European Journal of
Health Sciences
(EJHS)



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Dr. Perez Mbiire Batwine Mujuni, PhD

European Journal of Health Sciences
ISSN 2520-4645 (online)
Vol.11, Issue 2, pp 1-33, 2025

www.ajpojournals.org

Treatment Actions in Home Management of Malaria in Children Under Five Years in Kashari County, Mbarara District South Western Uganda

Dr. Perez Mbiire Batwine Mujuni, PhD[1*]
Faculty of Science, Department of Natural sciences, Uganda Martyrs University

Article history
Submitted 07.04.2025 Revised Version Received 10.05.2025 Accepted 09.06.2025

Abstract

Purpose: The purpose of this study was to describe treatment actions in home management of malaria in children under-five years in Kashari County, Mbarara District, Uganda.

Materials and Methods: This was a household survey employing quantitative methods of data collection. The study was conducted in Kashari County, Mbarara District, in Southwestern Uganda. Four hundred thirty two caretakers of children under five years who had a fever in the two (2) weeks preceding the survey were randomly selected from 23 villages (Lc1's). Caretakers were interviewed on treatment actions during the most recent episode of fever, perceptions about malaria, socio-economic and socio-demographic characteristics.

Findings: The findings found out that, 66% of the caretakers had good knowledge of the cause of malaria and reported mosquitoes as the cause and knowledge of the danger signs was generally low. 58% of the caretakers did not know the cause of convulsions and more than 6 in 10 (68%) of caretakers whose children had ever had convulsions, treated the convulsing children with herbs. More than eight in ten (85%) respondents took the first treatment action within 24 hours of recognition of fever but only 57% of the caretakers took appropriate treatment action. More than five in ten caretakers first obtained treatment from private health care provider. Less than three in ten (26%) obtained treatment from a government health unit. Only 22% of the caretakers took a second treatment action. Choice of first treatment was mainly based on severity of illness and availability of money. The reason for taking the second treatment action was mainly failure of the first treatment. First treatment action was associated with perception of the of the child's illness (OR=3.968, p=0.000) and age of the child (OR=2.353, p=0.020). Taking prompt and appropriate action was associated with distances to the nearest health facility (OR=4.167, p=0.000), household income (OR=3.800, p=0.000), politeness of health workers at the nearest health facility (OR=1.416, p=0.022) and perception of cause of malaria (OR=1.767, p=0.020). Less than three in ten caretakers take their children with malaria to a government health facility as the first treatment action. Private health care providers play a major role in treatment of malaria in children in Kashari County and the perceived quality and accessibility of health services contribute to choice of treatment options and promptness.

Unique Contribution to Theory Practice and Policy: It was therefore recommended that, the Ministry of Health should invest in more strategies that improve caretaker's choice of government health units as first treatment option. The health workers should therefore tell, educate and sensitize the caretakers the names and dangers of giving the sick children the drugs they don't know the names. Government should make sure that anti-malarial drugs are availed in the government health units.

Key words: *Treatment Actions, Home Management of Malaria, Children under Five Years, Kashari County, Mbarara District, South Western, Uganda*

INTRODUCTION

In Africa, malaria is a serious and sometimes a fatal disease caused by *plasmodium falciparum* transmitted by a female Anopheles Gambia complex and is spread to humans through the bite of an injective mosquito (Nchinda, 1998).

It is a potentially killer tropical disease characterized by cyclical bouts of fever with muscle stiffness, headache, severe chills, shivering, vomiting, malaise, flu-like symptoms and sweating. These symptoms can vary greatly in severity and be confused with other infections, such as influenza. Malaria is caused by a tiny parasite (*genus plasmodium*) that is transmitted by the female mosquito (*genus anopheles*). Malaria threatens about 40% of the world's population. According to the World Health Organization (WHO, 1998) 300 to 500 million people worldwide develop malaria and 1.5 to 3.0 million people mostly children die annually.

Incidence of malaria disease tends to decline uniformly with age such that children in the 5-9 year age class experience significantly fewer episodes than those in 1-4 year age class (Greenwood *et* al. (1987), Marsh *et* al. (1987), Cox *et* al. (1993)). This undermines the health and welfare of families, endangering the survival of children, debilitating the active population and straining both the countries' and people's resources (WHO, 1993). It kills one of every twenty children before their 5th birthday (WHO, 1993) and is particularly a killer in sub-Saharan Africa where 90% of the world's cases and deaths occur (WHO, 1998). In Uganda, Malaria is one of the leading causes of morbidity and mortality in children under five years (UNICEF, 1998), accounting for 46% of illness in children (UDHS, 1995) and is endemic in most parts of the country. Malaria is the main killer among children under five and specific death rate among children under-five, is 37/1000 live births and 18/1000 live births in high and low malaria endemic areas respectively (Malaria Newsletter, Jan 2001). Malaria also has long-term consequences on child health and development such as low birth weight, chronic anemia and reduced growth.

Findings of the Uganda Demographic Health Survey of 2000 - 2001 showed that anemia was found in 64% of children. According to the 1995 Burden of disease study in Uganda, 75% of life years lost to premature death are due to ten preventable diseases and among them malaria contributes 15.5%. Health information management systems (HIMS) reports from Kashari show that Malaria accounts for 40-60% of under-five outpatient attendances. The number of malaria cases of children under five increased by over 50% in 2003 (HMIS, 2001-2003). While use of mosquito nets as a preventative measure against malaria is recommended, only 8% of the children in Uganda usually sleep under a mosquito net (UDHS, 2001). According to the Uganda Demographic and Health Survey 2000 - 2001, 13% of households use bed-nets. A later study by the Ministry of Health and Partners (2002) found that only 19.2% of households had at least one mosquito net. Mosquito nets are less likely to be available in households in southwestern Uganda compared to other regions (UDHS, 2001). Therefore malaria control in Uganda like in most parts of Africa relies on early and effective treatment of the clinical disease.

Home-based treatment is a very common response to many illnesses in both the developed and the developing world. In a multi-health centre study by (WHO/AFRO, 2001) in 10 countries in Africa including Uganda more than 70%of the patients received medication at home as the first treatment before seeking hospital care. Early recognition of symptoms and giving the right treatment promptly reduces childhood morbidity and mortality and yet may be influenced by factors such as knowledge and perceptions of cause of Malaria.

Studies in some parts of Africa including Uganda suggest that immediate action as response on recognition of malaria include applying local herbs, purchasing modern drugs and applying a

cold cloth (UNICEF; 1994; Marsh *et* al. (1999)). Home treatment is prompt. Deming (1989) found that 97% of the children treated at home received the drug on the first day of fever and only 17% of the children attended a health centre on the first day of fever. Home treatment however has shortcomings and studies have documented that drugs bought are usually inappropriate and given in dangerous dosages (IMCI impact study, 1995; Nshakira *et* al. (2003)). In Kashari County, like in most parts of Uganda accessibility to health facilities is very low with approximately 30% of parishes having at least Health Centre II facilities (MOH, 2002).

To improve accessibility and case management, the MOH together with development partners are implementing home based management of fever strategy in a number of districts. In this strategy, safe and effective anti-malarial drugs for treatment of uncomplicated malaria are availed within communities (MOH, 2002) and health education provided. Studies done in Uganda indicate that majority (83%) of fever cases are managed outside the formal health services with shopkeepers (38%), drug shops and private clinics (41%) being the predominant sources of care (IMCI Multi Country Evaluation, Uganda 2000).

Ensuring availability of effective treatment does not in itself lead to effective use and compliance, as Tumwesigire and Watson (2002) found that one of the reasons for choice of where to obtain treatment is belief in the treatment practices and perceptions with respect to malaria. Management is a key in designing effective communication strategies that enhance community and especially caretaker's support to and participation in the programme. By conducting this survey therefore the results is hoped to provide the information on how treatment is done by caretakers' of children under five years in Kashari County and make recommendations.

Statement of the Problem

Malaria still remains a major problem in many parts of the world and is responsible for high childhood mortality and morbidity in Africa. Malaria is a significant health problem, threatening the lives and affecting the development of over 2.2 billion people in over 100 countries, which is about 40% of the world's population. These cases result in 1.5 to 3.0 million deaths (WHO, 1998).

