Malaria: Perceptions and Treatment Practices Among Mothers of Children Under 10 Years in Rural Ghana

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vorgelegt von Eckhardt, Stefan
aus Frankfurt am Main

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Aus dem Institut für Hygiene
Direktor/Leiter: Professor Eikmann

Gutachter: Prof. Dr. Korte

Gutachter: Frau Prof. D. Fischer

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1. Background

Malaria is one of the diseases which contributes significantly to morbidity and mortality in Africa. 90% of the estimated 300-500 Million malaria cases per year worldwide occur in sub-Sahara Africa. There are least one million deaths attributed to malaria per year in Africa (WHO, 2002). Children are the main casualties from the disease. The vast majority of the malaria death toll is especially among poor African children and most of them younger than 5 years old (WHO/Unicef 2003).

The costs of malaria are also enormous when measured in economic terms. Countries with a high number of cases of malaria are among the very poorest in the world, and typically have very low rates of economic growth; many have experienced declines in living standards in the past thirty years. Malaria has played a significant role in the poor economic performance of these countries. According to statistical estimates, sub-Saharan Africa's GDP would be up to 32% greater today if malaria had been eliminated 35 years ago. This would be the equivalent of up to $100 billion added to sub-Saharan Africa's current GDP of $300 billion. This extra $100 billion would, by comparison, be nearly five times greater than all development aid provided to Africa in the year 2000 (Sachs, 2002)

A review by Brinkmann and Brinkmann (1991) concluded that malaria is responsible for 20%-50% of all admissions in African health services, although only 8%-25% of all persons with malaria seek treatment at the public health facilities. The same review estimated, that the case fatality rate for malaria ranges from to 2-24%. Data for some countries is showing an increase in the annual incidence rates for malaria (increase of: 7.3 % for Zambia, 10.4 % for Togo, 21.0% for Rwanda). In Senegal the malaria related mortality of children < 10 years has risen 5.5 fold from 1984/85 to 1995 (Trape, 2001).

In 1955, the Eighth World Health Assembly launched a campaign to eradicate malaria by centralized programs based on the widespread use of DDT and the use of antimalarials in humans to eradicate the mosquito vector and interrupt the transmission of malaria. As a result malaria was to be eradicated from all participating countries in 1967.

However, the campaign was launched in only three countries in tropical Africa, since it was not considered feasible in the others. Vector control interventions in most of these excluded regions were considered ineffective because of the intensity of

transmission and the limited health infrastructure to support such a program. In the participating countries resistance against DDT and Chloroquine brought program activities to an end in 1969. In the following years, malaria started a gradual and sometimes even dramatic resurgence (Trigg et al. 1998).

Over the last two decades morbidity and mortality from malaria have been increasing, due to deteriorating health systems, growing drug and insecticide resistance, periodic changes in weather patterns, civil unrest, human migration and population displacement (World Bank, 2001).

Unfortunately, up to now there is no vaccine against malaria. More than a dozen candidate vaccines are currently under development, some of them in clinical trials. The hope is that an effective vaccine will be available within the next 7-15 years (WHO, 1998a).

Yet some protection against malaria is possible. Trials with insecticide impregnated bed nets in the Gambia, Ghana, Kenya and Burkina Faso have shown that mortality can be lowered by 15-35% (Snow et al,.1988 ,Alonso et al. 1991; D'Allessandro et al. 1995; Binka et al. 1998, Nevill et al. 1996, Diallo et al. 1999). A review of several studies looking at all published results in 1995 found insecticide treated bed nets to decrease the incidence rate ratio by approximately 50% in field trials performed (Choi et al.1995).

In view of the high burden of disease, WHO, together with UNDP;UNICEF and the World Bank, agreed in Amsterdam in 1992 to launch its initiative Roll Back Malaria (RBM) in 1998, based on the Global Malaria Control Strategy (Nabarro, 1999). This strategy is considerably different from the approach used in the eradication era, as it focuses on reducing the burden of disease and mortality rather than parasite control and is rooted in the primary health care approach and emphasizes on decentralized, flexible programs (Trigg et al. 1998).

The initiative intends to halve the suffering caused by malaria in 2010 with the existing malaria control tools.

The four central RBM strategies are:

- Rapid and effective treatment of persons with malaria at home or in a health facility within 24 hours of onset of symptoms
- Widespread use of insecticide-treated materials and other appropriate methods to limit human-mosquito contact

- Prevention of malaria in pregnant women in high transmission areas
- Detection and appropriate response to epidemics within two weeks of onset

These Core Strategies were selected because of their proven efficacy and effectiveness (World Bank, 2001).

Besides major strategies to control malaria through strengthening the national health systems, one of the main objectives in the initiative is to develop a broader approach including the private health sector (NGO´s, drug vendors, traditional healers). This also includes further support for community based action against malaria, with the main focus on availability of insecticide treated mosquito nets and the access to early effective treatment for all children with malaria in order to reduce the toll of malaria on young children (WHO, 1998b).

Nabarro (1999), WHO project manager for the Roll Back Malaria campaign, emphasizes that the center of the initiative should be the community. Therefore the control programs have to be designed to reflect local realities.

Prompt and effective treatment of malaria is a critical element of malaria control (WHO, 1993). In Africa, where most malaria is due to *Plasmodium falciparum* and potentially fatal, early and effective treatment could save many lives. (WHO/Unicef, 2003).

This key element is backed by data from McCaslin et al. (1994), which shows that prognosis of outcome is worse if treatment is delayed and Greenwood et al. (1987), who found that many deaths occur within 48 hours of the onset of the symptoms.

In general, the diagnosis of malaria is based on the clinical symptoms and the presence of malaria parasites.

In holoendemic malaria areas, the presence of malaria parasites might be only marginally useful as a diagnostic tool, as the majority of the population, including asymptomatic individuals, have parasitaemia most of the time (WHO, 2000).

In Africa, diagnostic tools such as microscopes may be lacking and the diagnosis of malaria is generally based on clinical criteria (Greenberg et al. 1989).

Taking this into consideration, in areas of intense transmission WHO therefore recommends, as part of the strategy of Integrated Management of Childhood

Illnesses (IMCI), all under-5's with fever to be presumptively treated with antimalarials (Nicoll, 2000).
The RBM program promotes the WHO guidelines "Integrated Management of Childhood Illness" as a key intervention for improving the management of children with fever, either in the health facility or at home (World Bank, 2001).

Very often the first action against childhood fever is taken at home, using drugs bought in shops (Van der Geest, 1987; Snow et al. 1992; Foster 1995; McCombie 1996; Miguel et al. 1998). A recent study in Uganda (Deressa et al. 2003) found home treatment the first line of action. 46,7 % of the cases took antimalarial drugs at home before visiting a health facility.
Gardiner et al. (1984) showed, that in Southern Ghana malaria self-treatment with drugs occurs in 87% of the urban communities and 94% of the rural communities.

