health education messages on malaria three or more times, 11.7% (n=7) twice and 11.7% (n=7) had received no malaria information messages during the preceding year (12 months). (Refer to figure 4.6). This means that 65.0% (n=39) of caregivers had received malaria messages more than once during the previous one year.

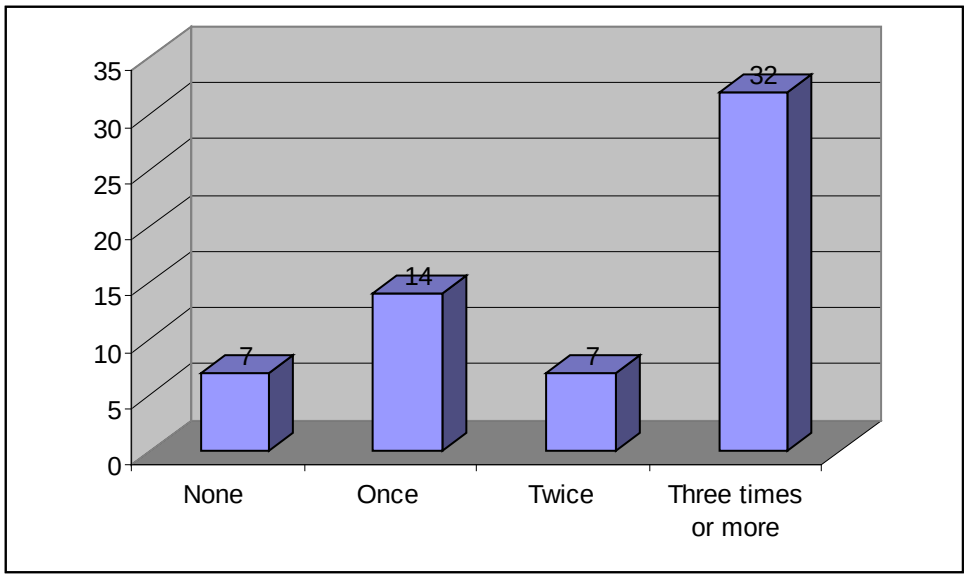

Figure 4.6 Number of times of receiving information on malaria (n=60)

4.3.4 Extent to which health education contributed to awareness on different malaria issues

Table 4.7 summarises the findings regarding the role of health education in caregivers' acquisition of knowledge regarding malaria transmission, presentation and prevention.

Table 4.7: Importance of health education as a source of information on malaria transmission, presentation and prevention

Characteristic	Frequency	Percentage
That fever is a major sign of malaria (n=59)		
Learned all about this through health education	14	23.7
Learned it partly through health education	20	33.9
Always known this without health education	25	42.4
That malaria is a dangerous disease (n=59)		
Learned all about this through health education	10	16.9
Learned it partly through health education	18	30.5
Always known this without health education	31	52.5
That malaria is the leading cause of sickness and death of children (n=59)		
Learned all about this through health education	12	20.3
Learnedt partly through health education	21	35.6
Always known this without health education	26	44.1
That malaria is caused by a parasite (n=57)		
Learned all about this through health education	20	35.1
Learned partly through health education	17	29.8
Always knew this without health education	20	35.1
That malaria can be prevented (n=59)		
Learned all about this through health education	8	13.6
Learned it partly through health education	27	45.8
Always knew this without health education	24	40.7
How to prevent mosquito bites (n=57)		
Learned all about this through health education	14	24.6
Learned it partly through health education	24	42.1
Always knew this without health education	19	33.3
How to prevent the breeding of mosquitoes (n=59)		
Learned all about this through health education	15	25.4
Learned it partly through health education	27	45.8
Always knew this without health education	17	28.8
The preventive measures against malaria (n=59)		

Learned all about this through health education	14	23.7
Learned it partly through health education	32	54.2
Always knew this without health education	13	22.0
That malaria is transmitted by mosquitoes (n=59)		
Learned all about this through health education	21	35.6
Learned it partly through health education	22	37.3
Always knew this without health education	16	27.1

Caregivers' replies to questions regarding the role of health education, in caregivers' acquisition of knowledge regarding malaria, are reflected in table 4.7.

4.3.4.1 Fever is a major sign of malaria

Out of 59 respondents, 42.4% (n=25) mentioned that they had always known that fever is a major sign of malaria, even without health education. However, 33.9% (n=20) mentioned that they had gained more information about that from health education and 23.7% (n=14) indicated that they had acquired this information from health education. This implies that 76.3% (n=45) were aware of fever as a major sign of malaria, with or even without, health education.

4.3.4.2 Malaria is a dangerous disease

Out of 59 respondents, 52.5% (n=31) indicated that they had always known that malaria is a dangerous disease even without health education, 30.5% (n=18) agreed that they had learned more about malaria as being a dangerous disease from health education, and 16.9% (n=10) indicated that they had acquired all their knowledge, about malaria as a dangerous disease, through health education.

4.3.4.3 Malaria is the leading cause of sickness and death among children younger than five

Out of 59 respondents, 44.1% (n=26) indicated that they had always known that malaria is the leading cause of sickness and death among children younger than

five, even without health education, 35.6% (n=21) agreed that they had learned more about this fact from health education. However, 20.3% (n=12) indicated that they had known this solely through health education messages. Consequently, health education sessions seemed to play an important role in imparting knowledge to caregivers about malaria's potential morbidity and mortality risks.

4.3.4.4 Malaria is caused by a parasite

Out of 57 respondents, 35.1% (n=20) had always known that malaria is caused by a parasite, even without health education, while 29.8% (n=17) agreed that they had learned more from health education, and 35.1% (n=20) indicated that they had known this solely through health education.

4.3.4.5 Malaria can be prevented

Out of 59 respondents, 40.7% (n=24) indicated that they had always known that malaria could be prevented, even without health education, while 45.8% (n=27) agreed that they had learned more about malaria prevention from health education. Only 13.6% (n=8) of the respondents indicated that they had acquired all their knowledge about malaria prevention aspects through health education.

4.3.4.6 Preventing mosquito bites

Out of 57 respondents, 33.3% (n=19) indicated that they had always known about preventing mosquito bites, even without health education while 42.1% (n=24) agreed that they had learned more from health education. However, 24.6% (n=14) indicated that they had acquired this knowledge solely through health education messages. Health education contributed to n 64.7% (n=38) of the respondents' knowledge about preventing mosquito bites.

4.3.4.7 Preventing the breeding of mosquitoes

Out of 59 respondents, 28.8% (n=17) indicated that they had always known how tp prevent mosquito bites even without health education and 45.8% (n=27) had learned more from health education, and 25.4% (n=15) indicated that they had acquired this knowledge solely through health education. This implies that out of 59 respondents, health education contributed to their knowledge (about the prevention of mosquito breeding) for 71.2% (n=42).

4.3.4.8 Preventive measures against malaria

Out of 59 respondents, 22.0% (n=13) indicated that they had always known that even without health education and 54.2% (n=32) indicated that they had learned more about this fact from health education. However, 23.7% (n=14) indicated that they had known this solely through health education.

4.3.4.9 Malaria is transmitted through mosquito bites

Out of 59 respondents, 27.1% (n=16) indicated that they had always known that malaria is transmitted through mosquito bites, even without health education, 37.3% (n=22) agreed that they had learned more from health education, and 35.6% (n=21) indicated that they had known this solely through health education. This implies that for 72.9% (n=43) of the respondents, health education contributed wholly of partly to their knowledge about malaria's transmission by mosquitoes.

4.3.4.10 The Importance of health education as a source of information on malaria transmission, signs (and symptoms) and prevention

From table 4.7, the most common types of messages regarding the cause of malaria and its prevention for which health education was the sole source of messaging included that:

- malaria is transmitted by mosquitoes 35.6% (n=21)
- malaria is caused by a parasite 35.1% (n=20)
- preventing the breeding of mosquitoes is possible 25.4% (n=16)
- mosquito bites should be prevented 24.6% (n=14)

The most common malaria prevention aspects about which people were knowledgeable, even without health education included that:

- malaria is a dangerous disease 52.5% (n=31)
- fever is the most important sign of malaria 42.4% (n=25)
- malaria can be prevented 40.7% (n=24)

4.3.5 Respondents' sources of information concerning malaria treatment and care

Respondents' sources of information regarding preferred malaria treatment practices were also assessed. Table 4.8 summarises the findings regarding the role of health education in caregivers' acquisition of knowledge regarding malaria treatment.

Table 4.8: Importance of health education as a source of information on malaria treatment and care

Characteristic	Frequency	Percentage
How malaria is treated (n=58)		
Learned all about this through health education	13	22.4
Learned it partly through health education	31	53.4

Always known this without health education	14	24.1
That children are more at risk of malaria than adults (n=59)		
Learned all about this through health education	14	23.7
Learned it partly through health education	19	32.2
Always known this without health education	26	44.1
That you can get help from community drug distributors (n=57)		
Learned all about this through health education	24	42.1
Learned it partly through health education	17	29.8
Always known this without health education	16	28.1
When to seek medical help for a sick child (n=56)		
Learned all about this through health education	17	30.4
Learned it partly through health education	19	33.9
Always known this without health education	20	35.7
How to determine that the malaria treatment is working (n=57)		
Learned all about this through health education	10	17.5
Learned it partly through health education	24	42.1
Always known this without health education	23	40.4
How to determine that the child's condition is deteriorating (n=57)		
Learned all about this through health education	10	17.5
Learned it partly through health education	19	33.3
Always known this without health education	28	49.1

4.3.5.1 Information about malaria treatment

Regarding treatment of malaria, out of 58 respondents, 24.1% (n=14) indicated that they had always known about malaria treatment even without health education and 53.4% (n=31) agreed that they had learned more from health education. However, 22.4% (n=13) indicated that they had known about this solely through health education.

4.3.5.2 Children's greater risk of getting malaria (compared to adults)

Out of 59 respondents, 44.1% (n=26) indicated that they had always known that children were at a greater risk of getting malaria than adults, even without health education while, 32.2% (n=19) indicated that they had learned more about this fact from health education. However, out of 59 respondents, 23.7% (n=14) indicated that they had known about this solely through health education. This implies that 76.3% (n=45) were aware that children are more at risk of malaria than adults with or without health education.

4.3.5.3 Help available from the village drug distributors

Out of 57 respondents, 28.1% (n=16) had always known that they could get help from village drug distributors for children under five with fever attacks, even without health education and 29.8% (n=17) had learned more from health education, while 42.1% (n=24) had acquired this knowledge solely through health education messages. This implies that 72.0% (n=41) of the respondents learned about the availability of help for malaria from a village drug distributor fully or partially through health education.

4.3.5.4 When to seek medical help for a sick child

Out of 56 respondents, 35.7% (n=20) indicated that they had always known when to seek medical help for a sick child, even without health education, and 33.9% (n=19) had learned more from health education, while 30.4% (n=17) of the respondents indicated that they had learned about this malaria aspect solely through health education messages.

4.3.5.5 Determining whether the malaria treatment was working

Out of 57 respondents, 40.4% (n=23) indicated that they had always known how to determine whether the malaria treatment was working even without health education, 42.1% (n=24) indicated that they had learned more from health education and17.5% (n=10) indicated that they had known this solely through health education.

4.3.5.6 Determining whether the child's condition is deteriorating

Out of 57 respondents, 49.1% (n=28) had always known when a child's condition deteriorated, even without health education, 33.3% (n=19) indicated that they had learned more from health education and 17.5% (n=10) had learned this solely through health education messages.

4.3.5.7 The importance of health education as a source of information about malaria treatment and care

From table 4.8, the most common types of messages regarding treatment of malaria for which health education was the sole source of information included that:

- community drug distributors could provide treatment for malaria 42.1% (n=24)
- Indications when medical help should be sought for the sick child 30.4% (n=17)

The most common messages regarding malaria treatment about which the respondents were knowledgeable, even without health education, included:

- how to determine that the child's situation was deteriorating 49.1% (n=28)

- how to determine that the malaria treatment was working 40.4% (n=23).

For the majority of messages, health education contributed at least partially to the caregivers' knowledge regarding these messages.

Table 4.9: Caregivers' knowledge about the cause and transmission of malaria

Characteristic	Frequency	Percent
What causes malaria? (n=60)		
Mosquitoes	34	56.7
Malaria parasites	17	28.3
Dirty water	7	11.7
Other causes	2	3.3
How is malaria transmitted? (n=59)		
By mosquitoes	44	74.6
By malaria parasites	8	13.6
From dirty water	4	6.8
From maize	3	5.1

4.3.6 Knowledge about malaria

Caregivers were asked about the actual cause of malaria and how malaria is transmitted. This was to assess whether people could distinguish between malaria parasites that are the direct cause of malaria and mosquitoes that act as the vectors for transmission of the malaria parasites. These findings are summarised in the table 4.9.

4.3.6.1 Caregivers' knowledge about the cause of malaria

As indicated by figure 4.7, out of 60 respondents, only 28.3% (n=17) were aware that malaria is caused by malaria parasites. Most respondents, 56.7% (n=34) thought that mosquitoes were the direct cause of malaria while 11.7% (n=7) considered dirty water to be the cause of malaria.