Although the knowledge of the disease has continued to advance and we have at our disposal intervention tools that are adequate to control the disease, the malaria situation has remained unchanged or has worsened in recent years. There has been a major resurgence of malaria because the malaria parasite has become resistant to anti-malarial drugs and mosquito vectors are resistant to insecticides. Traditionally most Ugandans first buy drugs for malaria from neighborhood shops without medical advice and only use health facilities when self-medication fails. This is due in part to the scarcity of health facilities and frequent drug shortages. For example, a recent demographic and health survey indicated that 44% of Ugandan mothers say the nearest health centre is too far from their homes. Malaria is the number one killer of children under-five in Uganda. It is also the single most common cause of miscarriage. In response to this serious health problem, the Uganda Ministry of Health signed the Abuja declaration to roll back malaria in Africa; and launched a strategy to ensure that children under five and pregnant women receive correct treatment of fever/malaria within 24 hours of onset, and that pregnant women prevent malaria through intermittent presumptive treatment (IPT) of malaria (MOH, 2001).

In developing countries including Uganda malaria seriously impairs the health of children under five years of age and of pregnant women, causing a vast number of deaths mostly in young children. During pregnancy, malaria is associated with maternal illness and severe

anemia. Malaria also contributes to low birth weight among newborn infants one of the leading risk factors for infant mortality (MOH, 2003).

It is estimated that 15.4% of life years lost due to premature deaths in Uganda are attributed to malaria (UDHS, 1995). Malaria is the leading cause of morbidity and mortality in children, a major cause of school absenteeism and there can be impairment of learning ability in children. Kashari County experiences Meso-endemic malarial transmission and the number of malaria cases reported each year is on the increase with 40-65% of the under-five out patients' attendances being due to malaria illness. Like in most parts of the country accessibility to health facilities is very low and approximately 30% of the parishes have at least health centre II level facilities. The MOH and partners have invested in the strategy of Home Based-Management of Fever strategy and as the program scale up, it is not known how malaria in children under five is managed in homes in Kashari County. When such data on care takers' treatment actions in Home Management of Malaria in children under five years is made available, it will act as a spring board for implementation of the Home Based Management of Fever/Malaria strategy in Kashari County, southwestern Uganda.

Objectives

The following objectives guided the study:

i. To describe community perceptions of Malaria;
ii. To describe actions taken to manage malaria in children under five (5) years;
iii. To determine factors associated with choice of first action in treatment of malaria in children less than five (5) years;
iv. To determine factors associated with time lag from onset of symptoms to appropriate treatment actions.

Scope

The study was conducted in Kashari County, Mbarara District, southwestern Uganda between December 2004 and February 2005. Kashari County consists of 40 parishes and is predominantly rural with a population of 162,594 persons of whom 30,000 are estimated to be children less than five years. This population is served by 13 government health units and four (4) NGO Health Centre II.

Significance

When the children with malaria/fever are not diagnosed and treated early with the appropriate drugs, the cost of managing cases increases because of the several complications that may develop.

Self-treatment continues to be widely practiced in most parts of Uganda both in rural and urban areas. Improved home treatment not only contributes to the reduction of severe malaria but also has socio-economic benefits including reduction of household expenditure on malaria and reduction of the time spent caring for sick children.

Scaling up of the Home Based Management of Fever (HBMF) strategy is ongoing and Batega *et* al., (2003) have reported that in communities where it is implemented, the programme has improved accessibility to effective anti-malarial treatment and compliance is high. The strategy acknowledges the role of communities and especially caretakers in the fight against malaria since their perceptions, knowledge and other factors may influence the treatment actions they choose when managing their children with malaria. It thus emphasizes the empowerment of

caretakers to provide prompt and effective treatment of fever at home through education and sensitization.

Review of the literature revealed that studies done in Uganda tried to identify factors associated with caretaker's treatment actions in management of childhood malaria in urban areas and other areas that were culturally different from Kashari County. Other studies were not age specific and did not establish how malaria in children under five years was managed in the home and yet treatment actions may vary depending on whether the sick person is a child or an adult. It is not known how caretakers in Kashari manage malaria in their children under five years and findings from studies reviewed earlier cannot be generalized to this area. As the HBMF programme scales up, studying existing treatment actions of caretakers provides knowledge of local realities, which may be used to design health education messages suited to local needs.

This study therefore is set out to contribute to bridging the knowledge gap by identifying the treatment actions of caretakers in home management of malaria and the factors that may influence the choice.

LITERATURE REVIEW

Reducing malaria mortality in children by improving treatment of cases is one of the objectives of Roll Back malaria in the African region and the Uganda Health Sector Strategic Plan (HSSP) has similar objectives. UNICEF is a partner in the Roll Back Malaria (RBM) initiative (A global partnership founded in 1998 by UNICEF), the World Health Organization (WHO), the United Nations Development Programme (UNDP), and the World Bank with the goal of halving the world's malaria burden by 2010. The initiative is enabling countries to take effective and sustainable action against malaria by focusing on these proven tools and strategies (UNICEF, 1998).

Malaria is one of the most frequent causes of illness in homes leading to not only suffering but also to economic loss as caretakers attending to sick children do not work. In Africa, between 80-90 percent of the patients treat themselves at home for the most common diseases such as malaria, other fevers, diarrhoea and the common cold.

In a multi- centre study done by WHO/AFRO (2001) in 10 countries in Africa including Uganda, more than 70% of the patients received medication at home as the first treatment before seeking hospital care. A study in Mulago Hospital indicated that 89.5% of the mothers gave some medicines at home before bringing the child to health facility as reported by Lubanga *et* al. (1997).

Uganda became the first country to launch large-scale home-based management (HBM) a malaria treatment strategy promoted by WHO. Uganda is leading the way with a large-scale HBM programme launched on April 25, 2002 (Africa Malaria Day) that is now the country's official national treatment policy. It comes two years after African heads of state signed a declaration in Abuja, Nigeria, pledging to half the burden of malaria by 2010 (MOH, 2002)

According to WHO estimates, malaria affects more than 300 million people and kills more than one (1) million people annually mostly children younger than 5 years. The WHO representative in Uganda said that WHO considers Uganda as a "torchbearer" in RBM because it was the first to abolish taxes on bed nets and now is taking a lead in home-based malaria management.

The project included prompt treatment, prevention, and control of malaria during pregnancy, promotion of the use of insecticide-treated nets, and effective management of emergency and epidemic situations. Also, through the HBM project, 80,000 volunteers will distribute a combination of Chloroquine and Sulfadoxine Pyrimethamine (SP) free of charge. Traditionally most Ugandans first buy drugs for malaria from neighborhood shops without medical advice

and only use health facilities when self-medication fails. This is due in part to the scarcity of health facilities and frequent drug shortages. For example, a recent demographic and health survey indicated that 44% of Ugandan mothers say the nearest health centre is too far from their homes (MOH, 2003).

Treatment Actions

Treatment actions vary between areas of different transmission. Lindblade *et* al. (2000) found that the majority (61.8%) of care takers in an epidemic prone region first sought treatment from a health facility as opposed to 17% in an endemic area (Deming *et* al. (1989)).

In a study of mothers bringing their children with fever to Mulago Hospital, Lubanga et al. (1997) found that drugs given at home were usually modern medicine 75.8%, a mixture of modern and herbs 21.4% and herbs alone was found to be as high as 71.3% (UNICEF, 1994).

Nshakira *et* al. (2002) reported that modern medicine used by caretakers at home included Chloroquine 40%, aspirin 36.7%, paracentamol 32.6% and antibiotics 15.8%. Medicine bought from shops in the community was 75% recommended and provided by a health care facility 13.2% or from home stock of medicines 12.0%. Home treatment has been associated with over or under-dosing with the former causing toxicity and the latter leading to drug resistance (MOH, 2002).

In the recent past years, global and local strategies to prevent malaria have changed. There has been marked progress in building capacity for fever/ malaria case management at the first level health facility through the Integrated Management of Childhood Illness (IMCI) approach of training. More than 4500 health workers have so far been trained (MOH, 2001).

In addition, the Home Based Management of Fever/ Malaria in Uganda uses the IMCI approach of case management whereby a mother should be in a Position to identify a malaria Episode, treat within 24 hours of on set, and identify complicated cases for referral and appropriate treatment action.