In rural communities, the access to the formal health facilities is very difficult. However, not only the poor accessibility contributes to self-treatment, but economic factors like transport costs, loss of work time and the costs at the health facility itself; be it in form of user fees or "under the counter motivations", or a combination of both. In Cameroon, treatment costs at the hospital were found to be 10 times higher than self medication with drugs purchased in shops (Louis et al. 1992). After an increase of user fees in the formal health sector in Ghana in 1985, the attendance at health stations dropped to a quarter of 1984 levels (Waddington et al. 1989).
Another reason for the low attendance rates at formal health facilities is the poor quality output for which a variety of direct and indirect reasons have been identified (Foster, 1995; Ruebush et al. 1995; Mwenesi et al. 1995; Ofori-Adjei et al. 1996).
Considering the need for early adequate treatment, the poor accessibility of health posts and the economic situation, especially in sub-Saharan Africa with 90% of the malaria cases world-wide, make self-medication and treatment at home often the only chance for receiving any kind of treatment.
In Ghana, the setting of this study, malaria is prevalent during the entire year.
In a survey conducted in 1986/87, parasitaemia in the central region of Ghana ranges from 19.6–33.3% in the dry season and 33.0–44.0% in the wet season (Afari et al.1993). Recent studies in the Asante region, the setting of this study, have shown

a malaria parasite prevalence of up to 87% in children at the end of the dry season. *Plasmodium falciparum* accounted for 92% of these infections (Brown et al. 2000).
Malaria accounts for about 32-42% of all outpatient admissions in Ghana and is the most common cause of death among children below 5 years (Ahmed, 1989). An estimated 8% of all certified childhood deaths can be accounted to malaria (Ahmed, 1989). Generally the picture of malaria mortality and morbidity in Ghana is scanty.
The use of bed nets is not common (4.4%), as shown by Aikins et al. (1994).
The Health system in Ghana is one of the so-called “cash and carry” health systems, forcing patients attending public health facilities to pay for whatever services and drugs (Biritwum, 1994).
The first line treatment for uncomplicated malaria in Ghana is Chloroquine, and some hospitals use Chloroquine as the drug of choice for the treatment of severe malaria.
As mentioned above, self-medication in Ghana is common.
Studies have shown that the quality of home treatment is often poor (Deming et al. 1989; Agyepong, 1992). The process of illness recognition, treatment seeking, referral practices and the treatment itself is poorly understood.
In order to improve home treatment, there is a need to understand the diagnostic criteria used in certain environments to identify malaria, and to increase knowledge about malaria and the treatment seeking patterns to enable them to identify the best way of implementing early diagnosis and treatment at home, in order to improve mortality and morbidity at community level.
Gender issues seem to have been neglected in recent studies. The role of the male caretaker (spouse of the mother) of the sick child may play a more distinct role in treatment decisions than previously assumed, especially as there seems to be economic influence on the choice of treatment; the male spouse is very likely to be involved in financial aspects of the family. Most studies focus only on the mother of the sick child, whilst the male spouse is left out.
Furthermore, the improvement of home treatment, e.g. through the training of shopkeepers, which was shown feasible with a significant impact (Marsh et al. 1999), is complicated through growing parasite resistance to antimalarials especially Chloroquine.

This paper tries to determine the treatment seeking behavior, as well as perceptions of malaria used as diagnostic criteria and judgment on the severity of malaria. The

quality of drug treatment in detail is investigated (self medication and outpatient treatment at official health providers) and compared to the treatment standards. Factors contributing to the actual treatment seeking behavior, in particular internal household decision dynamics among mothers and fathers, are analyzed.

2. Methods

2.1 Study Design

The study was designed as a cross-sectional survey. This study combined both qualitative and quantitative data collection methods to provide a broad understanding of factors and the context influencing mothers´ and fathers´ definition and treatment of childhood malaria. The strengths of quantitative methods are that they produce factual, reliable outcome data that are usually generalizable to some larger population. The strengths of qualitative methods as e.g. focus group discussions and in depths interviews, are that they generate rich, detailed, valid process data that usually leaves the study participants' perspectives intact. The combination of qualitative and quantitative data collection methods is viewed as complementary, assuming that weaknesses in either would be compensated by the other (Steckler et al. 1992; Yach, 1992). As qualitative methods focus group discussions were conducted. The quantitative tools used were a micro-census of the study population, the village information concerning structural issues (distances, number of drug shops, drug peddlers, schools etc.) and a structured interview with open-ended questions. This questionnaire was divided into different modules: a caretaker, a husband and a "sick" child module.

All mothers and fathers of children below 10 years identified through the micro-census of the study area were included in the study.

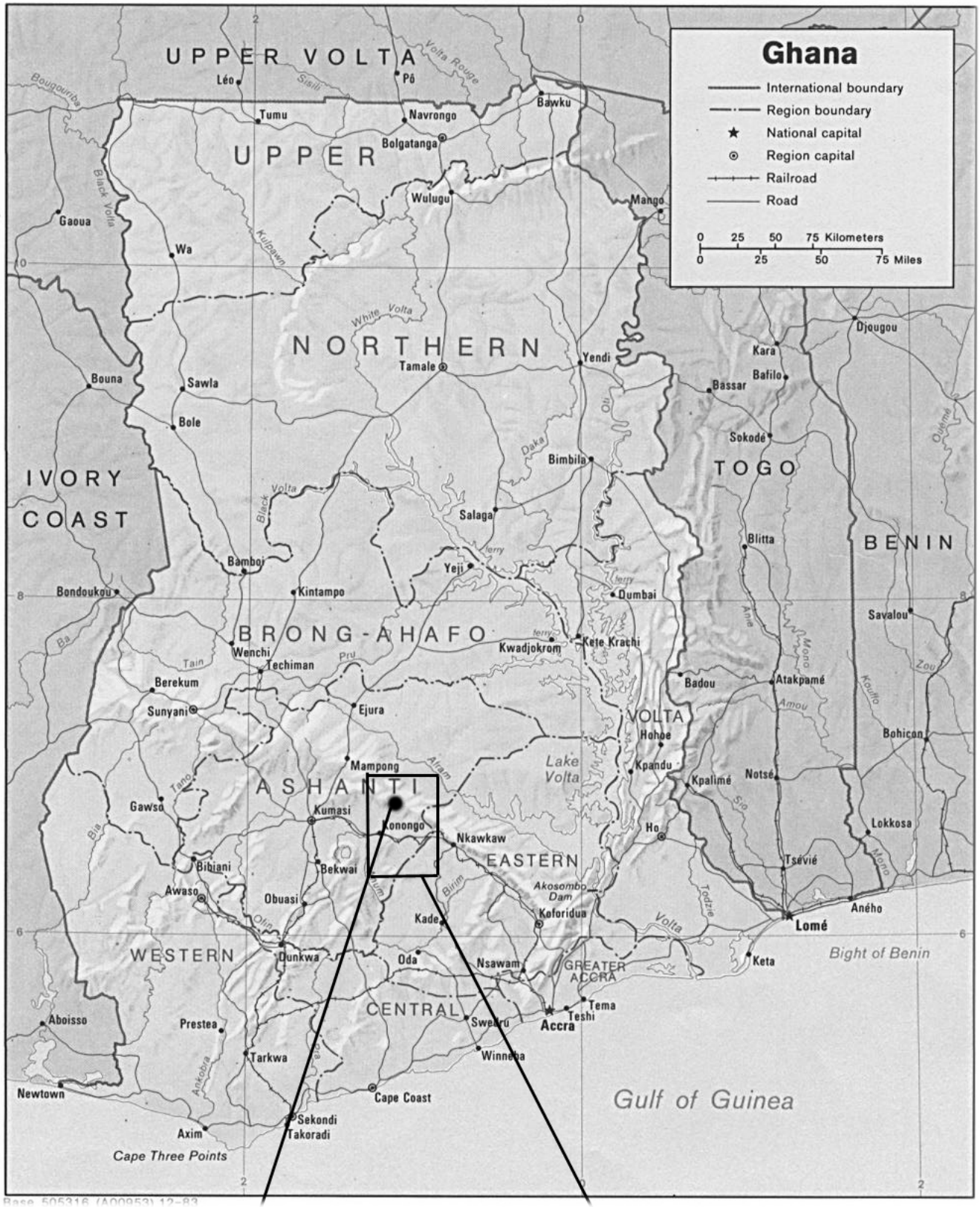
2.2 Study Site

The study was carried out in the Juansa and Agogo sub-districts of Asante Akim North District in the Asante Region of Ghana. The Asante Akim North district is a holoendemic malaria area. In the Asante Region, an overall prevalence of parasitaemia of 49.72-50.72 % was found in February – April 1998 with *Plasmodium falciparum* as the predominant species (Brown et al. 2000). At the District Hospital Outpatient Department malaria counts for the highest number of all the diseases (District Report, 1999).