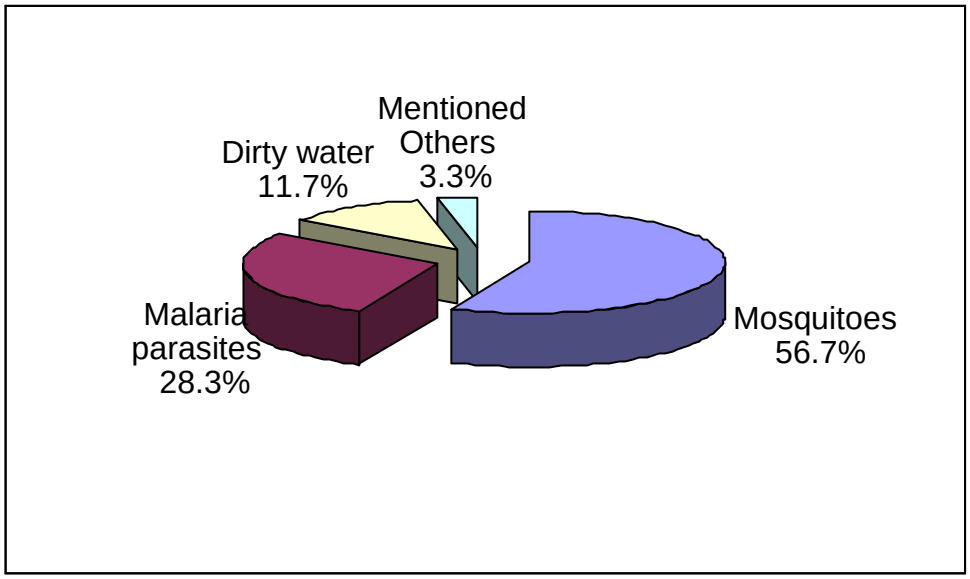

Figure 4.7: Caregivers' knowledge about the cause of malaria (n=60)

4.3.6.2 Caregivers' knowledge about the transmission of malaria

With regard to malaria transmission (refer to figure 4.8), out of 59 respondents, 74.6% (n=44) knew that malaria is transmitted by mosquitoes. However, 6.8% (n=4) reported that malaria is transmitted through dirty water and 5.1% (n=3) indicated that malaria is transmitted through improperly cooked maize. These findings show that there are still some gaps in caregivers' knowledge regarding the cause and transmission of malaria. However, stating that malaria is transmitted through dirty water might have some truth value, because mosquitoes breed in stagnant water, which is likely to become dirty.

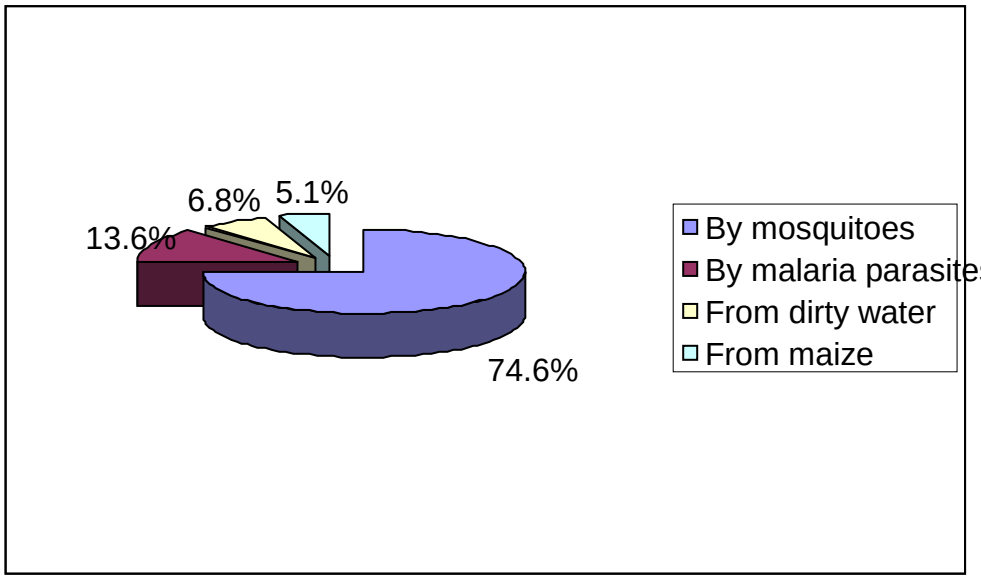

Figure 4.8: Caregivers' knowledge about the transmission of malaria (n=59)

Table 4.10: Caregivers' knowledge about the major symptoms of malaria (n=60)

Characteristic	Frequency	Percent
Knowledge about the major symptoms of malaria		
Fever	36	60.0
Vomiting	30	50.0
High temperature	24	40.0
Body weakness	16	26.7
Loss of appetite	13	21.7
Diarrhoea	13	21.7
Headache	12	20.0
Convulsions	5	8.3
Restlessness	4	6.7
Shivering /feeling cold	3	5.0
Joint pains	2	3.3
Sneezing /flu	2	3.3
Cough	2	3.3
Nausea	1	1.7
Mouth sore pains	1	1.7
Increased heart beat	1	1.7
Abdominal pain	1	1.7

4.3.6.3 Respondents' knowledge about the major symptoms of malaria

Respondents were asked to mention the major symptoms of malaria in an open ended question (refer to item 3.4.3 on the interview schedule). These findings, summarised in table 4.10, indicate that all 60 (100.0%) respondents mentioned fever/high temperature as the most important symptom of malaria. This implies that all caregivers knew that fever/high temperature is a major sign of malaria. Other frequently mentioned symptoms included: vomiting 50.0% (n=30), body weakness 26.7% (n=16), loss of appetite 21.7% (n=13), diarrhoea 21.7% (=13), headache 20.0% (n=12), convulsions 8.3% (n=5) and restlessness 6.7% (n=6). A few other symptoms were mentioned including: shivering 5.0% (n=3), joint pains 3.3% (n=2), cough 3.3% (n=2), 'flu' 3.3% (n=2), nausea 1.7% (n=1), painful mouth sores 1.7% (n=1), increased heartbeat 1.7% (n=1) and abdominal pains 1.7% (n=1). (Refer to figure 4.9).

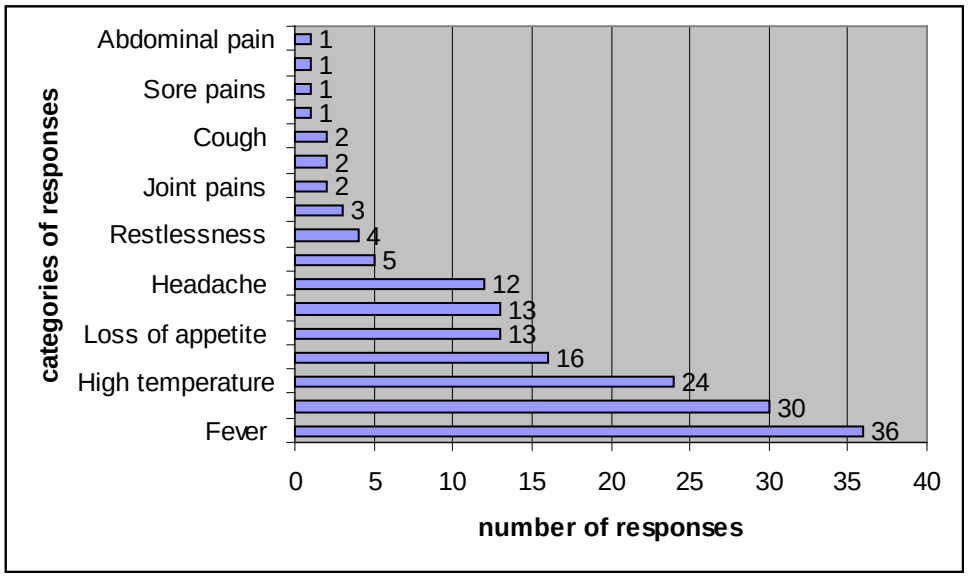

Figure 4.9: Respondents' knowledge about major symptoms of malaria (n=60)

Table 4.11: Caregivers' knowledge about the symptoms of malaria complications

Characteristic	Frequency	Percent
Knowledge about the major complications of malaria		
Convulsions	27	45.0
Dehydration	25	41.7
High temperature	15	25.0
Severe fever	11	18.3
Headache	6	10.0
Anaemia	6	10.0
Loss of appetite	5	8.3
Body weakness	3	5.0
Stomach ache	3	5.0
Restlessness	2	3.3
Loss of weight	2	3.3
Comma	1	1.7
Confusion	1	1.7
Cerebral malaria	1	1.7

4.3.6.4 Respondents' knowledge about danger signs of malaria

Respondents were asked in an open-ended question to mention the danger signs of malaria (refer to item 3.4.4 on the interview schedule). These findings are summarised in table 4.11: Each respondent could mention more than one danger sign of malaria. The most frequently mentioned complications of malaria included: convulsions 45.0% (n=27), dehydration 41.7% (n=25), high temperature/severe fever 43.3% (n=26). Infrequently mentioned danger signs included: headache 10.0% (n=6), anaemia 10.0% (n=6), loss of appetite 8.3% (n=5), body weakness 5.0% (n=3), stomach ache 5.0% (n=3), restlessness 3.3% (n=2) and loss of weight 3.3% (n=2). Other complications like coma, confusion, cerebral malaria were less known and each one was only mentioned once (1.7%). (Refer to figure 4.10).

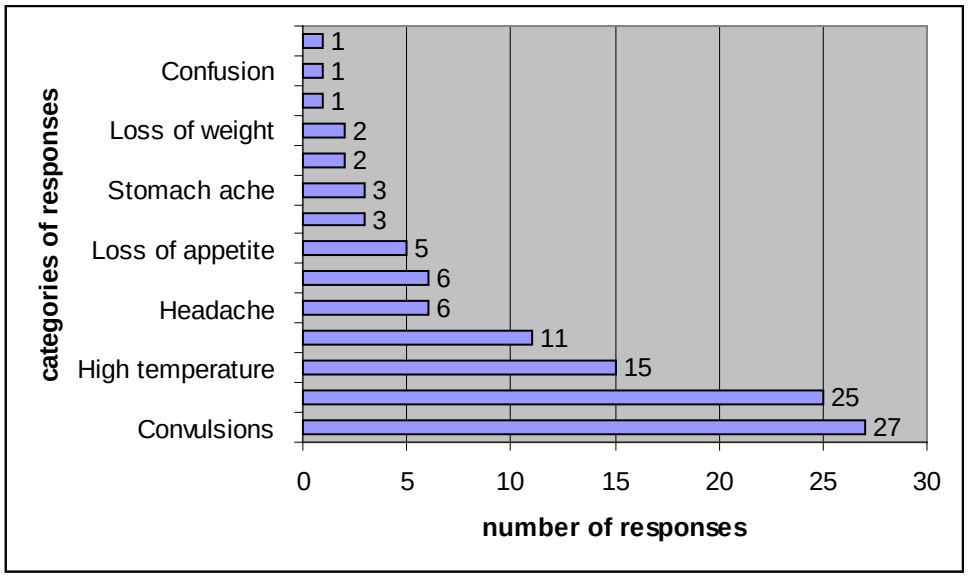

Figure 4.10: Caregivers' knowledge about danger signs of malaria (n=60)

Table 4.12: Actions taken by caregivers when a child had fever

Characteristic	Frequency	Percent
Immediate action taken when the child developed a fever (n=60)		
Gave paracetamol (panadol)	26	43.3
Tepid sponged	21	35.0
Gave local herbs	8	13.3
Gave anti-malaria pills	4	6.7
Other actions	1	1.7
Time from onset of fever to administration of anti-malaria drugs (n=51)		
0-24 Hours	45	88.2
Above 24 hours	6	11.8
Child taken to health unit (n=58)		
Yes	27	46.6
No	31	53.4

4.3.7 Actions taken in home-management of fever that characterised caregivers' behaviours

4.3.7.1 Immediate actions when the child became sick with fever

Caregivers were asked about the immediate actions taken at household level when they discovered that a child had fever. A number of treatment options were explored including use of anti-pyretic drugs like paracetamol or aspirin, tepid sponging to reduce the fever and the use of local herbs (refer to items 4.1.1 to 4.1.25 of the interview schedule). These are known practices at household level and the aim of this assessment was to quantify the extent to which they were used by the caregivers. Caregivers were also asked about the time they took to initiate anti-malaria treatment from the onset of illness in the children. In addition, caregivers were asked if they had taken the child to a health unit the last time when the child was ill with suspected malaria. These findings are presented in table 4.12.

Out of 60 respondents, 43.3% (n=26) gave an anti-pyretic drug (aspirin or paracetamol) as the first action when they noticed fever in the child, 35.0% (n=21) tepid sponged the child, while 13.3% (n=8) used local herbs, and only 6.7% (n=4) gave anti-malaria pills. Of all respondents, 46.6% (n=27) took the child to a health facility, while 53.4% (n=31) used alternative ways of treatment.

4.3.7.2 Caregivers' promptness in offering anti-malaria treatment for children with fever

Out of 51 respondents, 88.2% (n=45) agreed that their children were given anti-malarial treatment within the first 24 hours of onset of fever (refer to figure 4.11). These findings are according to the home-based management strategy which recommends that all children should access anti-malaria treatment within 24 hours of the first attack of fever (MOH 2006:27). However, 11.8% (n=) of the respondents

reported a delay of more than 24 hours before their children were treated with anti-malaria drugs.