The Home Based Management of Fevers (HBMF) is one of the approaches to effect the strategy of early and appropriate treatment of malaria. This is in line with the global Roll Back Malaria (RBM) targets. In April 2000 in Abuja, Nigeria, Heads of State of African countries made a commitment to ensure that at least 60% of those suffering from malaria have prompt access to affordable and appropriate treatment within 24 hours of onset of symptoms by the year 2005 (MOH, 2002).

Following the Abuja Declaration, the Uganda Ministry of Health and its development partners adopted the Home Based Management of Fever (HBMF) approach to effect the strategy of early and appropriate treatment of fever. This approach is meant to avail pre-packaged anti-malarial drugs (HOMAPAK) at community level for management of fever. Home-Based Management of Fever aims at improvement of access to quality anti-malarial drugs at community level in line with the National anti-malarial drug policy.

The Ministry of Health and its Partners conducted a study in six districts which included Kumi, Kamuli, Kiboga, Lira, Ntungamo and Kanungu which showed that out of the 83.9% of children under-five that had had fever two weeks prior to or at the time of the survey and only 47.7% of children with fever had access to any form of treatment within 24 hours of illness while 14.6% had used pre-packaged drugs. The HOMAPAK distribution had started in one survey district (Kumi) only at the time of the study (Ministry of Health and Partners, 2002). Local health workers and mothers of young children are trained to recognize the signs of malaria and further taught to seek treatment immediately.

Home Based Management of malaria/ fever (HBMF) strategy involved distribution of anti-malaria drugs through Community based Drug Distribution (CDD). This intervention is intended among other things to provide timely /prompt response (within 24 hours of onset of illness) and is largely intended for children below the age of five years.

According to Ministry of Health (MOH, 2002), treatment at home is to reduce malaria deaths in children under the age of five years. Mothers and health workers are told to take the child to a medical center if the fever is treated but continues after two days. Other signs of malaria include sleepiness and feeling sick in the stomach.

WHO report says that people often take patients to traditional healers for malaria treatment which may cause severe illness. But it says that the healers should be trained to tell them, when they must go to a hospital. In Uganda for example communities have elected persons to learn the signs of malaria and provide medicine.

Factors that May Influence Choice of Treatment Action and Time Lag from Recognition of Symptoms to Appropriate Treatment for Malaria

The choice of treatment for illness may depend on perceived cause, reason and origin of disease. While most mothers know mosquitoes as the cause of malaria, their perceived transmission mode differs from biomedical facts. Convulsions, a common complication of malaria is perceived as a super natural ailment best treated by traditional medicine. Kengeya-Kayondo *et* al. (1994), Nuwaha (2002) and UBOS (2003) reported that only 31.3% of care takers knew convulsions as a danger sign for malaria. The decision made by the caretakers may also be influenced by the perceived seriousness of the attack (UNICEF), 1994; Tumwesigire and Watson (2002).

Lindblade *et* al. (2000) found that the children who were most ill were 2.87 times more likely to be seen at a health facility within one day of illness. Lubanga *et* al. (1997) found that the proportion of women who gave modern drug increased with the mother's level of education from 57.7% among those with no education, to 66% among women with primary education and 72.5% among secondary and post-secondary women. Women with no education were twice as likely to give herbs only compared to women with formal education. Lubanga's study was done in a hospital and urban setting and the socio-economic characteristics of caretakers are different from those in the rural areas.

Poor people face particularly great barriers in accessing formal health care. Where mothers lack money then delays in seeking care can arise especially if the father of the child is absent (Tolhurst, 2003). Caretaker's choice of where to obtain treatment may be based on the cost of drugs, as most rural households may not afford treatment (Tumwesigire and Watson (2002)).

In a study conducted in Mpigi district, 25% of caretakers reported that delay to take action was influenced by unavailability of money in the household at the time of illness (UNICEF, 1994) and that referrals of malaria cases could be delayed for 2 days waiting for support from husbands. While the study of Tumwesigire and Watson (2002) was conducted in a rural area, malaria transmission in Kabale is different from transmission in Kashaari County with care takers likely to respond differently to malaria illness as reported by Lindblade *et* al. (2002).

Decision making about care seeking and how to pay for it is a source of conflict in some households (Tolhurst, 2003). The mothers' decision-making power has its great importance in influencing infant mortality. Among children whose mothers have no final say in any decision, 131 per 1000, died before celebrating their first birthday compared to 93 or fewer in 1000 among children whose mothers participate in making some decisions (UDHS, 2001). This finding may implicitly express the relationship between caretakers, decision-making and

delays of appropriate treatment actions. Access to health care facilities with effective treatment of malaria is still unsatisfactory since only 42.9% of the parishes in Uganda have any form of health facility.

Even where health facilities exist, access to basic elements of the health care package is far from optimal (MOH, 2002). In rural areas such as Kashaari County where the majority of the population live, accessibility is complicated by the presence of geographical barriers like swamps, marshes and hills. Lindblade *et* al. (2000) found that children for whom a health facility was closer to home than a shop were 2.58 times more likely to be seen early at a health facility. Perceptions about service quality might shape confidence and subsequent behaviors with regard to choice and usage of available health care facilities (Andaleeb, 2001). Patients may avoid a system or use it as last resort as Nuwaha (2000) found that perceived low quality of care was one of the reasons for seeking care outside public health facilities. The patient's previous experience when seeking care is important in determining continued use of the source.

Some of the important characteristics of quality include regular service, skill and reputation of providers, outcomes of care, availability of services, confidence and communication of providers (Ranklin *et* al. 2002). Data on existing treatment practices and factors that influence them is required for improving community capacity for correct home care for childhood sector as a strategic plan (MOH, 2000).

MATERIALS AND METHODS

The study design was a household survey and quantitative methods of primary data collection were used.

Study Setting

The study was conducted in Kashari County, Mbarara District, in southwestern Uganda. Kashari County consists of 40 parishes and is predominantly rural with a population of 162,594 persons of whom 30,000 are estimated to be children less than five years. This population is served by 13 government health units and four (4) NGO Health Centre II. Kashari was selected because of the high burden of malaria compared to other counties in Mbarara (HIMS, 2003). While Kashari contributes 16% to the population of Mbarara District (Census, 2002), Malaria cases reported in Kashari are 14.9% of the district total (HIMS, 2003). The number of under-five malaria cases increased from 18,196 in 2001 to 24,229 in 2002 and 37,623 in 2003. The number under five years' children attending OPD was 45,460 in 2001, and 46,958 in 2002 and 47,622 in 2003(HIMS, 2003).

The figures above exclude the malaria cases-admitted to Mbarara University Teaching Hospital and other private clinics and therefore under estimate the disease burden.

Target Population

The target population was caretakers in Kashari County, with children under five years of age. This is because they had the knowledge of the conditions of the children they were looking at.

Accessible Population

The accessible population was caretakers with children under five years residing in Kashari County at the time of the survey.

Study Population: Inclusion Criteria

Care takers with children under five (5) years of age, residing in the selected villages between December 2004 and February 2005, whose children had malaria/ fever, in the last two weeks

preceding the survey and who consented to participate in the Study were recruited for interview.

Exclusion Criteria

Caretakers, who were too ill to respond, were excluded from the study.

Sampling

A multi-stage sampling technique was used. A list of all sub counties in Kashari County from Mbarara district headquarters was obtained. This was followed by random sampling of villages (LC1's) followed by random sampling of households from selected villages (LC1's) and caretakers in the selected households were recruited for interview.

Sample Size Estimation

The sample size n was estimated using the modified Kish (1965) formula:

Sample size, $n = \frac{z^2 * p(1-p) * D_{eff}}{\varepsilon^2}$

Where,

z Is the standard normal value at the acceptable level of significance of 95%.

p Is the percentage of caretakers who knew convulsions as a danger sign for malaria illness of 31% (UBOS, 2003).

D_{eff} Is design effect taken to be two (2) as recommended by WHO.

ε Is acceptable error - estimates of the prevalence of conditions and behaviors are estimated within an acceptable error of 0.065 (6.5%)

$$n = \frac{1.96^2 * 0.31 * 0.69 * 2}{0.065^2}$$

$$= 389$$

The number of clusters c is calculated using the formula

$$c = \frac{p * (1-p) * D_{eff}}{S^2 b}$$

(Bennet et al., 1991)

Where p is the prevalence of knowledge of convulsions as a danger sign (31%)

D_{eff} = Design effect (2)

S = Standard error

$$= \frac{Confidence\,interval}{Z - alpha}$$

$$= \frac{0.065}{1.96} = 0.0332$$

b =Number of responses per cluster is set at 20 for convenience.