Agogo town, the base of the research team, is situated about 80 km from Kumasi, the second largest city of Ghana, and 30 km off the main road from Accra to Kumasi. The tarmac road leading to Agogo is a dead end road.

The two sub-districts mainly consist of secondary-forest environment.
The rainy season usually lasts from April to November with an average monthly rainfall of 173,1 mm during this time in Agogo town in 1999 (official data from the Kumasi meteorological institute).
The Official Health Sector consists of one Mission Hospital (District Hospital till 1999) in Agogo town and two Health Centers in each of the two sub-districts. The Health Centers are staffed with a nurse or a medical assistant. Only the hospital is equipped with a laboratory.
Furthermore, there are two Maternal and Child Health Centers in the Agogo sub-district and one in Juansa sub-district; each of them is attached to one of the health facilities mentioned above. There are 18 trained Traditional Birth Attendants (6 in Agogo Sub district, 12 in Juansa Sub district) (District Report, 1999).
Besides at the hospital dispensary, drugs can be purchased at 12 licensed chemical stores in Agogo sub-district, which are all located in Agogo town, and 11 licensed chemical stores in Juansa sub-district.
A pharmacy opened in Agogo in November 1999.
In-officially, there are reports about illegally operated chemical stores in the villages as well as reports about the so-called drug peddlers, who visit the villages by bicycle.
74 villages (58 in Agogo and 24 in Juansa) were identified even though official records mention only 40 villages in this area.
49 of these villages were located more than 5 km away from the nearest Health Post. The longest distance to the next Health Post was 32 km.
12 of these villages were situated more than 40 km away from the Agogo Hospital (longest distance 53 km) and only two villages were situated within a range of 10 km from the hospital.
1 village was situated on the main tarmac road with easy access to public transport.
Accessibility to some of the study villages was extremely difficult. During the rainy season 35 of the 74 villages were only accessible by motorbike. 7 of the 35 villages could only be reached by canoe. All of these 35 villages, with difficult accessibility were located in the Agogo sub-district, in the so-called Avram Planes bordering the Avram River.

Figure 1: **Map of Ghana**



2.3 Study Population

The estimated population of the study area (Juansa and Agogo subdistrict including Agogo town), based on projections of a 1984 official census, was 80,500. The main ethnic groups in the area are tribes from Akan origin, the Ewe and tribes from northern Ghana, which have the same language origin (Konkomba, Dagarti, Frafra, Moshi, Grushi, Dagomba etc).There is no official figure available on the distribution of the tribes among the population.

The main source of income is farming.

The study included all villages in Juansa and Agogo sub-district with a distance of more than 5 km to the nearest hospital. Subsequently, Agogo town and one close-by suburb were excluded from the study.

In 1999, the total population of the study villages included in the study was altogether 19,706 (in official census/own census data).

All families of that population with children below 10 years were targeted for the questionnaires.

2.4 Data Collection

2.4.1 Community Entry

Before the start of the actual data collection, the health officials on regional and district level were informed and involved in the study. In collaboration with the regional and district authorities, a letter informing the village chiefs and assemblies about the project was sent to the communities. Later, every village was visited and the project was introduced to the village chiefs, the elders and the community itself. The consent of the inhabitants regarding the project was sought and given at these community meetings.

2.4.2 The Micro-Census

A micro-census was conducted in all of the villages included in the study. Therefore village workers were recruited in each of the villages and trained on a specially designed house listing form (Annex).

The information gathered through the form was the name of the Household Head, the names of all the other members, their ages, sex, ethnic group, occupation, education

and their relationships within the household. Each individual was given an identity number.
Two days after the initial training of the village worker, a supervision visit was conducted. Usually after one week the data was collected and examined by the responsible fieldworker, and later by his supervisor.

2.4.3 The General Village Information

Information on each village was collected. All distances of the villages to the closest health post and to the closest hospital were measured in km and traveling time. The fieldworkers collected GPS data of the village center, river crossings and road junctions. During the procedure of community entry, information was gathered on drug shops in the village and drug peddlers (including type of drugs available and frequency of visits), Traditional Birth Attendants, Traditional Healers and Schools for each village.

2.4.4 The Focus Group Discussion

The approach used in the Focus Group Discussion was modeled on the procedure described in “The Malaria Manual” by Agyepong et al.(1995).
In order to obtain a broad spectrum of information and to be able to develop an adequate questionnaire, Focus Group Discussions were carried out. The objectives of the discussion were: Perceptions of malaria and the terminology in the corresponding local language, differentiation of severity, treatment strategies for uncomplicated and complicated malaria, costs, and finally the process of decision making.
According to these objectives a semi-structured interview topic guide was developed and translated into the local language.
Besides the knowledge gained pertaining to the objectives, it was essential to find out and to determine how the questionnaire was to be designed and which terminology had to be used.
The Focus Group team consisted of one moderator and one note-taker, who both spoke the local dialect (Twi) and English. In addition, a tape recording was made. The topic guide developed was practiced and pre-tested for one week preceding the

discussions, in six English sessions and four sessions in the local language, among villagers not participating in the study.
Each Group consisted of 6-9 participants and the Discussion was to last a maximum of 90 minutes.The discussions were held in the villages of the participants. The villages were within a range of 8-15 km distance from the nearest Health Post.
Inclusion criteria was to be caretaker of at least one child <10 years.
Caretaker was defined as the person who is bathing, feeding, clothing and taking the children to school (Ahorlu et al, 1997).
For the males is study, caretaker was defined as the male person who recognizes the child as his child.
Apart from the criterion „at least 1 child < 10 years“, the group was unstructured, to get as broad of a spectrum of information as possible.
For each of the three main ethnicities (Akan, Ewe, and Northern Tribes) in the study area, two Focus Group Discussions were carried out; one with the females and one with the males.
According to above mentioned criteria, the participants for each village were randomly selected. The micro-census data was used to compile the families with at least one child < 10 years in that village. From these families 9 female and 9 male participants were randomly drawn to take part in the Focus Group Discussions. Three more families were identified through the same method to replace potential drop outs.
After seeking consent from the participants, the discussion itself was recorded on tape. The tape recording was then transcribed into English and compared with the notes of the note-taker.

2.4.5 The Questionnaire

After getting an overview of the Focus Group Discussion outcome, a structured questionnaire was designed (Annex). The fieldworkers were trained on the questionnaire and interview techniques for one week. All fieldworkers were at least secondary school graduates, some were social science students. In addition**,** they were not associated with any medical institution of the study site to avoid bias from the interviewees.
After that, the questionnaire was pre-tested on 90 families in two villages not included in the study. Final adjustments were made before the questionnaire was translated into the local language (Twi). To rule out the possibility of mistakes due to incorrect

translation, a professional not involved in the study re-translated the questionnaire back into English.
The questionnaire consisted out of three parts:

- The Caretaker Questionnaire
- The Child Questionnaire
- The Husband Questionnaire

The Caretaker Questionnaire collected data on economic features of the household, perceptions of malaria, knowledge of malaria transmission and prevention methods used. For each of the children 0-9 years information on a perceived malaria episode within the last 4 weeks preceding the interview was collected from the responsible caretaker.
If there was a reported episode of perceived malaria, the child questionnaire was administered.
The caretaker was questioned about the perceived severity of the episode (severe/non-severe), and treatment actions taken. Depending on the treatment actions taken, more detailed information on that specific action was obtained. In case of the use of antimalarial drugs the questionnaire collected data on start, dosages and duration of the treatment given. Further areas of interest were the source of drug supply, advising persons, reasons for treatment steps, transport and the costs of drugs.
Furthermore, information on the decision taking between the female and male caretaker was collected, as well as on the aspects of bearing the costs for the treatment.
If drugs were given to the child the dosages given were compared to the WHO recommendations on drug use and dosages (WHO, 1997), which correspond to Ghanaian guidelines (WHO, 1999).
The “Husband” Questionnaire checked the same topics as the Caretaker Questionnaire concerning perceptions, prevention methods and causes of malaria.
In addition, each husband was asked for the usual treatment approach towards perceived malaria. The “Husband” Questionnaire also collected data on the decision process for the treatment between the female and the male caretaker, as well as on the person responsible for the payment of the treatment.