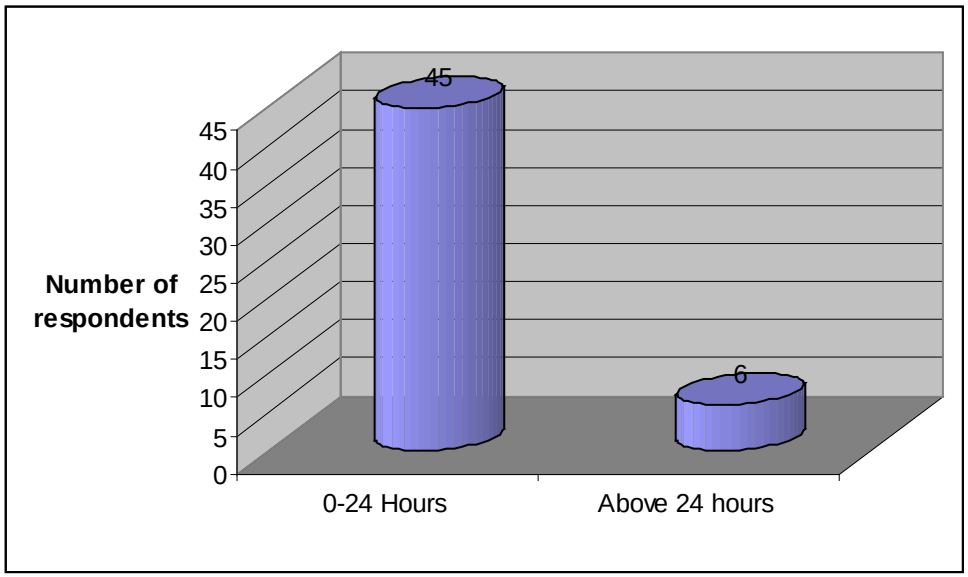

Figure 4.11: Promptness of treatment of children with fever (n=51)

4.3.7.3 Duration of hospitalisation

Out of the 60 households, 68.3% (n=41) reported that their children had been hospitalised. Of 41 respondents who reported hospitalisation of their children, 80.5% (n=33) were hospitalised for 1-3 days while, 19.5% (n=8) were hospitalised for more than 3 days (refer to figure 4.12). This means that most children were hospitalised for a short period of 3 days or less.

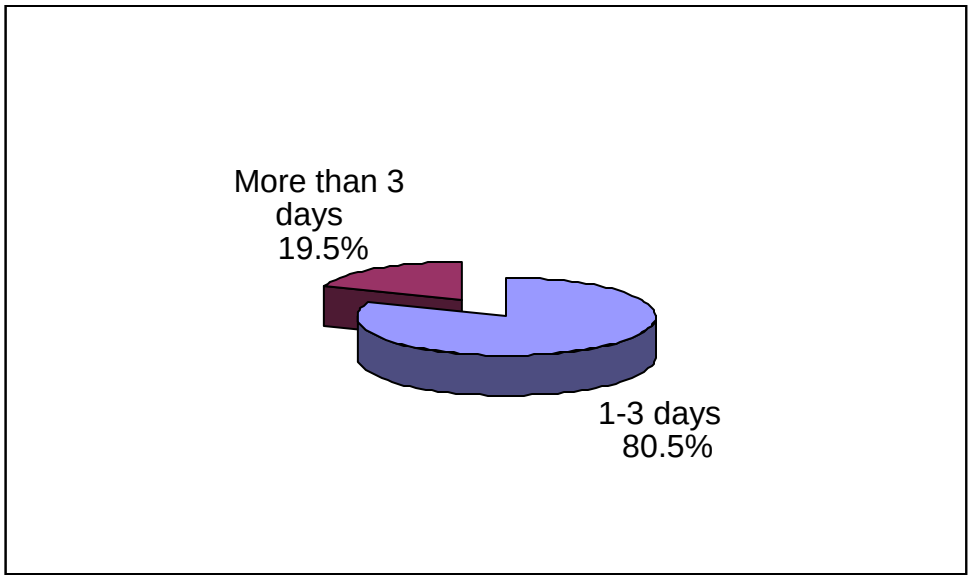

Figure 4.12: Duration of children's hospitalisation

Table 4.13: Caregivers' treatment-seeking options when a child had malaria

Characteristic	Response rate	Frequency (Yes)	Percent
Hospital/local clinic	n=59	39	66.1
Blood testing facility	n=56	35	62.5
Consults elders	n=57	31	54.4
Drug distributor	n=58	26	44.8
Drug store	n=59	23	39.0
Church	n=58	12	20.7
Traditional healer	n=59	5	8.5

4.3.7.4 Caregivers' usual places for seeking treatment for a child with fever

Caregivers were asked to indicate where they initially sought treatment once the child developed fever. The most common places are indicated in table 4.13. Out of 59 respondents, 66.1% (n=39) indicated that they opted to go to the hospital, and 62.5% (n=35) went to a health facility for blood testing before commencing anti-malaria treatment. This is commendable since the confirmatory test for the presence of malaria parasites is by a blood test (MOH 2006a:13). Other

respondents (54.4%, n=31) consulted elders in the community. Some caregivers (44.8%; n=26) went to village drug distributors, bought drugs from local drug stores (39.0%; n=23) while 20.7% (n=12) sought help from the church, and 8.5% (n=5) from traditional healers.

Table 4.14: Preferred actions by caregivers in response to different symptoms related to malaria

Characteristic	Frequency	Percent
When the child develops high fever (n=60)		
I take the child to the hospital	28	46.7
I give some treatment and take the child to hospital	24	40.0
I take the child to a village drug distributor	2	3.4
I treat the child at home	6	10
When the child becomes weak (n=59)		
I take the child to the hospital	31	52.5
I give some treatment and take the child to hospital	13	22.0
I take the child to a village drug distributor	2	3.4
I treat the child at home	13	22.0
When the child develops headache (n=56)		
I take the child to hospital	16	28.6
I give some treatment and take the child to hospital	15	26.8
I take the child to a village drug distributor	4	7.1
I treat the child at home	21	37.5
When the child vomits (n=59)		
I take the child to hospital	23	39.0
I give some treatment and take the child to hospital	24	40.7
I take the child to a village drug distributor	4	6.8
I treat the child at home	8	13.6
When a child has loss of appetite (n=58)		
I take the child to the hospital	22	37.9
I give some treatment and take the child to hospital	15	25.9
I take the child to a village drug distributor	8	13.8
I treat the child at home	13	22.4

4.3.7.5 Preferred actions taken by caregivers for different symptoms related to malaria

- *When the child developed a fever*

Caregivers were asked about their preferred actions when a child developed symptoms of malaria. Out of 60 respondents, 46.7% (n=28) indicated that their preferred action was to take the child straight to the hospital/health unit. However, 40.0% (n=24) indicated that they preferred giving some treatment at home before taking the child to a health unit, while 10.0% (n=6) indicated that they preferred treating the child entirely at home. This implies that 86.7% (n=52) of the caregivers took their sick children to the hospital/health unit (refer to figure 4.13). These findings were similar for other symptoms except for the situation where the children became weak. Taking children to village drug distributors ranked low in most caregivers' preferences (3.3%; n=2).

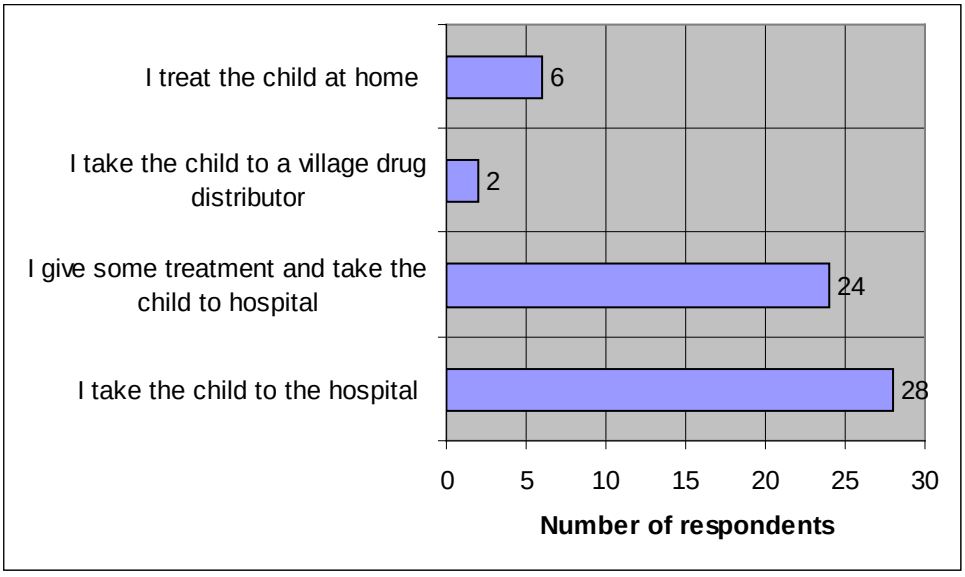

Figure 4.13: Respondents' preferred actions when a child developed fever (n=60)

- *When the child became weak*

In cases when children became weak, out of 59 respondents, 52.5% (n=31) preferred taking such a child to the hospital. However, 22.0% (n=13) preferred giving treatment at home before taking the child to the hospital. Only 3.4% (n=2) preferred taking the child to village drug distributors, while 22.0% (n=13) preferred treating the child at home when they became weak (refer to table 4.14).

- *When the child developed a headache*

In case of a child with a headache, out of 56 respondents, 28.6% (n=16) preferred to take such a child to hospital, 26.8% (n=15) would treat such a child at home then take him/her to the hospital but 7.1% (n=4) preferred taking the child to a village drug distributor. Some respondents (37.5%; n=21) preferred treating children with headaches at home. This implies that caregivers perceived headache to be a less serious symptom of fever, and probably did not associate headaches with potential cerebral malaria (refer to figure 4:14).

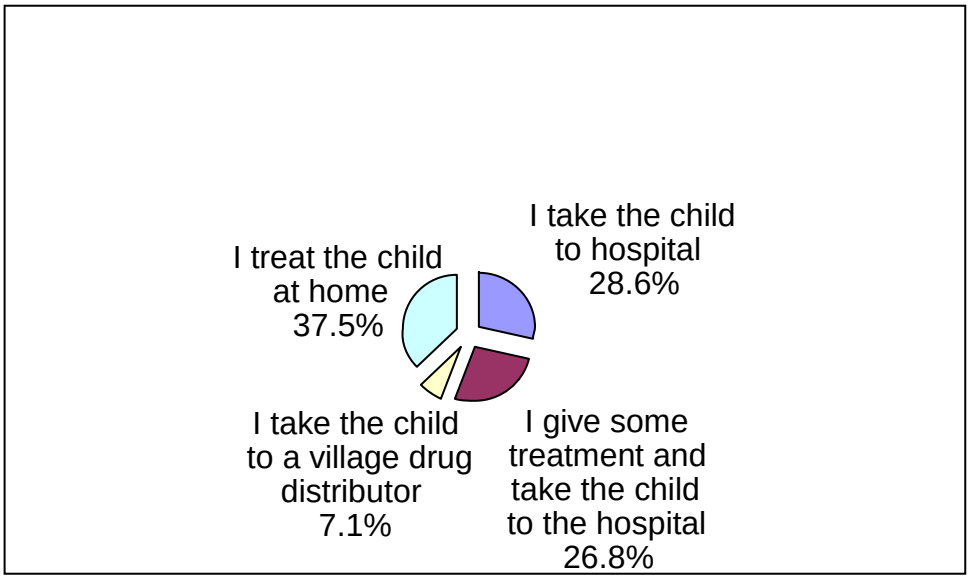

Figure 4.14: Caregivers' preferred actions when children developed headaches (n=56)

- *When the child vomited*

Out of 59 respondents, 39.0% (n=23) indicated that if the child vomited, their preferred actions were to take the child straight to the hospital/health unit, 40.7% (n=24) preferred to give some treatment at home and before taking the child to a hospital/health unit. However, 6.8% (n=4) preferred to take the sick child to a village drug distributor and 13.6% (n=8) would treat the child entirely at home. This implies that 79.7% (n=47) of caregivers would take their sick children to the hospital if they vomited (refer to table 4.14).

- *When a child lost his/her appetite*

Out of 58 respondents, 37.9% (n=22) indicated that, their preferred action was to take the child straight to the hospital/health unit. Another 25.9% (n=15) preferred first giving some treatment at home then taking the child to a health unit. Then, 22.4% (n=13) preferred treating children entirely at home. However, 13.8% (n=8) would take the child to a drug distributor. This means that 64.8% (n=37) would finally take their sick children to the hospital/health unit (refer to table 4.14).