Number of clusters =20 (approx.)

To cater for possible non-response errors, allowance of 10% was considered making 432 households visited in 23 clusters.

Demographic Factors

These were age, sex, marital status, number of children under five (5) years, household size, age and sex of child.

Socio-Economic and Cultural Factors

These included education, education of spouse, occupation, household income and decision making.

Knowledge and Perception about Malaria

These included Perception of the cause of malaria, knowledge of symptoms, complications of malaria and perception of child's illness.

Health Service Factors

These included distance from household to the nearest health facility, type of facility, perceived quality of services at nearest formal facility.

Outcome Variables

The primary outcome was treatment action. These included all treatment actions taken to improve the health of the sick child including supportive measures such as sponging, traditional remedies such as herbs, giving modern medicine from home stock, retail drug shops and pharmacies without prescription and taking child to health facility.

The secondary outcome was time lag from recognition of onset of symptoms to treatment action, which was measured in hours.

Data Collection

A semi-structured interviewer administered questionnaire was used. Caretakers who were identified as having children of less than five (5) years who had at least one episode of fever during the last two weeks preceding the survey and who consented to participate in the study. Caretakers were interviewed on the most recent episode of fever in the household. In households where there was more than one eligible child, the youngest child was chosen for the study.

Data Management and Analysis

The study database was created using Epidata version 2.1b software. Data were coded, entered in the computer and cleaned. Analysis was done using STATA version 8 because of its ability to analyze survey data taking into account the cluster sampling design effect.

Univariate Analysis

To describe background characteristics of respondents, community perceptions of malaria and actions taken to manage malaria in children under five years, categorical variables were summarized using frequencies and proportions while continuous variables summarized using median, mode, range, means and standard deviation. Results were presented in tables and charts.

Bivariate Analysis

To determine factors associated with choice of first action in treatment of children under five years, predictor variables were cross-tabulated with the outcome variables (first treatment action). The outcome variable first treatment action was categorized into four groups (take the

child to government health unit, private facility, buy medicine and use herbs). Those who had given medicine leftovers from previous illness episode were included in the category of buying drugs. Caretakers who had used non-biomedical options were included in the category of "used herbs". Cross-tabulation of independent variables and first treatment action was done so as to obtain percentage distributions which were used to show the general picture of the first treatment actions between caretakers of different characteristics. First treatment action was then dichotomized into used modern medicine or used herbs. Association between the outcome and independent variables were assessed using percentages, odds ratio and p-value.

The Pearson chi-square test was also used to establish whether there is statistical relationship between the variables.

$$\chi^2 = \sum_{i=1}^{r}\sum_{j=1}^{c}\frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

Where

$i = 1, \ldots, r$ and $j = 1, \ldots, c$

O_{ij} Is the observed frequency.

E_{ij} Is the expected frequency.

r Is the number of categories of independent variables.

c Is the number of categories of dependent variables.

Multivariate Analysis

This was performed on factors found on bivariate analysis to be associated with choice of first treatment action using logistic regression methods so as to find predictors of caretaker's first treatment action. To determine factors associated with time lag from recognition of onset of symptoms to appropriate action, appropriate action was defined as taking the child to a health facility or correct administration of anti-malarial drugs.

Instead caretakers were grouped into two: those who took appropriate action within twenty four (24) hours of fever onset (prompt and appropriate action) and those who had taken appropriate action after twenty four (24) hours or not taken appropriate action at all.

Analysis was performed using survey logistic regression.

The model is of the form,

$$\varphi(z) = \frac{1}{1 + e^{-z}}$$

Where z is the linear combination given by $\alpha + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_n x_n$ where $\beta_k's$ are the regression parameters estimates and $x_k's$ are independent variables.

For $k = 1, 2, \ldots, n$ and α is a constant.

All results of proportions and odds ratios presented are weighted estimates that cater for the design effect. The study involved a lot of travel because of being a millet-harvesting season where some of the caretakers' were participating. This made the study more costly than expected.

FINDINGS

Type of Facility and Availability of Anti-Malarial Drugs

There was a highly significant relationship between availability of anti-malarial drugs and type of nearest health facility (p =0.000).

The proportion of respondents agreeing that anti-malarial drugs were always available at the nearest health facility was higher for those who lived near a private health facility 68% (236) than the government health unit 30 %(102) as shown in Table below.

Table 1: Relationship between Type of Facility and Availability of Anti-Malarial Drugs at Nearest Health Facility

		Type of nearest health facility to the household							
		Private health facility		Government health facility		Others		**Total**	**%**
		No. of respondents	%	No. of respondents	%	No. of respondents	%		
Availability of anti-malarial drugs at nearest health facility	Always available	236	68.4	102	29.6	7	2.0	345	**100.0**
	Not available	7	8.2	77	90.6	1	1.2	85	**100.0**
	Not sure	1	50.0	1	50.0	0	0.0	2	**100.0**
	Total	**244**	**56.5**	**180**	**41.7**	**8**	**1.8**	**432**	**100.0**

Pearson X^2 (8) =121.0267 Pr =0.000

Community Perceptions and Knowledge about Malaria

The majority (66%) of the caretakers perceived the cause of malaria to be mosquitoes and about 27% did not know the cause as shown in the Table below

Table 2: Percentage Distribution of Respondents' by Perception of the Cause of Malaria

Cause of Malaria	Frequency	Percentage
Mosquitoes	283	66.5
Drinking unboiled water	97	22.5
Dirty water	95	22.0
Environmental changes	55	12.7
Eating fruits (mangoes, sugarcanes and maize)	31	7.2
Poor feeding	24	5.6
Uncooked food	20	4.6
Don't know cause	117	271.1

Knowledge of Symptoms and Signs of Malaria

Caretakers were asked about the symptoms and signs of malaria in children under five and the majority (96%) mentioned hot body, followed by rigors / shivering (68%), general weakness (50%) as shown in Table below

Other symptoms included excessive crying, red eyes, flu or cold, red urine, very yellow urine, mental disturbances, inability to talk, difficulty in breathing, excessive sleeping, stomach pains, mouth sores, sweating, nose breeding, abnormal heart beat, yellow eyes, constipation, worms and extreme loss of weight.

Table 3: Knowledge of Symptoms and Signs of Malaria

Symptoms and Signs of Malaria	Frequency	Percentage
Hot Body	416	96.3
Rigors/ Shivering	293	67.8
General Weakness	217	50.2
Headache	94	21.7
Excess Vomiting	90	20.8
Child Not Playing Normally	84	19.4
Diarrhoea	77	17.8
Mild- Moderate Vomiting	74	17.1
Unable to Feed at all	65	15.1
Cough	57	13.2
Loss of Appetite	33	7.6
Convulsions	31	7.2
Anemia	13	3.0
Not Breast Feeding	12	2.8
Joint Pains	11	2.6
Dehydration	7	1.6
Extreme Weakness	6	1.4
Other Symptoms	114	26.4

Treatment Actions

Actions taken to treat the child's illness were taking the child to the private clinic (52%), taking the child to a government health unit (37%) as shown in Table below Of all caretakers, 85% took the first action within 24 hours of recognition of fever. The first treatment action taken was mainly taking the child to a private clinic (38%), government facility (26%)

Table 4: Percentage Distribution of Respondents by Selected Treatment Actions Taken

Treatment action(multiple response)	Frequency	Percentage
Took the child to private clinic	226	52.3
Took the child to government health unit	159	36.8
Buying medicine from private clinic	98	22.7
Giving herbs	88	20.4
Buying drugs from drug shops	54	12.5
Used leftover medicine	35	8.1
Bought tablets from retail shops	33	7.6
Took the child to NGO health unit	7	1.6
Sponging and giving cold drinks	5	1.2
Did not know what to do.	2	0.5
Took First Treatment Action		
Yes	366	84.7%
No	66	15.3%
Total	432	100%
First Treatment action		
First Treatment action	**Frequency**	**Percentage**
Took the child to a private clinic	162	37.5
Took the child to government facility	114	26.4
Gave herbs	54	12.5
Bought medicine from private clinic	43	10.0
Bought tablets from drug shops	25	5.8
Bought tablets from retail shops	17	3.9
Used leftover medicine	13	3.0
Took the child to NGO health unit	4	0.9
Total	432	**100.0%**