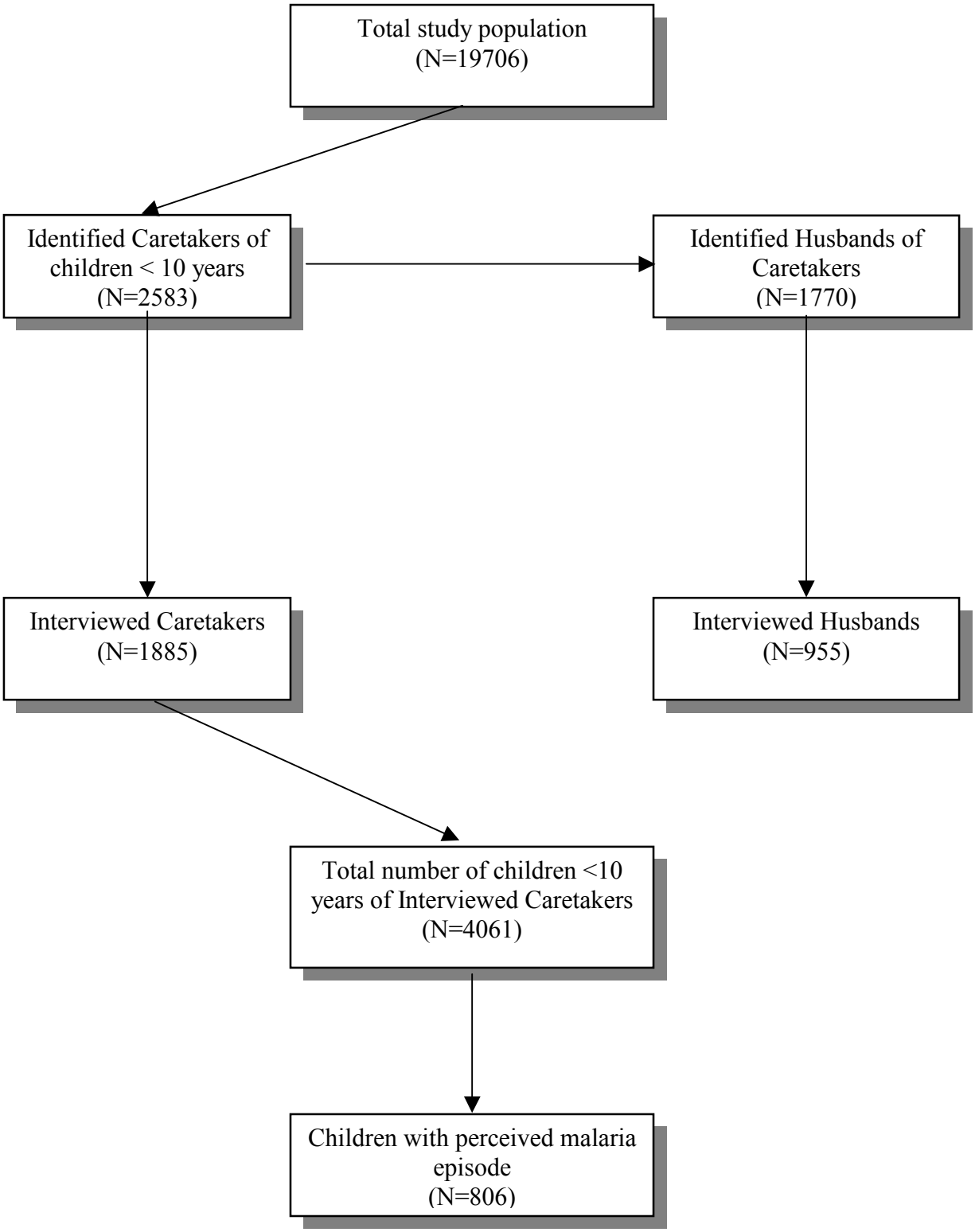
2.4.6 The Sampling

From the micro-census data, all families with children <10 years were identified. Lists with the names of the potential participants were compiled and sent to the responsible village workers with the date of interview and the request to inform and mobilize all listed mothers and their husbands for that date.
In order to get as many participants as possible, the so-called taboo days were chosen for the interview day. Taboo days are usually weekdays, where people do not attend their work, but stay in the home/village for communal labor.
Each village was visited again two days after the first interview day, to get hold of those who did not participate in the first session. People who could not be interviewed then, were subsequently excluded from the study. The flowchart in Figure 1 presents the numbers of interviewed mothers and fathers as well as identified children <10 years with and without perceived malaria episodes. This procedure of sampling was chosen for two reasons. Firstly. the number of children with perceived malaria episodes was supposed to be as high as possible in order to group the children for later analysis (e.g. age groups). Secondly, the study area was extremely difficult to access; within that area many villages were quiet small. Therefore a further random sampling of potential study participants would have created a serious logistic and time problem within the study budget and time frame. To check on potential biases due to the sampling method the non-interviewed identified potential study participants were compared to the interviewed study participants concerning age, ethnicity, education, number of children < 10 years, household seizes and distances to the closest health post.
In the two day interval between the interview dates, the fieldwork supervisor screened all the questionnaires for possible problems. If questions were missed or information obtained seemed questionable, the fieldworkers re-interviewed the persons on the next visit.

2.5 Data Handling

All data was entered twice on two separate databases. The two databases were compared and differing values were referenced with the original data and corrected. For data analyzing Stata and SPSS were used. The Focus Group Discussions were analyzed using a qualitative contents analysis according to Mayring (1995).

Figure 2: The study sample



3. Results

3.1 Demographic Data

The study population consisted of 19,706 registered participants in the micro-census. The household census collected data on the sex, ethnicity, age, education and occupation of the study participants. This data is displayed in the Figures 2-4. Sex is almost equally distributed with 49.2/50.8 % females/males.

The dominating ethnic group in the study area is the Akan, making up more than 50% of the population, followed by northern groups comprising nearly 30 % (Figure 3).

31.5 % of the study population are below 10 years (Figure 4); they are the target group for possible perceived malaria episodes.

The level of formal education is low; nearly 43 % of the participants above 14 years of age report not having received any formal education (Figure 5).

The main occupation among the study population is farming (72 %).

3.2 The Focus Group Discussion

Among the study population, 2,583 caretakers of children < 10 years were identified. Also 1,770 Husbands of Caretakers could be identified. The 3 Focus Group Discussions with the 3 main ethnicities was composed of this pool of Caretakers and their husbands.

During the Focus Group Discussions it became clear that a term for “malaria” exists in all the 3 main ethnic groups in this region (Akan, Ewe and language related tribes from North Ghana).

The Akan tribes in this region referred to malaria as *huraye*, or simply fever. The Ewe tribes use the term *asra,* while the northern tribes use the term *huraye,* too. The symptom complex described by these terms gives the clinical picture of malaria.

In accordance to the manifold symptom complex of malaria, in all the six discussions rounds people reported a diversity of symptoms they perceived as malaria.

The main symptoms mentioned in all the discussion rounds were fever/hot body /coldness, headache, weakness, abdominal symptoms (vomiting, diarrhea), paleness and yellow eyes (Table 1).