Table 4.15: Caregivers' preferred actions when a child developed danger signs for malaria complications

Characteristic	Frequency	Percent
When the child is convulsing (n=57)		
I take the child to the hospital	46	80.7
I give some treatment and take the child to a hospital	7	12.3
I take the child to a village drug distributor	2	3.5
I treat the child at home	2	3.5
When a child vomits everything (n=54)		
I take the child to the hospital	40	74.1
I give some treatment then take the child to hospital	9	16.7
I take the child to a village drug distributor	3	5.6
I treat the child at home	2	3.7
When a child has difficulty in breathing (n=48)		
I take the child to the hospital	38	79.2

I give some treatment and take the child to hospital	8	16.7
I take the child to a village drug distributor	-	-
I treat the child at home	2	4.2
When a child has severe anaemia (n=37)		
I take the child to the hospital	33	89.2
I give some treatment then take the child to hospital	1	2.7
I take the child to a village drug distributor	1	2.7
I treat the child at home	2	5.4
When a child has severe dehydration (n=24)		
I take the child to the hospital	18	75.0
I give some treatment then take the child to hospital	2	8.3
I take the child to a village drug distributor	2	8.3
I treat the child at home	2	8.3
When the child is unable to drink or breastfeed (n=19)		
I take the child to a hospital	15	78.9
I give some treatment then take the child to the hospital	1	5.3
I take the child to a village drug distributor	1	5.3
I treat the child at home	2	10.5

4.3.7.6 Preferred actions taken by caregivers when a child developed danger signs related to malaria

Respondents were also asked about their preferred actions when the child developed danger signs. These findings are presented in the table 4.15.

- *When the child had convulsions*

In case of convulsions, out of 57 respondents, 80.7% (n=46) would take the child to a hospital immediately, 12.3% (n=7) would first give some treatment at home and then take the child to hospital. However, 3.5% (2) preferred to take the child to a village drug distributor and 3.5% (n=2) preferred to treat such a child at home (refer to figure 4.15). This presents a challenge because danger signs require immediate referral to a health unit/hospital. According to Eddleston et al (2007:29-30), convulsions in children require urgent medical attention in a hospital.

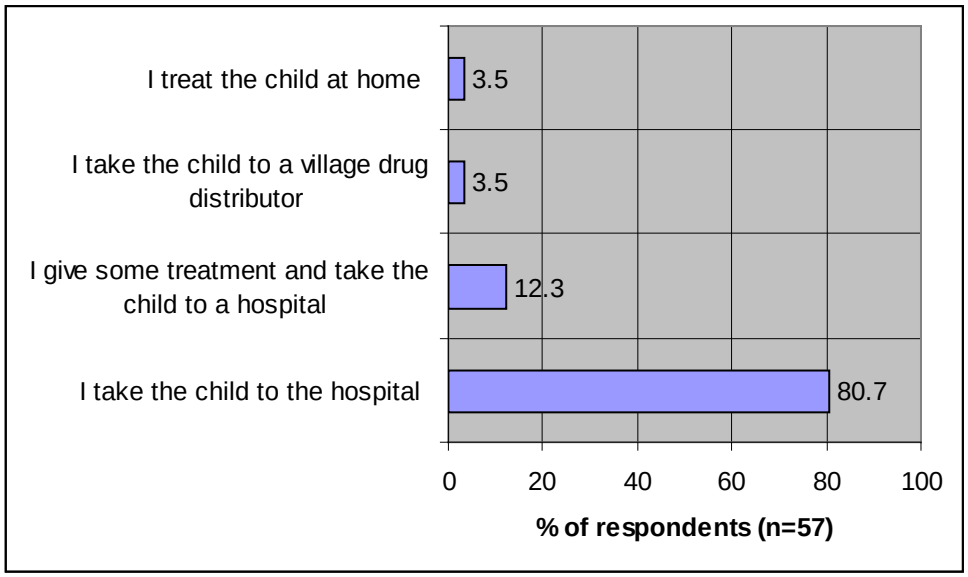

Figure 4.15: Caregivers' preferred actions when a child had convulsions (n=57)

- *When a child vomited*

Out of 54 respondents, 75% (n=40) would immediately take such a child to a hospital. Another 16.7% (n=9) would give some treatment at home first before taking him/her to hospital. This implies that 90.8% (49) of all respondents would take the child who vomited everything to a hospital (refer to table 4.15). Children who have fever and vomit, should be taken to a hospital/health unit since vomiting everything is a danger sign of malaria (MOH 2005a:20), and could cause rapid dehydration with potentially life-threatening complications. However, even though such cases need urgent care in a health unit, 5.6% (n=3) preferred to take these sick children to village drug distributors and 3.7% (n=2) preferred to treat their children at home. All children with danger signs of malaria should be treated in a hospital/health unit.

- *When a child had difficulty breathing*

Out of 48 respondents, 79.2% (n=38) preferred to take a child with breathing difficulties to hospital while 16.7% (n=8) would take such a child to hospital after giving some medication at home. This means that 95.9% (n=46) of caregivers would finally take their children to a health unit/hospitals (refer to table 4.15). However, 4.2% (n=2) preferred to manage such children at home. No respondent indicated that he/she would prefer to take care of a child with difficulty in breathing to a village drug distributor. Difficulty in breathing is one of the danger signs of malaria which should be managed in an established health unit/hospital (MOH 2005a:20).

- *When a child had severe anaemia*

Out of 37 respondents, 89.2% (n=33) preferred taking such a child to hospital while 2.7% (n=1) would do so after giving the child treatment at home. This implies that 91.9% (n=34) preferred taking severely anaemic children to hospitals or other health facilities (refer to figure 4.16). However, 8.0% preferred treating their children with severe anaemia at home or taking them to a village drug distributor. Severe anaemia is one of the major causes of death in children with malaria (Eddleston et al 2007:16-18).

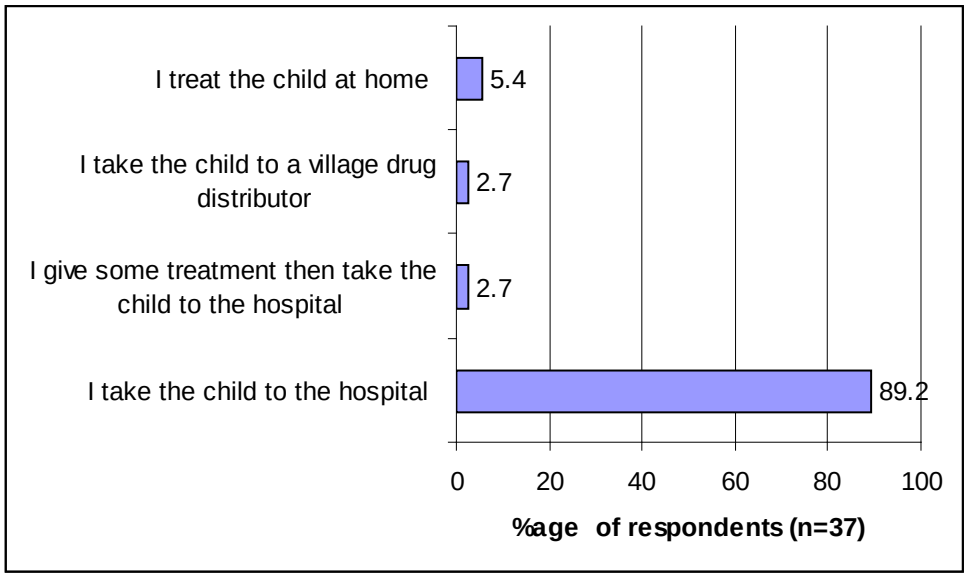

Figure 4.16: preferred action when a child has severe anaemia (n=37)

- *When a child had severe dehydration*

Out of 24 respondents, 75.0% (n=18) preferred taking children with severe dehydration to the hospital, but 8.3% (n=2) would only do so after they had given some treatment at home. This implies that 83.3% (n=20) of caregivers with severely dehydrated children, preferred taking such children to hospitals (refer to table 4.15). However, 8.3% (n=2) preferred treating children with severe dehydration at home and 8.3% (n=2) preferred taking them to a village drug distributor. Children with severe dehydration should be urgently managed at an established health facility (MOH 2005a:20).

- *When the child was unable to drink or breastfeed*

Out of 19 respondents, 78.9% (n=15) indicated that they took such children to the hospital, but 5.3% (n=1) first gave some medication at home before taking the children to a hospital. This implies that 84.2% (n=16) took children who were unable to drink or breastfeed to the hospital (refer to table 4.15). However, 10.5% (n=2)

preferred treating such children at home and 5.3% (n=1) took the child to a drug distributor.

4.3.8 Caregivers' home-based preventive actions against malaria

The malaria preventive actions explored included the use of mosquito nets, prophylactic anti-malaria drugs, local herbs; as well as the destruction of potential mosquito breeding sites and indoor residual spraying. (Refer to items 4.2.1 to 4.3.13 of the interview schedule).

4.3.8.1 The use of mosquito nets

Out of 60 respondents, mosquito net use for the children was prevalent in only 20.0% (n=12) of households studied. These findings are presented in figure 4.17. Therefore, out of 60 respondents, 80.0% (n=48) did not provide mosquito nets for their children. Among those who did not use mosquito nets, the main reason was the expensive nature of mosquito nets, costing about 15 000 shillings each (1US $= 1 900 Ugandan Shillings).

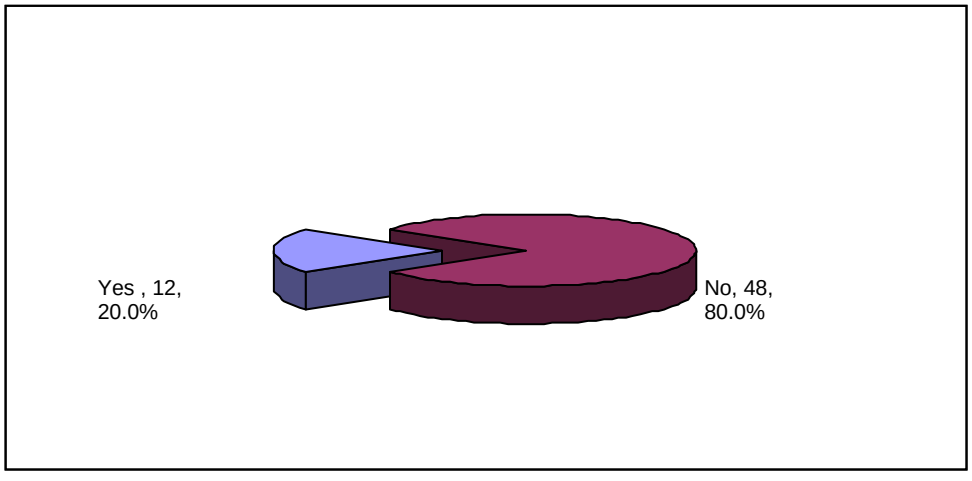

Figure 4.17: Mosquito net usage (n=60)

Table 4.16: Mosquito net use for children

Characteristic	Frequency	Percent
Use a mosquito net for the child (n=60)		
Yes	12	20.0
No	48	80.0
If used, was the net treated with insecticides? (n=12)		
Yes, twice a year	3	25.0
Yes, once a year	1	8.3
Rarely	1	8.3
Not treated at all	7	58.3
If used, was the net intact without holes? (n=12)		
Yes	5	41.7
No	7	58.3

4.3.8.2 Treatment of mosquito nets

Out of 12 respondents who used mosquito nets, 58.3% (n=7) did not use insecticide treated nets (ITNs) and only 25.0% (n=3) treated these nets regularly. Mosquito nets should be treated with insecticide twice a year (MOH 2007:21-22). (Refer to table 4.16).

4.3.8.3 State of mosquito nets

Out of 12 respondents who used mosquito net, 58.3% (n=7) reported that their nets were in a poor condition because they had holes. Mosquito nets with holes cannot prevent mosquito bites, because mosquitoes can get through the holes and bite persons under these nets. Only 41.7% (n=5) had mosquito nets that were intact and therefore in good condition. (Refer to table 4.16).

Table 4.17: Prevalence of other preventive measures against malaria

Caregivers preventive activity	N (no of respondents)	Frequency (yes)	%
General preventive activities			
Gives prophylactic anti-malaria drugs to children	n=49	30	61.2
Gives local preventive herbs to children	n=46	15	32.6
To prevent breeding of mosquitoes			
Drains stagnant water frequently	n=54	22	40.7
Clears bushes around homes frequently	n=50	19	38.0
Disposes containers likely to hold water	n=48	21	43.8
Keeps water containers covered	n=43	24	55.8
Measures to control mosquito bites			
Indoor residual spraying (IRS) regularly every 6 months	n=60	6	10.0
Applies mosquito repellents on skin of the child frequently	n=60	3	5.0
Installed mosquito screens for windows and doors	n=57	4	7.0

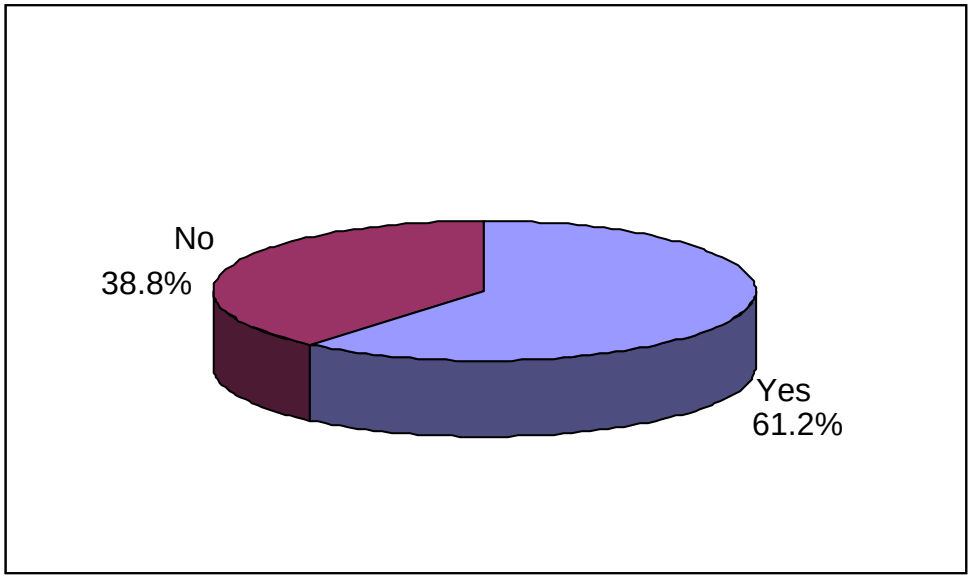

Figure 4.18: Use of prophylactic anti-malaria drugs in children (n=49)

4.3.8.4 Other preventive activities

Other preventive measures against malaria at the household level were also explored. (See table 4.17).