Reasons for Choosing the First Treatment Action

Multiple reasons for choice of the first action to take were reported and included severity of the child's illness (48%), lack of money (45%), distance to the health facility (39%) and advice from neighbor (38%) as shown in Table below

Table 5: Percentage Distribution of Respondents by Reasons for Choosing the First

Reasons	Frequency	Percentage
Severity of illness	205	47.5
Lack of money / it was the cheapest	196	45.4
Health facility near / far	170	39.4
Neighbour had used action before	164	38.0
Was advised to take that action	119	27.6
Thought the child had malaria/worms/to treat diarrhea	93	21.5
Had used treatment before	77	17.8
It was at night/weekend	77	17.8
Believe in the treatment	74	17.1
First aid / first alternative	72	16.7
To know illness and get correct treatment	61	14.1
To cool down temperature / persistent temperature	48	11.1
To get better treatment	35	8.1

Appropriate and Prompt Treatment Action

Of all caretakers interviewed in the study, only 57% (246) took prompt and appropriate action within 24 hours of recognition of fever the Table below

Table 6: Percentage Distribution of Respondents by Caretakers who took prompt and Appropriate Treatment Action

Treatment action	Frequency	Percentage
Yes	246	56.9
No	186	43.1
Total	432	**100.0**

Medicine Used to Treat the Child's Illness

Anti-malarial modern drugs commonly used were Chloroquine (64%) and quinine (54%). Antipyretics commonly used were paracentamol (96%), aspirin (9%) and hedex (9%). Antibiotics were also used and they included among others amoxycillin (11%) and Cotrimoxazole (7%). Nearly fifty four percent did not know the names of any of the drugs that were given to their children as shown in the Table below.

Table 7: Percentage Distribution of Respondents by use Modern Medicine to Treat the Child's Illness (Multiple Responses)

Drug type and name	Frequency	%
Anti-malarial drug		
Chloroquine	275	63.7
Quinine	234	54.2
Sulfadoxine-Pyrimethamine (SP)	89	20.6
Amodiaquine	3	0.7
Artemether	1	0.2
Antipyretics		
Paracetamol	416	96.3
Aspirin	40	9.3
Hedex	40	9.3
Action	32	7.4
Cafenol	27	6.3
Diclofenac	15	3.5
Antibiotics		
Amoxicillin	48	11.1
Cotrimoxazole	30	6.5
Ampicillin	26	6.0
Crystalline Benzyl Penicillin	14	3.2
Procaine Penicillin Fortified (PPF)	5	1.2
Other drugs		
Multivitamins	192	44.4
Mebendazole	47	10.9
Elpar	27	6.3
Haematincs	18	4.2
Magnesium trisilicate	17	3.9
Oral rehydration salt	8	1.9
Don't know name	232	53.7

Consequences of Late Treatment of Malaria

When caretakers were asked what they thought might happen to children under five years with malaria when they are not treated early (within 24 hours of onset of symptoms), majority of the caretakers (90%) thought that if a child with malaria is not treated early, he or she might die as shown in the Table below

Table 8: Percentage Distribution of Respondents by Consequences of Late Treatment of Malaria in Children Under Five Years

Consequences	Frequency	Percentage
Might die	388	89.8
Getting convulsions	124	28.7
Condition worsens	110	25.5
Excess hot body	108	25.0
Extreme weak	78	18.1
May become anaemic	64	14.8
May develop mental confusion	59	13.7
Dehydrated	48	11.1
Growth may be affected	43	10.0
Disease may cure on its own	28	6.5

Results of Bivariate Analysis

Percentage Distribution of Respondents Taking First Treatment Action by Independent Variables

Marital status of caretakers showed a significant effect in first treatment action (p=0.028) and the percentage of caretakers taking their children to private health facility was higher among married (41%) compared to those who were not married (26%). A higher percentage (14%) of caretakers who were not married used herbs as first treatment action compared to those who were married (12%). There was no significant effect in first treatment action taken between caretakers of different levels of education (p=0.575). However, the percentage of taking the sick child to the private health facility increased with the caretaker's level of education with 34.7% of those with no education, primary education (38.2%), secondary education (38.3%) and tertiary education (52%) as shown in the Table below.

Occupation showed a significant effect in treatment actions (p=0.001) and more peasants (farmers) gave their children herbs (15%) or took them to government health facility (31%) than the non–farmer (18%). More non-farmers took their children to a private health facility (48%) than farmers (33%). Household income showed a significant effect in treatment actions (p=0.002) and the percentage of caretakers who took their children to a private health facility increased with the level of income from 37% among household earning less than 50,000 Uganda shilling per months to 41% among households earning more than 50,000 Uganda shillings per months. Decision making on children's health care had significant effect in treatment actions (p=0.011) and more caretakers who sometimes had final say in children's health care took their sick children to a private health facility (42%) as first treatment action compared to 25% of those who could never have a final say in children's health care. Age of the child showed a significant effect in actions (p=0.001) and more children aged 2 years or less were seen at private health facility (44%) than those above 2 years (32%). A bigger percentage of children with severe illness were seen at a private health facility (39%) than children with mild illness (38%).

Caretakers who perceived the illness to be malaria showed a significant effect in first treatment action (p=0.000) and the proportion of caretakers who first took their sick children to a private health facility was higher among those who perceived the illness to be malaria (39%) compared to among those who thought that the child had other illnesses (36%). More caretakers who

thought that the child had other illnesses other than malaria first gave their children herbs (23%) than those who thought that the child had malaria (8%). Type of nearest health facility to the caretaker, showed a significant effect in first treatment action (p=0.000) and 54% of caretakers who lived near a private health facility first took their children to a private health facility compared to only 17% who lived near a government health unit and first took their children to a government health unit

Table 9: Percentage Distribution of Respondents Taking First Treatment Action by Independent Variables

Variable/Action	Used Herbs (%)	Bought Medicine (%)	Took the child to: Private Health Facility (%)	Took the child to: Govt Health Unit (%)	Pearson X^2	df	P-Value
Age of caretaker							
17-29 (n=253)	13.4	21.0	39.5	26.1	1.9941	6	0.920
30-39 (n=136)	11.0	25.0	38.2	25.7			
40+ (n=43)	11.6	25.6	32.6	30.2			
Marital status							
Married (n=355)	12.1	20.3	41.1	26.5	9.0979	3	0.028
Not married (n=77)	14.3	33.8	26.0	26.0			
Education level							
None (n=72)	9.7	23.6	34.7	31.9	7.5984	9	0.575
Primary (n=277)	14.1	22.1	38.2	25.6			
Secondary (n=60)	10.0	21.7	38.3	30.0			
Tertiary (n=23)	8.7	30.4	52.2	8.7			
Occupation							
Peasant (n=285)	14.7	21.1	33.3	30.9	16.3831	3	0.001
Others (n=147)	8.2	25.9	48.3	17.7			
Household income							
> 50,000 Ug. Shs. Per month (n=202)	13.4	27.7	41.1	17.8	15.2929	3	0.002
<= 50,000 Ug. Shs. Per month (n=224)	11.6	17.9	37.1	33.5			
Have a final say on children's health care							
Never (n=87)	17.2	32.2	25.3	25.3	11.2361	3	0.011
Sometimes (n=345)	11.3	20.3	41.7	6.7			
Household size							
2-5 people (n=296)	12.8	21.0	39.2	27.0	1.6272	3	0.653
6+ people (n=136)	11.8	26.5	36.8	25.0			
Age of the child							

Variable/Action	Used Herbs (%)	Bought Medicine (%)	Took the child to: Private Health Facility (%)	Took the child to: Govt Health Unit (%)	Pearson X^2	df	P-Value
2-24 months (n=233)	15.9	17.6	43.8	22.8	16.7074	3	0.001
25-59 months (n=199)	8.5	28.6	32.2	30.7			
Severity of illness							
Mild (n=112)	19.6	25.9	37.5	17.0	11.9802	3	0.007
Severe (n=320)	10.0	21.6	38.8	29.7			
Perception of illness of the child							
Malaria (n=307)	8.1	25.4	39.4	27.0	20.0136	3	0.000
Other illness (n=125)	23.2	16.0	36.0	24.8			
Perception of cause of malaria							
Mosquitoes (n=283)	13.4	24.4	38.2	24.0	3.3532	3	0.340
Other causes (n=149)	10.7	19.5	38.9	30.9			
Type of nearest health facility							
Govt health unit (n=180)	13.3	12.2	16.7	57.8	168.2921	3	0.000
Private health unit (n=252)	11.9	30.2	54.0	4.0			

Percentage Distribution of Respondents Taking Prompt and Appropriate Treatment Action and Independent Variables

Household income showed a significant effect in taking prompt and appropriate treatment action (p=0.000) and the percentage of caretakers who took their children for treatment increased with the level of household income from 44% among households earning less than 50,000 Uganda shilling per months to 70% among households earning more than 50,000 Uganda shillings per months.