Figure 3: **Ethnic disttribution of study population (N=19706)**

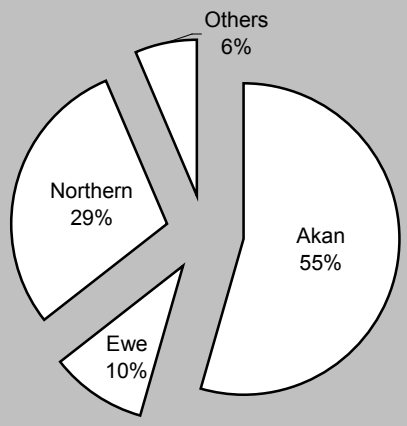


Figure 4: **Study population in age groups (N=19706)**

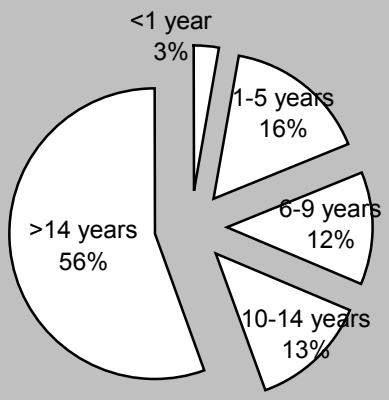


Figure 6: **Education of the study population above 14 years (N=10968)**

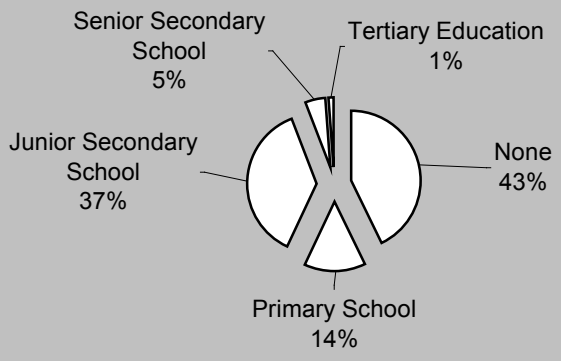


Table1: **Main Malaria symptoms in different ethnic groups mentioned by participants after an open-ended question**

	Akan		**Ewe**		**Northern Tribes**	
Symptoms of uncomplicated malaria	Female	Male	Female	Male	Female	Male
Feeling cold Fever/hot body Headache Abdominal discomfort (vomiting/diarrhea) Weakness Yellow eyes Paleness (Conjunctiva/Palms)	Mentioned in all groups					
Loss of appetite	*	*	*	*		*
Body/Joint pains	*	*	*		*	*
Jaundice	*	*		*	*	*
Vomiting		*	*	*	*	*
Yellow urine		*			*	
Coughing					*	*

*= mentioned as a symptom

For small children ("those , who cannot talk"), crying and refusal to eat or breast-feed was reported as a symptom of malaria, in addition to the ones mentioned above.

The participants in the discussions also stated that not all the fevers are necessarily malaria, but malaria is very common and, therefore, well known. *It is not only 'Asra' that can cause the fever. Different diseases also bring fever. Different diseases can bring fever, vomiting and running of stomach. Cholera can also bring about fever. But 'Asra' always comes first that is why we know the 'Asra' more. (Ewe man)*.

Other diseases like measles, pneumonia and common cold were referred to as ones which can also bring fever. Additionally, teething was seen as a possible cause of fever.

Fever was reported to be solely measured by touch in all discussion rounds. Breast-feeding children were reported to be diagnosed as febrile through the temperature of their lips during breast-feeding.

The initial treatment for perceived malaria usually takes place at home. In all the discussion rounds antipyretic treatment, usually Paracetamol, was mentioned as treatment given to the children.

Chloroquine was also mentioned in five of the six discussion rounds, with the exception of the female northern tribe group. Another commonly mentioned drug was vitamins. Some people reported antibiotics as choice of treatment.

Concerning herbal treatment, the participants in the Akan discussion rounds reported some resentment towards herbal treatment: In the sense that "*you have to know the herbs, which were better known in the olden days" (Akan woman)*. As well people talked about children refusing herbal preparations: "*We don't usually use herbs on them. Formerly, we were boiling some for them to drink but now some of them will not drink"(Akan woman)*. The male Akan discussion round mentioned herbal enemas, which they sometimes administer.

Among the Ewe and 'Northerners', herbal treatment seemed to be more popular. Some of the participants described the herbal treatment as their first action of choice: "*I don't give them paracetamol. I give herbs first"(Ewe woman) - "Boil 'Neem' leaves and lime to drink and cover with cloth"* – "*Don't use drugs immediately, because I may not have money" (Northerner man).*

Other participants in these rounds found herbal treatment to be useful, if drugs did not work, or as first aid: "*For people living in far away villages like us, we need to use the herbs because if the child is sick, there is no transport here to send him to hospital immediately, so we need to use the herbs as first aid. Or the child might be sick at night, in such cases you cannot do anything other than use herbs." (Ewe man).*

The herb always mentioned at first was the so-called 'Neem Tree'.

Nevertheless, herbal treatment was mentioned in all the rounds; however, the precise impact of herbal treatment really was not confirmed.

Treatment in the official health sector seems to be the second line of treatment seeking action:

"*We first buy the drugs for them to see whether they can help. If they do not, we take them to hospital" (Akan woman)*. Going to the clinic as first choice of action was

reported only once in all the rounds. Some people mentioned that the clinic is just too far away or the costs are too high: "*Also if you send your child to the hospital, before he is treated, you have to pay. It was not like that at first. At first, when you took your child to hospital, they treated the child before even giving you your bill, so if this happened then you could borrow money and then pay later. But it is not so now; therefore, I suggest the government should address this issue" (Akan man).*

The clinic is mainly a place to go after the home treatment failed, or if the disease is considered to be severe.

If the disease is considered to be severe, there seems to be a tendency to skip the health posts/clinics and go directly to the hospital.

The judgment on the severity of the disease is mostly made by the aforementioned symptoms, which then are more marked e.g. excessive vomiting, very high fever, pallor or extreme weakness. If there are severe symptoms, the immediate need for treatment is emphasized, and most of the discussion participants said that they would rush to the hospital, if possible: *"For the alarming symptoms, as soon as we see them, we send them to hospital. If you are not near the hospital, you have to give medicine and then send him to hospital." (Akan women) –" Take immediately to hospital if I have money or transport immediately available"* (*Northerner man in English).*

Convulsions, as a severe complication, were mentioned in discussion rounds with participants belonging to the Akan and Ewe tribes and the Northern men. The northern women mentioned it after probing. In general, convulsions were considered a severe complication, which needs immediate clinical attention*: "The fever disease makes the child very weak and it also makes the child convulse. So if the child has convulsions and you don't rush him to the hospital he might die"(Ewe man)*

But there were also statements given that convulsions need herbal treatment immediately.

Again, the accessibility of the public health sector seems to play a role in the decision concerning the treatment given: "*If the child convulsed suddenly here, since we have no doctor here, we have Herbs…"(Ewe man).*

Another topic during the discussion was the attitude towards small children when they developed malaria/"fever" symptoms. The participants referred to this group, as those who cannot talk. There was a consensus in all the groups that they need immediate attention: "*Theirs are even more difficult than those who can talk. He will*

be crying all the time and refuse to eat. So you have to act quickly so that he can eat." *(Akan woman).*

The treatment varied then again from giving drugs to taking them to the hospital: "*If you see that syrup and you have it at home, you give him some*." *(Akan woman)*- "*We rush them to the doctor. For the little ones you can't do anything for them." (Northerner woman).*

As we thought it might be interesting to look at the decision making process among the mother and the father, we also discussed the gender aspects of the choice of treatment.

The males and the females were in agreement in their respective discussion rounds that the mother is the one who recognizes the disease. A difference between the sexes arose concerning the final decision about what kind of treatment is to be given to the sick child. The mothers in the Ewe and Akan rounds said that they decide in cooperation with the fathers, or they even decide alone. "*The mother can tell the father that the child is not well, so they should take him to hospital (Akan woman)."*

The mothers of the Northern Tribe Round said that the father decides, because he has the money.