- *Use of prophylactic anti-malaria drugs*

Out of 49 respondents, 61.2% (n=30) often gave prophylactic anti-malaria drugs to children to prevent them from getting malaria (refer to figure 4.18).

- *Use of preventive local herbs*

Out of 46 respondents, (33%; n=15), gave local herbs to children for preventing malaria. This implies that, in this study area, preventive anti-malaria drugs were more frequently used than local herbs for preventing malaria in children. (Compare figures 4.18 and 4.19).

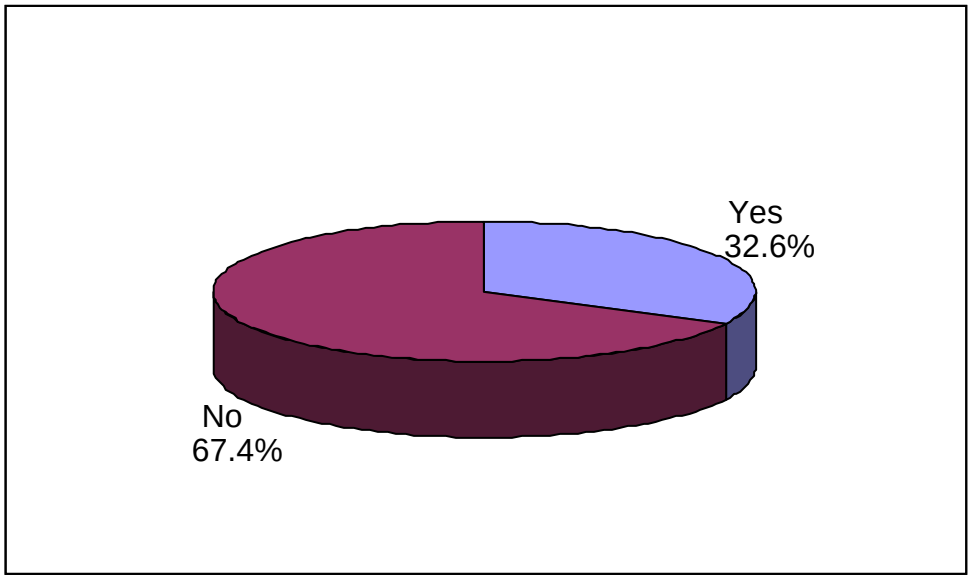

Figure 4.19: Use of preventive local herbs (n=46)

4.3.8.5 Prevention of breeding of mosquitoes

Out of 54 respondents, 40.7% (n=22) reportedly drained stagnant water around their houses frequently. However, out of 50 respondents, only 38.0% (n=19) cleared bushes around homesteads frequently, in order to reduce the mosquitoes' breeding sites. Out of 48 respondents, 43.8% (n=21) regularly disposed off all containers likely to hold water, and out of 43 respondents, 55.8% (n=24) regularly kept their water containers covered (refer to table 4.17). These actions constitute recommended activities of home hygiene which are important for preventing the breeding of mosquitoes. The reduction in the breeding of mosquitoes would lead to smaller mosquito populations, resulting in reduced transmission of malaria parasites. This should result in fewer cases of malaria in the population.

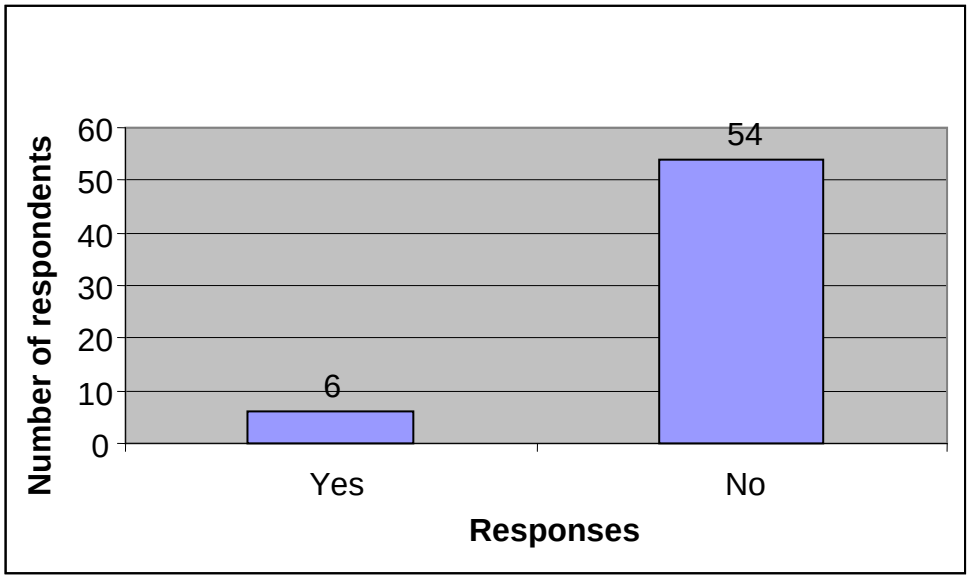

Figure 4.20: Internal residual spraying of houses (n=60)

4.3.8.6 Measures to control mosquito bites

The control of mosquito bites is essential for effective malaria prevention. Prevalence of the different preventive measures at household level was moderate

for most caregivers. Out of 60 respondents, indoor residual spraying had only ever been applied by 10.0% (n=6) of all the households surveyed. This means that 90.0% (n=54) had never practised this important preventive practice. (Refer to figure 4.20 and table 4.17). This is a low rate for this important control measure.

The use of mosquito repellents on children's skins was very low. Out of 60 respondents, only 5% (n=3) had ever applied mosquito repellents to the skins of their children. Out of 57 respondents, only 7.0% (n=4) had installed mosquito window screens in their houses (refer to table 4.17). These mosquito screens would prevent mosquitoes from entering houses.

4.4 SUMMARY

The analysis of the research findings indicated that the caregivers of children younger than five had some knowledge about malaria prevention, recognition of signs and treatment. However, enhancing caregivers' malaria knowledge could help to reduce malaria morbidity and mortality rates in children younger than five living in the malaria endemic study sites.

The next chapter presents the limitations, summary of the findings, conclusions and recommendations of the study.

CHAPTER 5
LIMITATIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

The previous chapter dealt with data analysis, presentation and discussion of findings of data collected at household level from 60 respondents. This chapter presents the limitations, conclusions and recommendations.

5.2 PROBLEM STATEMENT AND SPECIFIC OBJECTIVES

At the time of conceptualisation of this study, Mukono district had not achieved the expected decline in the number of children with fever attending Kawolo district hospital despite the implementation of the Home-based Management of Fever Strategy in June 2005. The reasons for this unexpected situation were not known. This prompted this study to find out how caregivers in Mukono district managed childhood fevers at home and to identify factors that influenced their actions.

As mentioned in section 1.6, the main purpose of the study was to describe practices of caregivers in home-based management of fever of children younger than 5 years in Uganda. The specific objectives of this study were to:

- Describe the demographic characteristics of the caregivers and of the 'reference children'
- Describe the environmental factors which influenced health care-practices of caregivers
- Describe the personal characteristics which influenced health care-practices of caregivers
- Describe the health care-practices including care-seeking behaviours of caregivers in home-based management of fever in children

5.3 LIMITATIONS OF THE STUDY

Because of resources available to the researcher, the study was conducted in the sampled three sub-counties out of a total of 27 sub-counties of the district. A total sample of 60 respondents was then interviewed. A bigger sample from more areas of the district would have been more representative of caregivers in the district. Although the participating villages were randomly selected, every third child's name on the village register was selected, which cannot claim to be truly random sampling, limiting the generalisability of the research results. Retrospectively truly random sampling of children's names should have been done. Children's names were selected from the available village registers. No register could be checked for completeness or correctness of data – the registers were assumed to be correct and complete. This might or might not have been the case.

Only caregivers were interviewed. More valuable information might have been obtained if the healthcare workers (especially nurses at the hospital and health stations), village drug distributors and traditional healers could have been interviewed as well. Although it is extremely difficult to obtain permission to

interview children, those five-year old children who had survived malaria attacks, could provide valuable insights into their personal experiences of suffering from malaria and of the treatments administered. The study did not explore the human suffering element cause by malaria morbidity and mortality among children younger than five.

Only structured interviews were conducted. More in-depth information might have been obtained by conducting individual in-depth or focus group interviews.

The information provided by the caregiver was accepted as being truthful without checking any information with other village members and/or with the reference child's hospital/medical files.

5.4 SUMMARY OF RESEARCH FINDINGS, CONCLUSIONS AND RECOMMEDNATIONS

The summary of the research findings will be presented briefly, according to four major sections of the structured interview schedule, the conclusions based on these findings and then recommendations based on the relevant conclusions. In this way numerous repetitions could be avoided and the concluding sections could be presented coherently.

5.4.1 Demographic characteristics of the caregivers and the 'reference children'

5.4.1.1 Summary of research findings

Out of 60 respondents, 35.0% (n=21) were aged 25-35 and 86.7% (n=52) were females, 59.3% (n=35) were married while 40.7% (n=25) were single parents. Only 10.0% (n=6) of the respondents had no formal schooling while 36.7% (n=22) attended primary school only. Concerning employment, 60.0% (n=36) of the

caregivers had some form of employment. However, 72.4% (n=42) earned less than 60,000 shillings per a month, while 15.5% (n=9) earned more than 90,000 shillings per month.

Out of 60 'reference children' 52.0% (n=31) were younger than 24 months. Out of 60 households, 96.7% (n=58) of the reference children had one, 71.6% (n=43) had two or more and 31.0% (n=18) had at least four malaria episodes during the preceding 12 months. In 60.0% (n=36) of all households, all children had at least one malaria episode. In 11.7% (n=7) of all households one child had died due to suspected malaria and 13.3% (n=8) of all households had lost two or more children reportedly due to malaria, implying that in 15 (25.0%) of the households at least one child had died from malaria.

5.4.1.2 Conclusions

In spite of the availability of anti-malaria drugs and the implementation of the home-based management of fever strategy in Uganda, most children had suffered malaria attacks during the preceding year and in a quarter of the households at least one child had reportedly died from malaria.

Malaria treatment programmes' outcomes were not favourable in the study sites.

5.4.1.3 Recommendations

Health education about malaria should be provided at a level appropriate to women mostly with primary school education.

Strict records should be kept of every malaria case in every village – probably by the village drug distributor, and monitored by the village chairperson. These records should indicate what actions were taken and what the outcomes of the malaria treatments were. Every child's records indicating that he/she died from

malaria (or fever) should be audited to identify possible shortcomings in treatments provided by the caregivers, village drug distributors and/or healthcare personnel. The non-availability of anti-malaria drugs should be indicated, as well and the utilisation of herbs and/or the services of traditional healers. In cases where more than one child died from malaria from one household, the environment should be inspected for stagnant water, lush vegetation close to the house and other potential environmental factors.

5.4.2 Environmental factors that influenced caregivers' anti-malaria actions

5.4.2.1 Summary of research findings

Out of the 60 respondents, 78.3% (n=47) lived within 5 kilometers of a health unit. According to 66.6% (n=40) of the 60 respondents anti-malaria drugs were available at the health units most of the time while 33.4% thought these drugs were rarely or never available.

Findings indicate that 69.5% (n=41) of the 60 respondents thought that drugs were rarely or never available from the village drug distributors. In addition, 46.4% (n=26) of caregivers thought that the drugs they received from the village drug distributors were often ineffective and 8.9% (n=5) thought that such drugs were never effective.

5.4.2.2 Conclusions

Most caregivers lived within five kilometers from a health station/hospital and could reach these services. However, health services could not always supply the necessary anti-malaria drugs. Village drug distributors apparently made limited contributions to the anti-malaria programme because many caregivers did not know about these services, did not trust the drugs supplied by them or considered them to be unavailable.