Severity of child's illness showed a significant effect in taking prompt and appropriate treatment action (p=0.013), caretakers whose children illness were thought to be severe were more likely to take prompt and appropriate treatment action (67%) compared to those whose illness were thought to be mild (53%).

Distance to the nearest health facility showed a significant effect (p=0.001) and caretakers who lived within 5km distance of a health facility were more likely to take prompt and appropriate treatment action (59%) compared to those who lived more than 5km away from a health facility (36%). Health workers being polite at the nearest health facility showed a significant effect (p=0.000) and caretakers who agreed that health workers at the nearest health facility were polite, were more likely to take prompt and appropriate treatment action (55%) compared to those who disagreed (4%). Although education level did not show a significant effect in taking prompt and appropriate treatment action (p=0.118), the percentages of caretakers taking prompt

and appropriate treatment action increased as their levels of education increased from no education (47%) to tertiary education (70%).

Although the age of caretaker did not show significant effect (p=0.319), results showed that the percentages of caretakers taking prompt and appropriate treatment action reduced as the age of caretaker's increased from 18-29 years (60%) to 40years and above (49%) in the Table below.

Table 10: Percentage Distribution of Respondents Taking Prompt and Appropriate Treatment Action and Independent Variables

	Prompt and Appropriate Treatment action				
Variable/Action	**Yes (%)**	**No (%)**	**Pearson X²**	**df**	**P-value**
Age of caretakers					
18-29 (n=253)	59.7	40.3	2.2829	2	0.319
30-39 (n=136)	54.4	45.6			
40+ (n=43)	48.8	51.2			
Marital status					
Married (n=355)	57.2	42.8	0.0463	1	0.830
Not married (n=77)	55.8	44.2			
Education level					
Tertiary (n=23)	69.6	30.4	5.8660	3	0.118
Secondary (n=60)	65.0	35.0			
Primary (n=277)	56.7	43.3			
None (n=72)	47.2	52.8			
Occupation					
Peasant/farmer (n=285)	57.5	42.5	0.1227	1	0.726
Non-farmer (n=147)	55.8	44.2			
Household income per month					
> 50,000 Ug. Shs. per month (n=202)	70.3	29.7	29.4524	1	0.000
<= 50,000 Ug. Shs. per month (n=224)	44.2	55.8			
Household size					
6+ people (n=136)	58.1	41.9	0.1059	1	0.745
2-5 people (n=296)	56.4	43.6			
No. of under-fives in the household					
2+ (n=191)	56.5	43.5	0.0223	1	0.881
1 (n=241)	57.3	42.7			
Age of the child					
2-24 months (n=233)	57.9	42.1	0.2044	1	0.651
>24 months (n=199)	55.8	44.2			
Severity of illness					
Severe (n=320)	67.0	33.0	6.1915	1	0.013
Mild (n=112)	53.4	46.6			
Perception of illness of the child					

Variable/Action	Prompt and Appropriate Treatment action				
	Yes (%)	No (%)	Pearson X²	df	P-value
Malaria (n=307)	57.3	42.7	0.0640	1	0.800
Other illness (n=125)	56.0	44.0			
Perception of cause of malaria					
Mosquitoes (n=283)	56.9	43.1	0.0010	1	0.975
Other causes (n=149)	57.1	42.9			
Distance to the nearest health facility					
<=5km (n=358)	59.2	40.8	10.7267	1	0.001
> 5km (n=58)	36.2	63.8			
Health workers polite					
Agree (n=408)	54.7	45.3	15.6749	1	0.000
Disagree (n=24)	4.2	95.8			

Relationship between First Treatment Action and Independent Variables

Age of the child showed a significant effect with caretaker's first treatment action (OR=2.353, p=0.020). Caretakers with sick children, whose age were 25 months and above used more of modern medicine (92%) than those in 2-24months (84%).

While severity of illness did not show a significant effect in actions (OR=1.335, p=0.427), caretakers whose children's illnesses were thought to be severe at the time of first treatment action were more likely to use modern medicine (90%) compared to those whose illnesses were thought to be mild (80%).

Perception of child's illness showed a significant effect in actions (OR=3.968, p=0.000) and children whose illnesses were perceived to be malaria were more likely to use modern medicine (92%) compared to other illnesses (77%).

Although occupation of the caretaker did not show significant effect in actions (OR=1.945, p=o.112), results showed that a higher percentage of caretakers who were non-farmers used modern medicine (92%) compared to the subsistence farmers (peasants) (85%).

While politeness of health workers at the nearest health facility did not show a significant effect in using modern medicine (OR=1.799, p=0.364), caretakers who agreed that health workers at the nearest health facility were polite showed a higher percentage in using modern medicine (88%) compared to those who disagreed (79%).

Although marital status of the caretakers did not show significant effect in actions (OR=0.601, p=o.289), results showed that a higher percentage of caretakers who were married used modern medicine (88%) compared to those who were not married (86%) as shown in the Table below.

Table 11: Relationship between First Treatment Action and Independent Variables

Variable/Action	Used medicine (%)	Used herbs (%)	Odds ratio	P-value
Age of caretaker				
40+ (n=38)	89.0	11.0	1.127	0.837
30-39 (n=136)	88.4	11.6	1.074	0.855
17-29 (n=253)	86.6	13.4	1.000	
Marital status				
Not married (n=77)	85.7	14.3	0.601	0.289
Married (n=355)	87.9	12.1	1.000	
Education level				
Tertiary (n=23)	91.3	8.7	1.221	0.887
Secondary (n=60)	90.0	10.0	1.145	0.770
Primary (n=277)	85.9	14.1	0.803	0.655
None (n=72)	90.3	9.7	1.000	
Occupation				
Non-farmer (n=147)	91.8	8.2	1.945	0.112
Peasant/farmer (n=285)	85.3	14.7	1.000	
Household income				
> 50,000 Ug. Shs per month (n=202)	86.6	13.4	0.496	0.065
<= 50,000 Ug. Shs per month (n=224)	88.4	11.6	1.000	
Household size				
6+ people (n=136)	88.2	11.8	1.054	0.888
2-5 people (n=296)	87.2	12.8	1.000	
Age of the child				
25-59 months (n=199)	91.5	8.5	2.353	0.020
2-24 months (n=233)	84.1	15.9	1.000	
Severity of illness				
Severe (n=320)	90.0	10.0	1.335	0.427
Mild (n=112)	80.4	19.6	1.000	
Perception of child's illness				
Malaria (n=307)	91.9	8.1	3.968	0.000
Other illness (n=125)	76.8	23.2	1.000	
Perception of cause of malaria				
Mosquitoes (n=283)	86.6	13.4	0.969	0.931
Other causes or don't know (n=149)	89.3	10.7	1.000	
Distance to the nearest health facility				
<=5km (n=358)	88.6	11.4	1.250	0.641

Variable/Action	Used medicine (%)	Used herbs (%)	Odds ratio	P-value
> 5km (n=58)	87.9	12.1	1.000	
Health workers polite				
Agree (n=408)	88.0	12.0	1.799	0.364
Disagree (n=24)	79.2	20.8	1.000	

Relationship between Time Lag from Onset of Symptoms of Malaria to Appropriate Treatment Action and Independent Variables

Household income per months, perception of cause of malaria, distance to the nearest health facility and politeness of health workers at the nearest health facility were found to be significantly associated with taking prompt and appropriate treatment action as shown in the Table below. In household where income was more than 50,000 Uganda shillings per months, the odds of taking prompt and appropriate treatment action by caretakers were 3.8 times the odds of taking prompt and appropriate action by caretakers whose household's income was less than 50,000 Uganda shillings per months (OR=3.800,P=0.000). The odds of taking prompt and appropriate treatment action by caretakers agreeing that health workers at the nearest health facility were polite were 1.4 times the odds of taking prompt and appropriate treatment action by caretakers who disagreed(OR=1.416, P=0.022).