Meanwhile the fathers in all the rounds stated very clearly that they are the only ones to decide: *"In most cases the mother notice first. I decide"(Akan man)*

When it came to the issue of who pays the bill for the treatment, all the rounds were again in agreement: "*The father pays" (Northern woman).*

The Focus Group Discussions all in all revealed sufficient knowledge of uncomplicated malaria symptoms. Treatment usually takes place at home, be it with drugs or herbal preparations.

The reasons given for the preference of home treatment are based on accessibility and affordability of the official health providers. Perceived severity and the age of a child seem to be substantial factors for choosing the official health sector as source of treatment. Men have a rather substantial influence in the choice of the treatment, especially as they are the ones responsible for the costs.

3.3 The Questionnaire

3.3.1 Data on the Study Population Sample

1,885 caretakers (73 % of 2,583) were interviewed using the methods described. Of these 1,885 interviewed caretakers 34 (1,8 %) were males. 518 (27,4 %) of the female caretakers reported being unmarried. 127 (6,7 %) of the caretakers reported that their husband is living in a different community outside the study area. Altogether, 1,770 husbands of the 2,583 caretakers could be identified and 955 (54 %) of them could be interviewed. The missing figures concerning the total number of husbands is explained through the fact that in Ghana up to 4 wives are legal and some husbands were married to more than 1 of the identified caretakers.

Table 2 and Table 3 exhibit the main demographic characteristics of the interviewed caretakers in comparison to the overall population of identified caretakers in the study area. Table 2 shows quantitative data in an univariat analysis, while Table 3 shows frequency distributions of ethnicity and education. Interviewed and not interviewed husbands were not compared.

The study participants lived closer to Agogo town or to the closest health center. Caretaker age and the number of household members varies within the range of the 95 % confidence interval. The frequency distribution in Table 3 shows a tendency of the participants towards a higher education and towards the ethnicity of the Akan. In general, these differences can be rated as marginal. The study participants are a rather exemplary sample of the study population.

All the presented tables are based on the data of the census and the thereby identified households with children <10 years.

Table 2: **Caretaker participation in the study compared by age, number of household members and distances**

Variable	All identified caretakers		Interviewed caretakers	
	Mean	95 % CI	Mean	95% CI
Individual				
Caretaker age	33.3	32.9 – 33.8	33.2	32.7 – 33.7
Household characteristics				
Total household members	8.2	8.0 – 8.4	8.3	8.1 – 8.5
Household members < 10 y	3.0	2.9 – 3.1	3.1	3.0 – 3.2
Distances				
Distance to Agogo (km)	23.9	23.3 – 24.4	23.0	22.5 – 23.5
Distance to Health Facility (km)	9.1	8.8 – 9.4	8.3	8.0 – 8.6

Table 3: **Caretaker participation compared by ethnicity and education**

Variable	All identified caretakers N=2583		Interviewed caretakers N=1885	
	n	%	n	%
Individual				
Ethnicity				
Akan	1339	51.8 %	1020	54.1 %
Ewe	272	10.5 %	193	10.2 %
Northern tribes	820	31.7 %	561	29.8 %
Others	152	5.9 %	111	5.9 %
Education				
None	1357	52.5 %	910	48.3 %
Primary	388	15.0 %	287	15.2 %
Junior Secondary and higher	830	32.1 %	682	36.2 %
Unknown	8	0.4 %	5	0.3 %

3.3.2 Knowledge of Malaria

3.3.2.1 Perceptions of Malaria

As already reported in the results of the Focus Group Discussions, the residents of the study area use local terms for a fever disease which gives the clinical picture of malaria. The term varies between the different ethnic groups (*huraye, fever, asra*). According to the ethnic group of the participant, these terms were used interchangeably to gather information on the symptoms of the disease. Instead of using these terms, the author will use the term malaria/perceived malaria for simplification.

Fever was perceived by 76.4% of mothers and 78.8% of fathers as the leading symptom of malaria. After probing, these percentages were close to 100%. The other most common symptoms were jaundice, yellowish urine and abdominal discomfort, which was defined as any gastro enteric condition (Table 4).

The perceptions of malaria vary only minimally between the different genders. The most noticeable difference between the females and the males is visible regarding the symptom jaundice. A total of 78,4 % of males consider this as a symptom, 16,1 % more than the females.

An interesting observation is that only the symptom fever gained more than 50% in response to an open ended question. After probing, however, all the reported symptoms were mentioned in more than 80% of the interviews, with the exception of the symptoms coughing and jaundice (Table 4).

Table 4: **Perceived main malaria symptoms after an open ended question and after probing reported by mothers and fathers of children <10 years**

Malaria symptoms	**Mothers** (N=1882)		**Fathers** (N=955)	
	Open question	After probing	Open question	After probing
Fever	76.4 %	97.6 %	78.8 %	98.8 %
Jaundice	39.5 %	62.3 %	42.4 %	78.4 %
Yellowish urine	34.9 %	91.9 %	32.2 %	94.2 %
Abdominal discomfort	29.4 %	75.2 %	31.2 %	80.1 %
No appetite	20.9 %	89.7 %	27.2 %	93.8 %
Pallor	20.6 %	83.4 %	16.5 %	86.6 %
Weakness	15.5 %	91.9 %	20.9 %	97.4 %
Headache	9.1 %	89.5 %	10.6 %	92.2 %
Bodily pains	7.6 %	83.3 %	9.8 %	87.8 %
Cough	4.0 %	60.1 %	3.3 %	64.0 %
Others	7.7 %		11.3 %	

Total exceeds 100% due to multiple mentioning

Table 5: **Perceived severe malaria symptoms after an open ended question and after probing reported by mothers and fathers of children <10 years**

Malaria symptoms	**Mothers** (N=1880)		**Fathers** (N=955)	
	Open question	After probing	Open question	After probing
Convulsions	12.2 %	30.3 %	13.2 %	34.5 %
Coma/unconsciousness	6.2 %	27.0 %	7.3 %	30.1 %
High fever	44.4 %	49.2 %	42.0 %	52.9 %
Anemia	15.0 %	63.0 %	14.8 %	64.6 %
Rapid breathing	6.0 %	69.4 %	5.9 %	75.3 %
Severe jaundice	13.8 %	56.6 %	16.0 %	58.5 %
Persistent cough	2.3 %	57.3 %	3.3 %	62.2 %
Persistent vomiting	10.3 %	58.9 %	12.1 %	63.7 %
Persistent diarrhea	4.3 %	47.3 %	6.5 %	51.9 %
Little or no urine	1.1 %	41.1 %	0.8 %	46.5 %
Dark red/black urine	7.0 %	54.2 %	7.0 %	56.5 %
Others	36.0 %		40.0 %	
Very weak	23.8 %		32.4 %	
Can't eat/ weight loss	11.7 %		13.0 %	
Hallucinations	1.2 %		1.9 %	
Constipation	1.0 %		1.6 %	
Cries a lot	1.3 %		2.1 %	
Various others	5.6 %		5.5 %	

The perception of severe malaria symptoms is not as straightforward as the perceptions of uncomplicated malaria. High fever and extreme weakness were the leading symptoms mentioned after open ended questions . Respiratory distress and anemia were the two most often mentioned symptoms after probing. Convulsions and unconsciousness were not perceived to be common symptoms of severe malaria. Neither after an open ended question, nor after probing were these symptoms mentioned in more than 35% of the interviews (Table 5).