5.4.2.3 Recommendations

Anti-malaria drugs' availability at every hospital, health station and village drug distributor's stores must be checked regularly and recorded. A monitoring and storing system of anti-malaria drugs should be implemented and audited on a three monthly basis. A system should be put in place whereby anti-malaria drugs could be delivered to any healthcare service point within hours of requesting these drugs. Children who die from malaria due to the unavailability of anti-malaria drugs should be viewed in a serious manner and steps taken to prevent similar occurrences in future.

Village drug distributors should provide accessible anti-malaria drugs and advice and support. These village drug distributors should attend regular in-service education sessions, be subject to monitoring by the village chairperson and by the regional health authorities. These services should be advertised within each village, regular supplies of anti-malaria drugs should be available free of charge, and the people must know that the same drugs are issued by the village drug distributor as by the pharmacists at hospitals or health stations. The village drug distributor should know the danger signs of malaria and when to refer a child to the hospital or health station. Records of all treatments given and of the outcomes of treatments must be kept.

5.4.3 Personal characteristics which influenced health care-practices of caregivers

5.4.3.1 Summary of research findings

Family members (60.0%; n=36) and community leaders (59.3%; n=35) were the most important 'significant others' that influenced caregivers' care-seeking practices. Caregivers were also likely to be influenced by what other

caregivers/peers (45.8%; n=27) did. However, 55.9% (n=33) were not influenced by culture and customs.

The most frequent sources of health education messages on malaria were health workers 85.0% (n=51), the electronic media 81.7% (n=59) and fellow care-takers 80.4% (n=45). Newspapers 61.7% (n=37), schools 61.7% (n=37), local seminars 52.6% (n=30) and places of worship 51.7% (n=31) were also relatively frequent sources on malaria education messages. However, drug distributors 40.0% (n=24), traditional healers 11.7% (n=7) and civil society organisations 37.3% (n=22) were less likely to provide information on malaria to caregivers. The two most important sources of health education were health workers and the electronic media (radio and TV).

About the frequency of malaria health education messages malaria, 65.0% (n=39) of caregivers had received malaria messages more than once during the last one year, while 23.3% (n=14) had received information only once. The most common types of messages included:

- That malaria is transmitted by mosquitoes (35.6%; n=21)
- That malaria is caused by a parasite (35.1%; n=20)
- How to prevent the breeding of mosquitoes (25.4%; n=15)
- The prevention of mosquito bites (24.6%; n=14)

The most common malaria aspects about which people were knowledgeable even without health education included:

- That malaria is a dangerous disease (52.5%; n=31)
- That fever is a major sign of malaria (42.4% (n=31)
- That malaria can be prevented (40.7%; n=24) knew it even without health education.

The most common malaria treatment aspects for which health education was the sole source of information included:

- That the village drug distributors can provide treatment for malaria (40.4%; n=23)
- When to take the sick child for medical help (30.4%; n=17)

Aspects of malaria treatment about which respondents were knowledgeable even without health education included:

- How to determine that the child's situation was deteriorating (49.1%; n=28)
- How to determine that the malaria treatment was working (40.4%; n=23)

Only 28.3% (n=17) of caregivers were aware that malaria is caused by malaria parasites, and some respondents thought mosquitoes were the direct cause of malaria, while others (11.7%; n=7) thought the direct cause of malaria was dirty water.

With regard to malaria transmission, 74.6% (n=44) knew that malaria is transmitted by mosquitoes. However, 6.8% (n=4) reported that malaria is transmitted by dirty water and 5.1% through improperly cooked maize.

5.4.3.2 Conclusions

Healthcare personnel and the electronic media were the most frequent sources of malaria information. The caregivers had some knowledge about malaria, but could benefit from more knowledge.

5.4.3.3 Recommendations

Health education about malaria should be provided to all pregnant women and to all mothers with children aged five or younger. They must be knowledgeable about all aspects of malaria, especially about the diagnosis, treatment and danger signs. As 25.0% of the households participating in this study, had lost at least one child due to malaria, the importance of effective health education cannot be overestimated.

All aspects mentioned under the summary of findings should be addressed during malaria health education sessions. The village drug distributors should assist with such health education.

5.4.4. Caregivers' health care-practices: home-based management of fever in children

5.4.4.1 Summary of research findings

The Home-based Management of Fever strategy of the MOH (Uganda), recommends that children should receive initial anti-malaria treatment within 24 hours of the onset of fever (MOH 2007b:3-4).

Out of 60 respondents, 43.3% (n=26) used anti-fever drugs (paracetamol and aspirin) as the first action when children developed fever. Then, 35.0% (n=21) of all caregivers applied tepid sponging and 13.3% (n=8) used local herbs to control the fever. Out of 51 respondents, 88.2% (n=45) reported giving the child anti-malaria drugs within 24 hours of the onset of the fever. However, 11.8% (n=6) of all caregivers did not do so within 24 hours.

With regard to the most common symptoms of malaria, 46.7% (n=45) of the respondents indicated that they preferred to take their children with fever straight to the hospital or health unit while 40.0% (n=24) preferred first giving some treatment at home before taking the children to a health unit. However, 10.0% (n=6) preferred treating their children entirely at home and 3.4% (n=2) preferred taking their children to a village drug distributor. These findings were similar for other symptoms.

With regard to convulsions, out of 57 respondents 93.0% (n=53) preferred taking a convulsing child immediately to the health unit. However, 25.9% (n=14) of caregivers would not take children who were vomiting everything immediately to the hospital.

Out of 60 households, only 20% (n=12) used mosquito nets for their children. Even for households that had bed nets, 58.3% (n=7) of these nets were not in a poor condition with holes. The prevalence of other preventive activities like indoor residual spraying, draining of stagnant water at the household level was low, mostly due to financial costs.

Caregivers did not know what preventive measures to take against malaria, and even those who knew about such measure could not afford to implement these preventive actions. The monthly household incomes did not enable caregivers to buy and/or maintain insect treated nets, install gauze at their houses' windows and doors, sprayed their houses with residual anti-mosquito insecticides, use mosquito skin repellents or discard stagnant water or lush vegetation near their homes.

Only 20.0% (n=12) of respondents used mosquito nets for their children. Of those few who used mosquito nets, more than half reported that the nets had holes and that the nets were not treated with insecticides.

Only 10.0% (n=6) of households practiced indoor residual spraying against mosquitoes.

Anti-malaria drugs were more frequently used (61.2%, n=30) than local herbs (32.6%, n=15), for prevention of malaria in children.

5.4.4.2 Conclusions

Health education cannot claim success because not all caregivers administered anti-malaria drugs within 24 hours of the onset of fever. No all caregivers knew the danger signs of malaria nor what actions to when children experienced such danger signs. Only a minority took preventive measures such as using insect treated nets, indoor insecticide sprays, or discarding stagnant water.

5.4.4.3 Recommendations

Health education programmes must measure its impact by doing regular checks on caregivers' malaria knowledge and by supplying any missing or correcting any inaccurate information. The village drug distributors can render valuable services by supplying anti-malaria drugs and by monitoring the child's reactions to these drugs. Timely referrals to hospitals/health stations could save children's lives.

As most caregivers could not afford preventive measures such as insect treated nets, indoor residual sprays, clearing stagnant water or lush vegetation close to their homes, government subsidies should assist caregivers to implement and sustain these preventive measures. Records of malaria incidences should be studied and where a number of cases appear in close geographic proximity, stagnant water and lush vegetation should be cleared. Government subsidised job creation projects could embark on clearing stagnant water, lush vegetation, spraying houses, installing mosquito gauze on window and door openings and supplying and maintaining insect treated nets.

5.5 SUGGESTIONS FOR FUTURE RESEARCH

This study was conducted in Mukono district, one of the ninety districts in Uganda. Similar studies should be conducted throughout the country in selected districts from various regions to establish how caregivers in Uganda generally do household management of fever in children in Uganda. Comparative studies could be done between districts with high and those with low malaria mortality figures.

Respondents in this study were caregivers. Village drug distributors and health workers should identify constraints faced by them in activities related to home management of fever.

Environmental studies on how to control mosquitoes should be conducted in the area.

Studies on how to alleviate household poverty should be conducted in the area, possibly with the assistance of non-Government organisations.

5.6 CONCLUSIONS IN RELATION TO THE ASSUMPTIONS STATED IN CHAPTER 1

- Some caregivers were unaware of the availability of the free anti-malaria medications at community level provided by village drug distributors.
- Caregivers did not trust in the effectiveness provided by village drug distributors.
- There were periods of unavailability of effective anti-malaria drugs not only at the village drug distributors' sites but also at the hospitals and health units.
- The competence of the drug distributors was doubted by some caregivers.
- Some caregivers preferred to have their children medically treated after laboratory (blood) tests confirmed a malaria diagnosis rather than instituting symptomatic home-based treatment.
- Caregivers considered drugs administered at hospitals to be more effective than those administered at community level.
- Caregivers did not prefer herbal medications to anti-malaria medications.

5.7 CONTEXTUALISATION OF RESEARCH RESULTS WITHIN THE CONCEPTUAL MODEL OF RECIPROCAL DETERMINATION

The concept of reciprocal determination of Bandura's social cognitive theory helped to design the structured interview schedule. The concept of reciprocal determination is the dynamic interaction of the personal factors, behaviour and environment in which the behaviour is performed (see section 1.9.2.3). The research tool addressed the three key factors of concept of reciprocal determination in the following manner;

- Section B of the interview schedule comprised of items on environmental factors that influenced caregivers' home based anti-malaria actions (see annexure B).
- Section C of the interview schedule comprised items on personal factors that influence caregivers' anti-malarial actions. Such personal factors included caregivers' learning factors, levels and sources of knowledge about malaria transmission, presentation, treatment options and prevention.
- Section D of the interview schedule comprised items on caregivers' behaviour in home based anti-malaria actions, including home-based malaria treatment and preventive activities.

This implies that the study findings complied with the conceptual model of reciprocal determination.

5.8 CONCLUDING REMARKS

Many caregivers were not conversant with the fact that children should commence taking anti-malaria drugs within 24 hours of the onset of fever. They also did not know that children with danger signs of malaria should be taken to the health units without any delays. The MOH policy on treatment of complicated malaria stipulates that all cases of complicated malaria with danger signs should be managed at an established health unit (MOH2007c:24).

Many children's lives could be saved if village drug distributors would have reliable accessible anti-malaria drugs in stock at all times, and if they could provide support and guidance. Caregivers need sufficient knowledge about malaria to provide appropriate and timely care to their young children. The importance of health education cannot be overemphasised but the impact of such programmes should be monitored. Village drug distributors, hospitals and health units without anti-malaria drugs could have contributed to the deaths of some of the children who had died in 25.0% of the households that participated in this study in Uganda. The home-based treatment of fever strategy did not prevent these children's deaths. Timely access to

free anti-malaria drugs, and timely referrals to hospitals/health units for danger signs of malaria, might save many Ugandan children’s lives in future, by detecting and treating potential malaria complications effectively.

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Annexure A: Consent forms

a -(ENGLISH)

Dear research participant

This is a request to you to participate in a research study entitled “caregivers’ home-based management of fever in Mukono District, Uganda”. The purpose of the study is to find out how do caregivers in Uganda manage fever at home. Your participation in this research is voluntary, and you will not be penalised or lose benefits if you refuse to participate or decide to withdraw from the study after you have agreed to participate. Your participation will involve answering questions during an interview session. Your participation is important because the researcher will be able to get the necessary information which will enable him fulfil the study objectives. This study will among other things, get information on how caregivers in mukono district manage fever in children younger than five years. Then, possible areas of recommendation can be suggested in order to improve health care services delivery in the District.

We do not anticipate significant risks involved in your participation. The information provided will be confidential and anonymous. On request, a written summary of the research results will be availed to participants. Any additional information about the study may be provided by the research assistant or you may contact Dr Richard Bbosa at Kawolo Hospital Box 210, Lugazi.

Consent

The nature of the study entitled “caregivers’ home-based management of fever in Mukono district, Uganda” including the above information, has been described to me orally. I understand what my involvement in the study means and I voluntarily agree to participate.

_____	_____	_____
Name of participant	Signature of participant	Date
_____	_____	_____
Name of interviewer	Signature of interviewer	Date

b –CONSENT FORMS (LUGANDA)

Okukkiriza okwetaba mu kunonyereza

Omuzadde

Assabiddwa okwetaba mukunonyereza okuli wansi w'omutwe ogugamba nti "engeri abazadde gyebalabiriramu abaana abalwadde omusujja awaka mu district y'eMukono, Uganda". Omugaso gw'okunoonyereza kuno kwekumanya abazadde mu Uganda balabilira batya abaana awaka? Okwetabakwo mukunoonyereza kuno kwakyeyagalire era nebwobeera nga tewetabyemu oba nga obivuddemu, tojja kubaako na mutawaana gwonna. Bw'onetabamu, ojja kusabibwa okuddamu ebibuuzo ebinakubuuzibwa. Okwetabaakwo mukunoonyereza kuno kujja kuyamba okuwa ebilowoozo ebinayaamba okutuuka kubiluubirirwa by'okunoonyereza kuno. Okunoonyereza kuno kugenda kuwa ebikwata ku bazadde mu District y'eMukono engeri gyebajanjabamu awaka omusujja mubaana abali wansi w'emyaka etaano. Oluvanyama, ebiteeso bingi bija kufunibwa olw'okuyamba okutumbula eby'obulamu mu district.