The odds of taking prompt and appropriate treatment action by caretakers perceiving the cause of malaria to be mosquitoes were 1.8 times the odds of taking prompt and appropriate treatment action by caretakers who perceived other causes (OR=1.767, P=0.020). Although severity of illness did not show a significant effect in actions (OR=1.393, p=0.237), the odds of taking prompt and appropriate treatment action by caretakers whose children's illness was thought to be severe, were 1.4 times the odds of taking prompt and appropriate treatment action by caretakers whose children's illness was thought to be mild.

The odds of taking prompt and appropriate treatment action by caretakers living within 5km distance of a health facility were 4.2 times the odds of taking prompt and appropriate treatment action by caretakers living more than 5km away from a health facility (OR=4.167, P=0.000).

Table 12: Relationship between Time Lag from Onset of Symptoms of Malaria to Appropriate Treatment Action and Independent Variables

	Prompt and Appropriate Treatment action			
Variable/Action	**Yes (%)**	**No (%)**	**Odds Ratio**	**P-value**
Age of caretakers				
40+ (n=43)	48.8	51.2	1.634	0.232
30-39 (n=136)	54.4	45.6	1.637	0.056
18-29 (n=253)	59.7	40.3	1.000	
Marital status				
Not married (n=77)	55.8	44.2	0.674	0.208
Married (n=355)	57.2	42.8	1.000	
Education level				
Tertiary (n=23)	69.6	30.4	2.622	0.107
Secondary (n=60)	65.0	35.0	2.407	0.042
Primary (n=277)	56.7	43.3	1.534	0.179
None (n=72)	47.2	52.8	1.000	
Occupation				
Non-farmer (n=147)	57.5	42.5	1.640	0.054
Peasant/farmer (n=285)	55.8	44.2	1.000	
Household income per month				
> 50,000 Ug. Shs per month (n=202)	70.3	29.7	3.800	0.000
<= 50,000 Ug. Shs per month (n=224)	44.2	55.8	1.000	
Household size				
6+ people (n=136)	58.1	41.9	1.149	0.585
2-5 people (n=296)	56.4	43.6	1.000	
No. of under-fives in the household				
1 (n=241)	57.3	42.7	1.174	0.491
2+ (n=191)	56.5	43.5	1.000	
Age of the child				
>24 months (n=199)	55.8	44.2	0.957	0.845
2-24 months (n=233)	57.9	42.1	1.000	
Severity of illness				
Severe (n=320)	67.0	33.0	1.393	0.237
Mild (n=112)	53.4	46.6	1.000	
Perception of illness of the child				
Malaria (n=307)	57.3	42.7	1.030	0.908
Other illness (n=125)	56.0	44.0	1.000	
Perception of cause of malaria				
Mosquitoes (n=283)	57.1	42.9	1.767	0.020
Other causes or don’t know (n=149)	56.9	43.1	1.000	

	Prompt and Appropriate Treatment action			
Variable/Action	**Yes (%)**	**No (%)**	**Odds Ratio**	**P-value**
Distance to the nearest health facility				
<=5km (n=358)	59.2	40.8	4.167	0.000
> 5km (n=58)	36.2	63.8	1.000	
Health workers polite				
Agree (n=408)	95.8	4.2	1.416	0.022
Disagree (n=24)	79.2	20.8	1.000	

Results of Multivariate Analysis using Logistic Regression

The factors found to be associated with caretaker's first action in treatment of malaria in children under five years in Kashari County were perception of the illness of the child and age of the child.

The odds of using modern medicine by caretaker's perceiving the child's illness to be malaria was 4 times the odds of using modern medicine by caretaker's perceiving to be other diseases (OR=3.963, p=0.000).

The odds of using modern medicine by caretakers, whose sick children were above 24 months of age, were 2.4 times the odds of using modern medicine by caretakers with sick children of age below 24 months (OR=2.350, p=0.020) as shown in Table below.

Table 13: Predictors of Caretakers' First Action in Treatment of Malaria in Children under Five: use of Modern Medicine Versus Herbs (n=410)

Factors	Odds Ratio	z	P>|z|
Age of Caretaker			
30-39 years	0.930622	-0.18	0.855
18-29 years	1.126857	0.21	0.837
Marital Status			
Married	0.6006747	-1.06	0.289
Level of Education			
Primary	1.24574	0.45	0.655
Secondary	0.818694	-0.29	0.770
Tertiary	0.873320	-0.14	0.887
Occupation of Caretaker			
Peasant (Subsistence Farmer)	1.944534	1.59	0.112
Household Income			
> 50000 Ug. Shs /month	2.018255	1.84	0.065
Household Size			
6+ people	1.053889	0.14	0.888
Age of the Child			
> 24 months	2.350264	-2.33	0.020
Severity of Illness			
Mild	1.334718	0.79	0.427
Perception of Illness of the Child			
Malaria	3.962563	-3.88	0.000
Perception of Cause of Malaria			
Mosquito	1.031859	0.09	0.931
Distance to the Nearest Health Facility			
<= 5 Km	0.7998106	-0.47	0.641
Health Workers Being Polite			
Agree	1.7998453	-0.91	0.364

Number of obs = 410

LR chi2 (15) = 31.79

Prob > chi2 = 0.0069

Log likelihood = -130.10594

Predictors of Time lag from Onset of Symptoms of Malaria to Appropriate Treatment Action (n=410)

Distances to the nearest health facility, household income, politeness of health workers at the nearest health facility and perception of cause of malaria were found to be significant predictors of time lag to appropriate treatment action.

The odds of taking appropriate and prompt treatment action by respondents living within 5km distance to the nearest health facility were 4.2 times the odds of taking appropriate and prompt treatment action by respondents who lived far (>5km) from a health facility(OR=4.173, p=0.000).

The odds of taking appropriate and prompt treatment action by caretakers whose household's income was more than 50,000 Uganda shillings per months, were 3.8 times the odds of taking appropriate and prompt treatment action by caretakers whose household's income was less than 50,000 Uganda shillings per months (OR=3.781, P=0.000).

The odds of taking appropriate and prompt treatment action by caretakers' agreeing that health workers at the nearest health unit were polite were 2.7 times the odds of taking appropriate and prompt treatment action by caretakers who thought that the health workers at the nearest health unit were not polite (OR=2.743, P=0.023).

The odds of taking appropriate and prompt treatment action by caretakers perceiving the cause of malaria to be mosquitoes were 1.7 times the odds of taking appropriate and prompt treatment action by caretakers who perceived the cause of malaria to be other causes (OR=1.738, P=0.023) as shown in the Table below.

Table 14: Predictors of Time lag from Onset of Symptoms of Malaria to Appropriate Treatment Action (n=410)

Factors	Odds Ratio	z	P>|z|
Age of Caretaker			
30-39 years	0.610776	-1.91	0.056
18-29 years	0.644767	-1.09	0.277
Marital Status			
Married	0.658473	-1.34	0.180
Level of Education			
Primary	1.52188	1.32	0.188
Secondary	2.420615	2.04	0.041
Tertiary	2.575364	1.59	0.113
Occupation of Caretaker			
Peasant (Subsistence Farmer)	1.608091	1.86	0.062
Household Income			
> 50000 Ug. Shs /month	3.780994	5.12	0.000
Household Size			
6+ people	1.110444	0.42	0.674
Age of the Child			
> 24 months	0.951418	-0.22	0.826
Severity of Illness			
Mild	1.413176	1.24	0.216
Perception of Illness of the Child			
Malaria	0.9618342	-0.15	0.879
Perception of Cause of Malaria			
Mosquito	1.7379208	-2.27	0.023
Distance to the Nearest Health Facility			
<= 5 Km	4.1734885	-4.21	0.000
Health Workers Being Polite			
Agree	2.7434842	-2.27	0.023

Number of obs = 410
LR chi2 (15) = 73.06
Prob > chi2 = 0.0000
Log likelihood = -245.07322
Pseudo R2 = 0.1297

CONCLUSION AND RECOMMENDATION

Conclusion

Nearly all caretakers in this study were females with more than 8 in 10 (88%) being mothers of the children on whom illness interviewed were conducted and aged between 18 and 68 years.