3.3.2.2 Knowledge of the Mosquito Vector

The mosquito is recognized as a vector for malaria, by 42.3 % of the caretakers and by 54.3% of their husbands (Table 6). Other beliefs are still influential factors. Causes mentioned included bad nutrition, extensive exposure to sun, dirty surrounding and various other reasons, such as mangos, groundnuts, rainy season and stress.
Using Pearson Chi Square tests the knowledge of the mosquito vector correlates with ethnicity ($p=0.018$) and education ($p<0.001$), if there is a school in the village ($p=0.017$) and the possession of a radio($p<0.001$)

Table 6: **Perceived causes of malaria**

Causes of malaria	**Caretaker** (N=1874)	**Husband** (N=948)
Mosquito	42.3 % (793)	54.3 % (517)
Bad food/water	21.0 % (393)	33.8 % (322)
Sun	19.2 % (359)	24.5 % (233)
Dirty surrounding	16.9 % (316)	18.6 % (177)
Others (includes: mango, groundnut, rainy season, stress etc)	14.7 % (276)	14.7 % (144)

Total exceeds 100% due to possible multiple answers

3.3.3 Malaria Prevention

Concerning prevention among females, the leading method reported was drugs, which rates second regarding the males' prevention methods. 10 percent more males report the use of mosquito nets (Table 7), which is therefore the leading method of prevention reported among the males. Generally, the use of mosquito nets is low. Only 23% of the caretakers and 33% of their husbands reported the use of bed nets.

The use of insecticide impregnated nets was not reported, however, not specifically asked for. During the time of the study there was no indication of the presence of insecticide impregnated nets on the local market. Moreover, there was no indication of either education on, or distribution or sales of impregnated bed nets through public health channels.

Concerning the use of drugs as prevention method, it remains unclear whether the participants meant intermittent treatment episodes, or continuous chemo-prophylaxis. From experience, the author would suggest rather intermittent prophylactic treatment than continuous prophylaxis.

Table 7: **Malaria prevention methods used in households**

Malaria prevention used	**Caretaker** (N=1877)	**Husband** (N=955)
Drugs	28.3 % (531)	28.5 % (272)
Mosquito net	23.0 % (431)	32.7 % (312)
Good food/water	14.9 % (280)	17.8 % (170)
Herbs	12.2 % (228)	16.2 % (155)
Clean surrounding	13.1 % (246)	16.8 % (160)
Avoid sun	7.4 % (139)	8.8 % (84)
Mosquito coils	4.5 % (85)	6.5 % (62)
Others (includes burn herbs, enough rest etc.)	9.6 % (181)	8.5 % (81)

Total exceeds 100% due to multiple answers

3.3.4 Incidence of Perceived Malaria

806 perceived malaria episodes in the last 4 weeks preceding the interview dates were reported by 1,885 identified caretakers of 4,061 children below 10 years; using this data, an incidence rate for perceived malaria during that time was calculated. Assuming the children are no more at risk after one malaria episode during the 4 weeks preceding the interview an incidence of 2.6 episodes per person per year was calculated. This figure represents the incidence rate during the study period.

23.4 % (188) of the total 806 perceived malaria episodes were perceived to be severe by the caretaker. The symptoms which led to this judgment were: high fever (59 %), pallor (25 %), persistent vomiting (23 %), convulsions (20 %), rapid breathing (19 %), ,jaundice (16 %) and diarrhea (16%). Other mentioned symptoms included unconsciousness/coma, coughing and dark red/black urine.

3.3.5 Malaria Treatment Strategies

Table 8 displays treatment strategies of caretakers within the first 48 hours after the onset of symptoms. 94.5 % of the children received various types of treatment while 5.5 % did not receive any treatment within that time frame. Among those who received treatment, most treatment took place within the first 24 hours.

662 (82.7%) of the children with perceived malaria episodes received medication at home. Paracetamol was the leading drug given to treat malaria (63.6%), while antimalarials were used in 41% of the cases to treat malaria at home. Chloroquine is nearly exclusively the antimalarial drug of choice. Other drugs, such as vitamins and blood tonics were given to 33.3% of the children. Administration of antibiotics was reported in 2.9% of the cases.

The official health sector was the choice of treatment in 22.6 % of all perceived childhood malaria cases.

Herbal home treatment was given in 13 % of the cases. Only 0.5 % of the perceived malaria episodes were treated by a herbalist.

Table 8: **Treatment actions for perceived childhood malaria within 48 hours after onset of symptoms**

Treatment action (N=801)	**Within <24 hours**	**Within 24-48 hours**	**All actions within 48 hours**
Self –treatment			*82.6 % (662)*
Antimalarials			
Chloroquine	38.7 % (310)	1.1 % (9)	39.8 % (319)
Others	1.2 % (10)	0.0 % (0)	1.2 % (10)
Paracetamol	61.7 % (494)	1.9 % (15)	63.6 % (509)
Antibiotics			2.9 % (23)
Any other drug			33.3 % (267)
Herbs	9.9 % (79)	3.1 % (25)	13.0 % (104)
Unknown drugs	8.2 % (66)	0.1 % (1)	8.4 % (67)
Others			0.6 % (5)
Non Laymen treatment			*23.1 % (185)*
Health facility	14.7 % (134)	5.7 % (47)	22.6 % (181)
Herbalist	0.5 % (4)	0.0 % (0)	0.5 % (4)
No action			5.5 % (44)

Total exceeds 100% due to combined treatment actions

3.3.5.1 Factors Influencing the Choice of Treatment

Data obtained from the micro-census, the village information and the questionnaires were assessed in relation to the treatment strategies. The treatment strategies analyzed were:

- Visit of a health facility within 48 hours after onset of symptoms
- Antimalarial home treatment within 48 hours after onset of symptoms

These two strategies were analyzed because they are the two treatment strategies which are assumed to be most effective methods of curing the disease. Herbal treatment is not yet proven to be effective; however, the Neem Tree was found to have anti-inflammatory effects (Mwenesi et al, 1995). Due to the small amount of reported herbal treatment and the lack of knowledge about dosages, herbal treatment was not analyzed further.

Factors included in the calculations were: Perception of severity (severe/non-severe), the age of the child, the age of the caretaker, education, socio-economic status, ethnicity, distance from the next health facility and the existence of a drug shop in the village. The distance from the next health facility was measured in minutes with a car or motorbike. Times can be much greater if no transport is available. Especially the travel times above 45 minutes were measured with our project motorbike as the only transport possible and can therefore be much greater for the inhabitants of the villages. The socio-economic status was estimated through a scoring system which included housing status (storerooms, staples), owned transport vehicles (car, motorbike, canoe, bicycle) and electrical appliances (radio, TV, refrigerator).

Decision dynamics were analyzed using factors concerning the persons who are involved in the choice of the treatment, the persons who make the final decision and the persons held responsible for the costs.

3.3.5.1.1 Predictors of Clinic Attendance

The choice of the official health sector as treatment strategy showed significant correlations (p-value < 0.05) among the following factors: Perception of severity (severe/non-severe), the age of the child, the age of the caretaker, distance from the

next health facility, the ethnicity and the persons involved in the decision process. The factors education and the socio-economic status did not show significance (Table 9). Results of a logistic regression analysis with the factors described above are displayed in Table 10. In this method, all variables were included simultaneously into the equation. Variables concerning the decision dynamics are excluded due to a narrowing down of the study population to married caretakers only. Results concerning the decision dynamics are presented in chapter 3.5.5.1.3.