Tetusuubira nti okwetabaakwo mukunoonyereza kuno kunakuviiramu obuzibu bwonna. Ebirowoozo byonna by'onowa bijja kutwalibwa nga byakyaama. Bw'onoba oyagadde, ebikulu kubinaava mukunoonyereza bijja kukuweebwa. Bwoba nga oyagala ebirala kukunonyereza kuno mbuuza oba tuukirira Dr. Richard Bbosa mu Kawolo Hospital, Box 210, Lugazi.

Okukukasa

Okunoonyereza kumutwe "abazadde engeri gyebajjanjabamu awaka omusujja mu district y'eMukono, Uganda", owamu n'ebikukwatako binyinyonyodwa. Ntegeedde okwetaba kwange mukunoonyereza kuno kyekinayamba era nzikirizza okukwetabamu nga sikakiddwa.

_____	_____	_____
Amannya g'omuzadde	ekinkumu ky'omuzadde	olunaku
_____	_____	_____
Amanya g'omunonyereza	ekinkumu ky'omunonereza	olunaku

Annexure B: STRUCTURED INTERVIEW SCHEDULE (*EBIBUUZO)*

In English /*Luganda* language

TITLE: CAREGIVERS' HOME-BASED MANAGEMENT OF FEVER IN UGANDA (*OMUTWE: ENGERI ABAZADDE GYEBAJANJABA OMUSUJJA AWAKA)*

GENERAL INFORMATION *(EBIKUFAAKO*)

Date: **(***Olunaku)* _____/_____/2009
Research assistant: **(***abuuza ebibuuzo*) _____
Respondent number: **(***namba y'addamu)* _____/_____
Respondent's village: **(***Ekyalo kyo)* _____
Respondent's sub-county: **(***gombolola yo)* _____

SECTION A: SOCIO-DEMOGRAPHIC DATA OF THE RESPONDENT AND THE 'REFERENCE' CHILD (*EMBEERA EYABULIJJO EY'OMUZADDE N'OMWAANA*)

For office use (*bya ofiisi)*

1.1 How old are you? **(***olina emyaaka emeka*?

Less than 25 years **(***wansi w'emyaaka 25*)		1
25-34 years **(***emyaaka 25-34*)		2
35-44 years **(***emyaaka35-44)*		3
45-54 years **(** *emyaaka45-54)*		4
55-64 years **(***emyaaka55-64*)		5
65-74 years **(***emyaaka65-74)*		6
75 years or older **(***emyaaka 75 n'okusingawo)*		7
	1	

1.2 What is your gender? **(***Oli wa kikula ki?)*

Male **(***musajja)*		1
Female(*mukyala*)		2
	2	

1.3 What is your marital status? (*Oyimiridde otya mubyobufumbo?)*

Never married **(***sifumbirwangako)*		1
Married **(***ndimufumbo)*		2
Divorced **(***twagattululwa)*		3
Separated **(***twayawukana)*		4
Widowed **(***namwandu*)		5
Cohabiting **(**tubeerawamu)		6
	3	

1.4 What is the highest level of education you have completed? ***(****Ddaalaki lyewatuukamu mukusoma?)*

No schooling ***(****saasoma*)		1
Primary school **(***mu pulayimale)*		2
Secondary school ***(****mu siniya*)		3
Post-secondary school **(***waggulu wa siniya)*		4
University **(***mu univasite*)		5
	4	

1.5 What has your work status been in the last 3 months? **(***Ebyemirimugyo bibadde bitya mumyezi 3 emabege?)*

Government employee **(***mukozi wa gavumenti*)		1
Non–government employee **(***mukozi atali wa gavumenti)*		2
Self-employed **(***nekozesa nzekka*		3
Student **(***musomi)*		4
Unemployed ***(****sikola*)		5
Housewife ***(****mukyala mufumbo)*		6
	5	

1.6 Over the past one-year can you tell me what the average earnings of your household have been per month? **(***Osobola okumbulira enyingizaayo mumakaago bweebadde mumwaka gumu emabega?*

Shs 0 -14 999		1
Shs 15 000- 29 999		2
Shs 30 000- 44 999		3
Shs 45 000- 59 999		4
Shs 60 000- 74 999		5
Shs 75 000- 89 999		6
Shs 90 000 and more ***(****n'okusingawo*)		7
	6	

1.7 How old is the 'reference' child under your care? **(***Omwana oyo wa bukuluki?)*

12 months or less ***(****myezi 12 oba tanagiweza*)		1
13-24 months **(***myezi 13-24*)		2
25 -36 months ***(****myezi 25-36*)		3
37- 59 months **(***myezi 37-59)*		4
	7	

1.8 What is the gender of the child under your care? (*Omwana gwolabirira wakikulaki?)*

Male **(***mulenzi)*		1
Female **(***muwala)*		2
	8	

1.9 What is your relationship with the child under your care? (*Omwana akuyita atya?)*

Mother /father (*maama /taata*)		1
Grandparent *(jajja)*		2
Sibling (sister /Brother) (*mugandawange)*		3
Relative (*waluganda*)		4
Guardian *(mulabirira)*		5
Others specify *(ebirara byogere)*…….		6
	9	

1.10 How many episodes of fever the child has had in the preceding 12 months? *(omwona yakalumbibwa omusujja emirundi emeka omwaka guno?)*

None *(tewali)*		1
Once *(gumu)*		2
Twice *(ebiri)*		3
Three time *(esatu)*		4
Four times or more *(ena n'okusingawo)*		5
	10	

1.11 How many children under 5 years under your care? *(olina abaana bameka abatasussa myaka etaano?)*

One child *(omu)*		1
Two children *(babiri)*		2
Three children *(basatu)*		3
Four children or more *(bana n'okusingawo)*		4
	11	

1.12 How many children are born to your family? *(olinai abaana bameka?)*

One child *(omu)*		1
Two to four *(babiri okutuuka kubana)*		2
Five or more *(bataano oba okusingawo)*		3
	12	

1.13 How many of your children under 5 years have had malaria? *(abaanabo abato bameka abaali bafunye omusujja?)*

None *(tewali)*		1
All *(bonna)*		2
Some *(abamu)*		3
	13	

1.14 How many of your children have died of malaria? *(abaanabo bameka abaafa omusujja?)*

None *(tewali)*		1
One *(omu)*		2
Two *(babiri)*		3
Three or more *(basatu n'okusingawo)*		4
	14	

SECTION B: ENVIRONMENTAL FACTORS (factors that influence caregiver's ant-malarial actions)
(embeera y'ekitundu ekuleetera okulabiriramu omusujja)

2.1 Give the distance /access to nearest health unit /hospital **(***olugendo okutuuka ku ddwaliro)*

Less than 5 kilometres (walkable distance) *(otambulowo)*		1
More than 5 kilometres (osussa 5 kilometres)		2
	15	

2.2 What can you say about the availability of anti-malarial drugs at the hospital **(***okubaawo kweddagala muddwaliro*

Always available *(libaawo)*		1
Often available *(oluusi libaawo)*		2
Rarely available *(lumu nalumu lwelibaawo)*		3
Never available *(teribaawo)*		4
	16	

2.3 What is your comment about availability of anti-malarial drugs with the village drug distributor **(***okubaawo kweddagala mukitundu*)

Always available*(libaawo)*		1
Often available *(oluusi libaawo)*		2
Rarely available *(lumu nalumu lwelibaawo)*		3
No longer available *(terikyaliwo*)		
Never available *(teribaawo)*		4
	17	

2.4 What is your comment on effectiveness of available drugs with the village drug distributor **(***obulungi bweddagala eliliwo mukitundu)*

Very effective *(likolanyo)*		1
Often not effective *(olusi terikola)*		2
Never effective *(terikola)*		4
	18	

2.5 Give your comment on availability of the village drug distributor ***(****okubawo kw'omusowo w'ekitundu*)

Always available *(abeerawo)*		1

Not always available *(olusi abeerawo)* 2
Never available *(tabeerawo)* 3

19

2.6 What is your comment on availability of traditional healers? **(***okubeerawo kw'abasowo ab'ekinnansi?)*

Readily available *(abaawo)* 1
Not readily available *(olusi abaawo)* 2
Never available *(tabeerawo)* 3
Not aware *(simanyi)* 4

20

2.7 How have your health-care practices been influenced by other family members? **(***enkola y'okujjanjaba mumakaago?)*

I always follow their health-care practices *(mbigoberera)* 1
I often follow what they do *(oluusi mbigoberera)* 2
I never follow them *(sibigoberera)* 3

21

2.8 How is your health care practice been influenced by health care practices of fellow caregivers /peers? ***(****enkola y'okujjanjaba yabazadde /abemikwano abalala?)*

I always follow their health care practices *(mbigoberera)* 1
I often follow what they do *(oluusi mbigoberera)* 2
I never follow them *(sibigoberera)* 3

22

2.9 How is your health-care practice been influenced by health-care practices of community leaders? ***(****enkola y'okujjanjaba mukitundukyo?)*

I always follow their health care practices *(mbigoberera)* 1
I often follow what they do *(oluusi mbigoberera)* 2
I never follow them *(sibigoberera)* 3

23

2.10 How would you describe you level of satisfaction of services offered at public health facilities? ***(****enkola*

y'eddwalirolyo ogyogerako ki?)

Services at health facilities are satisfactory. *(amalwaliro gafaayo)*		1
Health facilities services are fairly satisfactory. *(amalwaliro gagezaako)*		2
Health facilities services are never satisfactory. *(amalwaliro tegafaayo)*		3
	24	

2.11 Does culture and customs of the community influenced your anti-malarial actions? ***(****eby'obuwangwa n'enneyisa eby'ekitundu?*)

Yes *(yee)*		1
At times *(oluusi)*		2
No *(nedda)*		3
	25	

SECTION C: PERSONAL FACTORS *(EBIKWAATA KUMUNTU)*

3.1 What is your source of health education messages /information on malaria *(Wojja abifa kuby'obulamu.)* **(Key: 1= Yes, 2=No).**

3.1.1	From health workers *(okuva kubasawo)*		26
3.1.2	Village drug distributors *(okuva kubasawo b'ekyalo)*		27
3.1.3	Traditional healers *(abasawo b'ekinansi)*		28
3.1.4	From electronic media (Radio, TV,) *(radiyo ne Tivvi)*		29
3.1.5	From news papers *(okuva mu mpapula)*		30
3.1.6	Places of worship *(amasinzizo)*		31
3.1.7	Schools *(amasomero)*		32
3.1.8	Through local NGOs /CBOs ***(****okuyita mu bibiina byabannakyewa)*		33
3.1.9	Locally organized seminars **(***Emisomo gy'omukitundu*		34
3.1.10	Information from fellow caregivers /peers **(***ebitubuulirwa okuva kubazadde abalala*		35

	/abemikwano)		
3.1.11	Of those sources (3.1.1 to 3.1.10), what do you consider as the most important source of information on malaria? *(kw'ebyo mu 3.1.1 –3. 1.10, ki kyosubira okuba ekisinga okuba ekyomugaso?)* ……	36	**XX**
3.1.12	About how many times did you receive health education messages on malaria in the past one year? *(mumwaka gumu emabega, emirundi nga emeka gyewakafuna okusomesebwa ku musujja?)*		
	Once *(gumu)*		1
	Twice *(ebiri)*		2
	Three times or more *(esatu oba okusingawo)*		3
	None *(tekibangawo)*		4
		37	

3.2 Learning factors; Indicate how you have learnt how to care for a child who develops high fever *(tubuulire engeli gyewayigamu endabirira y'omwa ow'omusujja)*
Key: 1=Yes2=No

3. 2.1	Health workers *(abasawo)*	38	
3.2.2	Community drug distributors *(abasawo b'ekitundu)*	39	
3.2.3	Traditional healers *(abasawo b'ekinansi)*	40	
3.2.4	Media messages *(ebyamawulire)*	41	
3.2.5	Elders /senior mothers /pears *(abakulu /abekinnywi)*	42	
3.2.6	Previous experience/treatment outcomes **(***okusinziira kubumanyirivubwo mukujjanjaba*)	43	

3.3 According health education information you have acquired, state how these statements apply to you *(okusinziira kukusomesebwa,biki abikwatako)*
Key: for numbers 3.3.1 to 3.3.15
I learnt it the first time through health education (nakiyiga omulundi ogwasooka) ***=1***
I gained some information through health education (nayiga okuva mukusomosebwa) ***=2***

	I have always known this therefore health education did not teach me anything new. (ebyo nali mbimanyi) ***=3***	
3.3.1	That fever is the major sign of malaria *(nti omusujja kabonero ka malaria)*	44
3.3.2	That malaria is a dangerous disease *(omusujja bulwadde bwakabi)*	45
3.3.3	That malaria is the leading cause of sickness and death of children in Uganda *(nti omusujja gwegusinga okulwaaza n'okutta abaana mu Uganda)*	46
3.3.4	That malaria is caused by a parasite *(nti omusujja guletebwa kawuka)*	47
3.3.5	That malaria can be prevented *(omusujja gusobola okugemebwa)*	48
3.3.6	How malaria is treated *(enzijanjaba y'omusajja)*	49
3.3.7	That children are more at risk of malaria than adults *(nti abaana bebasinga okutawinyizibwa omusujja)*	50
3.3.8	The preventive measures against malaria *(enziyiza y'omusujja)*	51
3.3.9	That malaria is transmitted by mosquitoes *(nti omusujja gutambuzibwa nsiri)*	52
3.3.10	The symptoms for simple and complicated malaria *(obubonero bw'omusujja)*	53
3.3.11	That you can get help from community drug distributors *(nti omusawo w'ekitundu asobola okukuyamba)*	54
3.3.12	When to take your sick child for medical help *(ddi lw'otwala omwana mudwaliro)*	55
3.3.13	How to determine that the malaria treatment is working? *(engeri gy'omanya nti eddagala likola)*	56
3.3.14	How to determine that the child's condition is deteriorating? *(engeri gyoraba nti embeera y'omwana eyononeka)*	57
3.3.15	How to prevent mosquito bites *(engeri gyewewalamu ensiri)*	58

3.3.16 How to prevent the breeding of mosquitoes *(engeri gy'oziyizaamu okuzaala kwensiri)* | | 59 |

3.4 KNOWLEDGE ON MALARIA *(byomanyi kumusujja)*

3.4.1 What causes malaria? *(kiki ekilwaaza omusujja)*

Mosquitoes (ensiri)	1	
Malarial parasites (akawuka k'omusaujja)	2	
Dirty water (amazzi amakyafu)	3	
Unboiled food (emmere embisi)	4	
Maize (kasooli)	5	
Others specify (ebirala byogere) ……..	6	
		60

3.4.2 How is malaria transmitted? *(kiki ekitambuza omusujja)*

Mosquitoes (ensiri)	1	
Malarial parasites (akawuka k'omusujja)	2	
Dirty water (amazzi amakyafu)	3	
Unboiled food (emmere embisi)	4	
Maize (kasooli)	5	
Others specify (ebirala byogere) ……..	**6**	
		61

3.4.3 What are major symptoms? *(buboneroki obukulu kumusujja?)* 62 **XX**

……
……
…… …… ……. ……. …… ……. …….