Eight in ten (82%) caretakers were married and almost 5 in 10 (59%) were less than 30 years of age. Subsistence farming was the main occupation (66%) and more than 4 in 10 (43%) farmers worked mainly on someone else's land. This has direct implication on incomes and affordability of proper anti-malarial treatment. The study also has revealed that less than 5 in 10 (46%) households earned more than Uganda shillings. 50,000 per months. The proportion of respondents agreeing that anti-malarial drugs were always available at the nearest health facility was higher for those who lived near a private health facility 68% than the government health unit 30 %.

Less than 6 in 10 (56%) caretakers lived in houses whose floors were earth floors. Less than 2 in 10 (15%) could not read. More than 8 in 10 (83%) lived within 5km distance to a health facility implying good access to health care facilities. In a rural community in southwestern Uganda, Tumwesigire and Watson (2002) reported a higher proportion of households that were living within 5km to a health facility.

Knowledge and Perception of Cause, Symptoms and Complications of Malaria

Less than 7 in 10 (66%) of the caretakers had good knowledge of the cause of malaria and reported mosquitoes as the cause while the rest either had mixed perceptions or did not know the cause at all. This may have implication on management. The study also revealed that some children were given herbs or given modern medicine other than anti-malarial drugs. Nearly all caretakers mentioned hot body (96%) as symptom of malaria, which is an important clinical symptom in home knowing management of malaria. However when caretakers were asked about the symptoms the child had, the proportion reporting hot body was lower than those who knew it as a symptom of malaria. This difference may be showing the gap in recognition of hot body and knowing it as a symptom. On the other hand it may be true that these children did not have hot body at the time they were noticed as being sick since other symptoms may precede hot body.

The Home Based Management of Fever (HBMF) programme has identified key danger signs, which the drug distributors are reminded to look out for when children are brought to them. These include convulsions, loss of consciousness, severe vomiting, child not able to drink or breast feed, extreme weakness (child unable to stand or sit), difficulty in breathing and anemia. This study has shown that knowledge of danger signs of malaria among caretakers in Kashari County was generally poor. Less than 1 in 10 (7%) caretakers mentioned convulsions as a symptom of malaria and less than 1 in 10 (7%) reported it as a danger sign. More than 5 in 10 (58%) caretakers did not know the cause of convulsions and more than 6 in 10 (68%) treated the convulsing child with herbs. This poor knowledge combined with poor management can lead to unnecessary severe complications and may contribute to increase in childhood mortality.

Treatment Actions in Management of Malaria in Children Under Five Years

More than eight in ten (85%) respondents took the first treatment action within 24 hours of recognition of fever. Most caretakers gave some form of treatment to their young children within one day of onset of fever. Deming *et* al. (2002) in 1989 reported similar findings in Togo, West Africa and Nshakira *et* al. (2002) in Eastern Uganda. All these studies indicate that home treatment of childhood illness such as malaria is usually prompt but may not be appropriate.

Higher percentages of caretakers were reported as using modern drugs compared to herbs. Generally more than 8 in 10 (88%) caretakers used a modern medicine only to treat their children's illness and less than 2 in 10 used herbs (13%) only. This could be a true increase of

modern medicine to treat malaria since the campaign against malaria has intensified in the recent past with the MOH increasing health education through mass media.

More than six in ten (65%) caretakers first took their children to a health facility. Less than three in ten (26%) obtained treatment from a government health unit. Results of the current study show that caretakers (more than five in ten) first obtain treatment from private health care provider which is consistent with results of other studies in UgandaTumwesigire and Watson (2002) in the south west and Nshakira *et* al. (2002) in the east. The study has also shown that the majority of caretakers lived near a private health facility than a government health unit.

Choice of first treatment action was mainly based on severity of illness and availability of money while the main reason for choice of second treatment action was failure of the first treatment. The odds of using modern drugs to treat sick children, whose illness was thought to be severe, were 1.4 times the odds of using modern drugs on those whose illness was thought to be mild. When children have mild illness, caretakers tend to think that they can be treated at home with over-the-counter drugs and improve. However when the children are severely ill the parents take them to health facilities where they think the child will be properly managed. Buying medicine from a nearby drug shop may cost less and does not involve transport costs. Getting treatment from other sources may be more expensive. When caretakers who are mostly mothers do not earn an income and in the absence of financial support, cheap treatment options become more appealing. Similar findings have been reported by UNICEF (1994) in Mpigi district in Uganda and by Tolhurst (2002) in Ghana West Africa.

The percentage of caretakers taking their children to private health facility was higher among married (41%) compared to those who were not married (26%). This could be because of financial support they receive from the spouse. It is also possible that not only do spouse provide financial support but also participate in the decision making of how the child should be treated. People who are employed in other occupations other than agriculture in a rural setting have a financial advantage over the subsistence farmers since their incomes may be more stable and sometimes higher than that of subsistence farmers (peasants).

The odds of using modern medicine to treat their sick children by caretakers' agreeing that the health workers at the nearest health unit were polite were 1.8 times the odds of using modern medicine by caretakers who thought that the health workers at the nearest health unit were not polite. Politeness of health workers is one of the critical items in quality of health services (Ranklin *et* al. (2002)). When health workers are polite, they encourage their clients to use their services the next time they need them as Andaleb (2001) reported that perceptions of service quality might shape confidence and subsequent behavior with regard to choice and usage of available health care facilities.

Appropriate and Prompt Treatment Action

Less than 6 in 10 (57%) caretakers took appropriate treatment action within 24 hours of recognition of fever in their children under five years. The proportion of children under five in Kashari County receiving prompt and appropriate anti-malarial treatment is still below the target of 60% of Ministry of Health.

The odds of taking appropriate and prompt treatment action by respondents living within 5km distance to the nearest health were 4.2 times the odds of taking appropriate and prompt treatment action by respondents who lived far (>5km) from a health facility. The study by Lind blade *et* al. (2000) reported a slightly higher figure, probably because it was done in epidemic area and treatment seeking for malaria may be different for people in areas of different malaria transmission. The odds of taking appropriate and prompt treatment action by caretakers

perceiving the child's illness to be malaria as the result of bite by mosquitoes were 1.7 times the odds of taking appropriate and prompt treatment action by caretakers perceiving the child's illness to be malaria as the result of other causes.

The odds of taking appropriate and prompt treatment action by caretakers whose household income was more than 50,000 Uganda shillings per months were 3.8 times the odds of taking appropriate and prompt treatment action by caretakers whose household's income was less than 50,000 Uganda shillings per months.

Summary of Conclusions

More than six in ten caretakers perceived mosquitoes as the cause of malaria. Nearly all caretakers knew hot body as a symptom of malaria and more than five in ten did not relate convulsions to malaria. Less than one in ten reported convulsions as the danger sign for malaria. Less than three in ten caretakers first took their sick children to a government health unit and more than five in ten first obtained treatment from the private health care provider. More than eight in ten caretakers used modern medicine to treat their children with malaria. Less than six in ten caretakers took prompt and appropriate treatment action. Caretakers who were non-farmers, whose children were of age greater than 24 months and perceived the illness of their children to be malaria, were more likely to first use modern medicine to treat their children with malaria. Caretakers who lived within 5km distance of a health facility, household incomes greater than 50,000 Uganda shillings, agreed that health workers at the nearest health unit were polite and perceived the cause of malaria to be mosquitoes were more likely to take prompt and appropriate treatment action.

Recommendations

The Ministry of Health should invest in more strategies that improve caretaker's choice of government health units as first treatment option.

Possible measures include sensitization of health workers about their client care and communication.

Since less than 2 in 10 (27%)of the caretakers did not know the cause of malaria ,the Ministry of Health should sensitize and educate the caretakers of the children under five years the causes and danger signs of malaria so that they can put measure to prevent it.

In addition more than 5 in 10 (54%) of the caretakers did not know the names of the drugs given to the sick children, this was dangerous to the life of the children. The health workers should therefore tell, educate and sensitize the caretakers the names and dangers of giving the sick children the drugs they don't know the names.

Government should make sure that anti-malarial drugs are availed in the government health units.

The Ministry of Health sensitization campaign against malaria should target caretakers of children under five years and emphasize recognition of severe malaria and danger signs and prompt treatment actions.

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