3.4.4 What are the dangerous signs of malaria you know? *(buboneroki obwakabi kumusujja bwomanyi?)* **63** **XX**

……
……
……

SECTION D: CAREGIVER'S BEHAVIOUR (**actions for care and control of malaria)** ***(enkolayo mukwewala omusujja)***

4. 1 CARE ACTIONS FOR A CHILD WITH FEVER (*endabirira y'abaana b'omusujja)*

4.1.1 What was the first thing the caregiver did after fever attack? *(kiki ky'ewasokanga okukola?)*

I give paracetamol *(mpa panadol)*		1
I tepid sponge *(mussako ekiwero)*		2
I give anti-malarial pills *(mpa eddagala ly'omusujja)*		3

	I give local herbs *(mpa eddagala lyekinnansi)* ☐		4
		64	
4.1.2	Other actions not mentioned in 4.1,1 *(ebirara ebitali mu 4.1.1)* ……	65	**XX**
4.1.3	Out of above list (4.1.3 to 4.1.9), where do you seek first help? (*mu lisiti 4.1.3 okutuuka ku 4.1*.9 *kiki ekisinga obukuliu?)* …… ……	66	**XX**
4.1.4	How long from time of onset of fever to time of administering of anti-malarial drug? *(oyisaawo bbanga ki okutuusa lwoowa eddagala?)*		
	0-24 hours		1
	Above 24 hours *(waggulu wesaawa 24)*		2
		67	
4.1.5	Was the child hospitalised? *(omwana bamuwa ekitanda?)*		
	Yes *(yee)* ☐		1
	No *(nedda)* ☐		2
		68	
4.1.6	If your child has ever been hospitalized, for how long? (bwekiba nti yee, bbanga ki?)		
	1-3 days ☐		1
	4-7 days ☐		2
	8-14 days and above (kusukka munaku 8) ☐		3
		69	

In case the child has fever where do you seek help? *(omwana bwalwala wa w'ononya obuyambi?)*
Key for numbers 4.1.6 to 4.1.13:
1 =Yes, 2=No,

4.1.7	Drug distributor *(omusa w'ekitundu)*	70
4.1.8	Hospital *(eddwaliro)*	71
4.1.9	Traditional healer *(omusawo w'ekinnansi)*	72
4.1.10	Drug store *(edduka ly'eddagala)*	73
4.1.11	Local clinic *(kiriniki)*	74

4.1.12	Church *(kkanisa)*	75	
4.1.13	Consults the elders for advice *(webuuze ku bakulu)*	76	
4.1.14	I take the child to any facility for blood tests **(***mutwala ne bamujjako omusaayi)*	77	

This is my preferred action when I see these specific signs in a child with fever *(kino kyenkola omwana bwaba n'obubonero bw'omusajja)*

Key for numbers 4.1.15 to 4.1.25:
1= I take the child to the hospital *(ntwala omwana muddwaliro)*
2= I give some treatment and take the child to the hospital *(muwa eddagala nemutwala muddwaliro)*
3= I take the child to a village drug distributor *(mutwala ewomusawo wekitundu)*
4= I treat the child at home *(mujjanjaba awaka)*

4.1.15	When the child develops high fever *(omwana bwafuna omusujja)*	78	
4.1.16	When the child becomes weak *(omwana bwanafuwa)*	79	
4.1.17	When the child develop headache *(omwana bwalwala omutwe)*	80	
4.1.18	When a child vomits *(omwana bwasesema)*	81	
4.1.19	When a child has loss of appetite *(omwana bwaba tayagala kulya)*	82	
4.1.20	When the child is convulsing *(omwana bweyesika)*	83	
4.1.21	When a child vomits everything *(omwana bwasesema buli kamu)*	84	
4.1.22	When a child has difficulty in breathing *(omwana ngassa bubi)*	85	
4.1.23	When a chid has severe anaemia *(omwana ngatalina musaayi)*	86	
4.1.24	When a child has severe dehydration *(omwana ngaweddemu amazzi)*	87	
4.1.25	When a child is unable to drink or breastfeed *(omwana ngatasobola kunwya oba okuyonka)*	88	

4.2 PREVENTIVE ACTIVITIES OF CAREGIVER *(byokola okuziyiza)*

What general preventive measures undertaken by caregivers

against future fever attack *(omuzadde byakola okuziyiza)*
Key 1=yes 2=no

4.2.1 Give prophylactic anti-malarial *(mpa eddagala ly'okuziyiza)* 89

4.2.2 Give local preventive herbs *(eddagala lyekinansi)* **90**

Caregiver's home based preventive activities implemented *(omuzadde byakozeeko mukuziyiza)*
Key for numbers 4.2.3 to 4.2.6:
Every day *(buli lunaku)* **=1**
At least once a week *(gumu mu wiiki)* **=2**
1-3 times a month *(1-3 mumwezi)* **=3**
Very seldom *(oluusi)* **=4**
Have never done it *(sikikolanga)* **=5**

Actions to inhibit breeding of mosquitoes *(byokola okuziyiza ensiri okuzaala)*

4.2.3 Drain any accumulation of water around the house *(obutakkiriza bitaba)* 91 ☐

4.2.4 Clear bushes along water banks /home-stead *(okusaawa kumabbalali wenzizi /n'awaka)* 92 ☐

4.2.5 Dispose off all containers likely to hold water *(okwewala ebikebekebe)* 93 ☐

4.2.6 Keep water containers covered *(kubikka ku bibeeramu amazzi)* 94 ☐

Action to control mosquitoes *(byokola akuziyiza ensiri)*

4.2.7 Indoor residual spraying (IRS) *(okufuuyira enju)*

Regularly every after 6 months *(bulu myezi mukaaga)* ☐ 1
Rarely done *(sibulikiseera)* ☐ 2
Never done it *(sikikolangako)* ☐ 3
95 ☐

4.2.8 Apply mosquito repellents on skin of the child *(okweyambisa ebigoba ensiri kumubiri)*

Always *(buli kiseera)* ☐ 1
Once in a while *(oluusi)* ☐ 2
Never *(sikikolangako)* ☐ 3

96

4.2.9 Apply mosquito gauze /screens for windows and doors of the house *(obutiimba mu madirisa)*
Yes all of them *(yee, gonna)*

Yes some of them *(yee, agamu)* 1
None of them *(nedda)* 2

97

4.2.10 Do you use a mosquito net for your child? *(okozesa akatimba kensiri k'omwanawo?)*

Yes *(yee)* 1
No *(nedda) (go to no. 4.2.12)* 2

98

4.2.11 If (4.2.10) above is yes, is the net treated with insecticides? *(4.2.9 waggulu nga kituufu,akatimba kasibwaamu eddagala?)*

Yes (twice a year) *(emirundi ebiri)* 1
Yes (once a year) *(yee, omulundi gumu)* 2
Rarely *(lumu na lumu)*
Never *(nedda)*

99

4.2.12 If (4.2.10) above is yes, is the mosquito net intact with no holes? *(4.2.9 nga kituufu, akatimba kalamu?)*

Yes *(yee)* 1
No *(nedda)* 2

100

4.2.13 If the above (4.2.10) is no, give reasons why you are unable to have a mosquito net for the child? *(4.2.9 ngasikituufu, nsongaki ekugaana okuba n'akatimba?)*
……..
……
……..

101 **XX**

THANK FOR YOUR PARTICIPATION IN THE STUDY *(WEBALE KWETABA MU KUNONYEREZA KUNO)*

END

Annexure C: Evidence of services of a translator/editor

4th, February, 2010

Declaration by the translator /editor

I have edited the research report of the study, “Caregivers’ home based management of fever in Mukono district, Uganda”. I have checked and certified correct English to Luganda translation of the interview schedule and consent forms.

Jamaica Mulindwa (+256-752-877319)

B.A. Languages (MUK), PGDE.

Graduate Teacher, languages. English-Luganda Interpreter /editor.

Kampala, Uganda.

Annexure D: Ethical clearance certificate: Research and ethics committee, Department of health studies, Unisa.

UNIVERSITY OF SOUTH AFRICA
Health Studies Research & Ethics Committee
(HSREC)
College of Human Sciences

CLEARANCE CERTIFICATE

Date of meeting: 19 **November 2008** Project No: **3494-553-9**

Project Title**: THE ASSESSMENT OF THE HOME-BASED MANAGEMENT OF FEVERS STRATEGY IN MUKONO DISTRICT, UGANDA**

Researcher**: Dr RS Bbosa**

Supervisor/Promoter**: Prof VJ Ehlers**

Joint Supervisor/Joint Promoter**:**

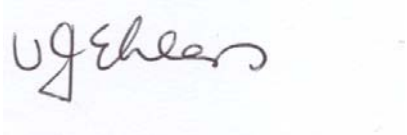
Department: **Health Studies**

Degree: **MPH**

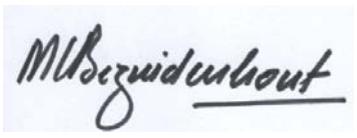
DECISION OF COMMITTEE

Approved [√] **Conditionally Approved** [ ]

Date: 19 November 2009



Prof VJ EHLERS
RESEARCH COORDINATOR: DEPARTMENT OF HEALTH STUDIES



Prof MC Bezuidenhout
ACADEMIC CHAIRPERSON: DEPARTMENT OF HEALTH STUDIES

PLEASE QUOTE THE PROJECT NUMBER IN ALL ENQUIRES

Annexure E: Permission from Ugandan authorities to do research in Mukono district

Kawolo hospital
Box 210, Lugazi.
23rd, November, 2009.

To District Health Officer /Inspector of health, Mukono district,

Re. REQUEST FOR DATA COLLECTION FROM YOUR INSTITUTION

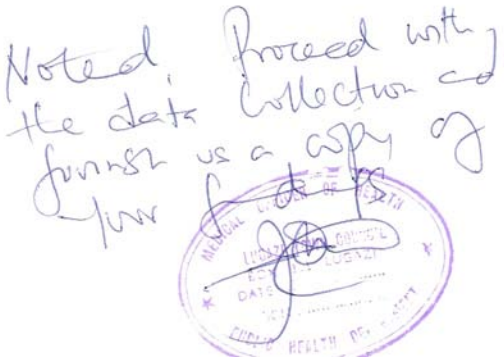
I wish to inform you that I'm undertaking a master's degree programme in public health of University of South Africa. My data collection tool has been approved by the ethical committee of the University as par attached copy of clearance certificate.

Title: Caregiver's Home-Based Management of Fever in Mukono District, Uganda.

I therefore request to be allowed to collect data for the study. After the completion of this research, study findings will be availed to you.

Yours,

Bbosa Richard S.
Researcher.



Annexure F: Letter from statistician

School of Public health, Makerere University,
Kampala.
Tel: +256772412455
E-Mail: wromay2000@yahoo.co.uk
25th January, 2010.

The research committee,

School of health studies, UNISA.

Re: **DATA ANALYSIS FOR STUDENT; MPH 34945539**

I wish to certify that I have analysed data for MPH Student, Bbosa Richard S (MPH 34945539). To the best of my ability, I declare that this is the outcome of the research 'CAREGIVERS' HOME-BASED MANAGEMENT OF FEVER IN MUKONO DITRICT -UGANDA' of 2009-2010.

Yours,

Signed:

Roy William Mayega (Dr.)