Table 9: **Correlation of the variable "Visit to health facility within 48 hours after start of symptoms" as treatment strategy**:

Variable	Visit of health facility F (%)	No visit of health facility F(%)	Chi value	p-value
Individual				
Caretaker age			7.1	0.008
≤30 years	109 (26.5%)	302 (73.5%)		
>30 years	72 (18.6%)	315 (81.4%)		
Ethnicity			9.0	0.029
Akan	85 (20.8%)	323 (79.2%)		
Ewe	13 (14.4%)	77 (85.6%)		
Northern tribes	69 (28.5%)	173 (71.5%)		
Others	14 (24.1%)	44 (75.9%)		
Age of child			33.7	0.000
<1 year	32 (42.7%)	43 (57.3%)		
1-5 years	120 (24.8%)	363 (75.2%)		
>5 years	29 (12.1%)	211 (87.9%)		
Perceived severity of malaria episode			77.8	0.000
Severe	87 (46.3%)	101 (53.7%)		
Non – severe	94 (15.4%)	515 (84.6%)		
Structural				
Travel time to next health facility			7.8	0.021
<5 minutes	80 (27.0%)	213 (73.0%)		
6- 45 minutes	61 (23.0%)	204 (77.0%)		
>45 minutes	40 (16.9%)	197 (83.1%)		
Drug-Shop in village			4.1	0.042
Yes	95 (26.0%)	271 (74.0%)		
No	86 (19.9%)	346 (80.1%)		

Only significant effects are reported. Row percentages are reported. N changes due to missing values. Statistics reported represent measures based on Pearson Chi²- Test for cross tables. Variables analyzed but not significant: Socio-economic status, education

The age of the child seems to be the most influential factor regarding the choice of treatment. Children below 1 year were 6.0 (95 % CI 3.0 – 12.0) times more likely to be treated at a health post than children above 5 years. Perceived severity of disease

has a similar impact. These children were 5.3 (95 % CI 3.6 – 7.9) times more likely to receive treatment at the official health sector than children with a perceived non-severe disease. Children living in households within a range of 5 minutes from the next health post were 3.8 (95 % CI 2.1 – 6.6) times more likely to be brought to a health facility than children living more than 45 minutes from a health post.
The absence of a drug shop in the village made the decision to visit a health post more likely by the factor 2 (95 % CI 1.3 – 3.2).

Table 10: **Factors significantly influencing the presentation of children with perceived malaria to health posts within the first 48 hours after onset of symptoms: A logistic regression analysis**

Dependent variable:	Visit to Health facility: 777 observations 1= Visit of Health facility 0= No visit of Health facility	
Independent variables	Relative risk	95% Confidence limits for the relative risk
Individual		
Age of child		
<1 year (1)	6.0	3.0 – 12.0
1-5 years (2)	2.5	1.6 – 4.1
>5 years (Reference 0)		
Perceived severity of malaria episode		
Severe (1)	5.3	3.6 – 7.9
Non – severe (Reference 0)		
Structural		
Travel time to next health facility		
<5 minutes (1)	3.8	2.1 – 6.6
6- 45 minutes (2)	1.4	0.8 – 2.4
>45 minutes (Reference 0)		
Drug shop in the village		
No (1)	2.0	1.3 – 3.2
Yes (Reference 0)		

Variables entered into equation, but did not attain significance: Age of caretaker, ethnicity, economic status, education

3.2.5.1.2 Predictors of Antimalarial Home Treatment

Chi Square test with the same data as already analyzed for the choice of the official health sector as treatment strategy were performed with the factor “Antimalarial drug treatment within 48 hours after onset of symptoms” The results of these Chi Square tests only showed significant findings ($p<0.5$) concerning the treatment decision

structures (Chapter 3.5.5.1.3) and the educational background. A higher use of antimalarial drugs among the educated could be seen. The factor “At least Primary school education” compared to the factor “No education” showed a significance level of p=0.03. The use of antimalarial drugs was similar among older and younger mothers and among the different ethnic groups. The age of the child and the perceived severity of the disease as well as the existence of a drug shop in the village or the distance to the next health post did not show any significant impact on the use of antimalarial drugs.

A logistic regression analysis then revealed other influential factors. The same factors and methods as described in chapter 3.5.5.1.1 were used and the treatment decision factors were excluded in the initial logistic regression model.

The logistic regression now showed a 0.6 times lower use of antimalarial drugs among the poorer (Economic status: low) than among the richest population group (Economic status: high) (Relative risk 0.6, 95 % CI 0.4 – 0.97). Not having direct access to a health facility as well, contributed to the use of antimalarial drugs at home by the factor 1.7 and 1.6 (95 % CI 1.1 – 2.5). Results are displayed in Table 11.

Table 11: **Factors significantly influencing the antimalarial drug use in perceived malaria within the first 48 hours after onset of symptoms: A logistic regression analysis**

Dependent variable:	Self medication with antimalarials: 779 observations 1= Antimalarial given 0= No antimalarial given	
Independent variables	Relative risk	95% Confidence Limits for the relative risk
Individual		
Economic status		
Low (1)	0.6	0.4 – 0.97
Middle (2)	0.9	0.6 – 1.4
High (Reference 0)		
Structural		
Travel time to next health facility		
>45 minutes (2)	1.7	1.1 - 2.5
6- 45 minutes (1)	1.6	1.1 - 2.5
<5 minutes (Reference 0)		

Variables analyzed but not significant: Age of caretaker, age of child, ethnicity, education, drug-shop in the village, perceived severity.

3.3.5.1.3 Decision Dynamics within Households and their Influence

576 (71.9%) of the caretakers were married; information on decision dynamics was available from 573 of them. In about two thirds of these cases, the final treatment decision was made by the husband, who was also generally responsible for the payment (Table 12).

Table 12: **Final treatment decision and payment made by mother or father for perceived childhood malaria episode**

Treatment decision and payment by: (N=573)	Caretaker	Husband
Initial involvement in first treatment steps	54.9 %	35.0 %
Final decision	33.3 %	61.8 %
Final payment	15.6 %	77.5 %

Missing % to 100 are falling under others

The husbands themselves were interviewed concerning the different roles in the decision making process on a general basis (not for a specific illness episode). 90% (710) of them claimed to normally make the final decision and 81% claimed to be involved in the initial choice of treatment (first treatment steps)(N= 952 and 947 respectively).

The decision making structures in the households were analyzed with the same statistical tools. Only caretakers with partners were included in the sample. Using Chi Square tests, in both treatment categories (Health facility and antimalarial drug use) the person involved in the choice of treatment and the person making the final decision had significant impact on the treatment strategy chosen. The factor “Who pays” proved significant concerning the choice of the official health sector as source of treatment, but not concerning the use of antimalarial drugs (Tables 13,14).

The impact of the decision process was analyzed using the logistic regression model used for earlier calculations (Chapter 3.3.5.1.1).

The variables “Involvement in the choice of treatment” and “Who paid” were not included into the logistic regression model due to suspected confounding with the variable “Who made the final decision”. This last variable was considered as most important and most meaningful.

Table 13: **Correlation of decision making factors within households and the visit of a health facility as treatment strategy**

Variable	Visit to health facility F (%)	No visit to health facility F(%)	Chi value	p-value
Decision dynamics				
Involvement in choice of treatment (married caretakers only)			14.0	0.001
Caretaker	52 (16.7%)	260 (83.3%)		
Husband	60 (30.3%)	138 (69.7%)		
Others	10 (17.2%)	48 (82.8%)		
Final decision of treatment type (married caretakers only)			14.0	0.000
Caretaker	24 (12.6%)	166 (87.4%)		
Husband	93 (26.5%)	258 (73.5%)		
Who paid the bill (married caretakers only)			8.3	0.004
Caretaker	9 (10.3%)	78 (89.7%)		
Husband	107 (24.3%)	333 (75.7%)		

Only significant effects are reported. Row percentages are reported. N changes due to missing values. Statistics reported represent measures based on Pearson Chi²- Test for cross tables.

Table 14: **Correlation of decision making factors within households and the use of antimalarial drugs as treatment strategy**

Variable	Chloroquine self-treatment F (%)	No Chloroquine self-treatment F(%)	Chi value	p-value
Decision dynamics				
Involvement in choice of treatment (married caretakers only)			18.7	0.000
Caretaker	157 (47.9%)	163 (52.1%)		
Husband	60 (30.3%)	138 (69.7%)		
Others	31 (53.4%)	27 (46.6%)		
Final decision of treatment type (married Caretakers only)			6	0.014
Caretaker	93 (48.9%)	97 (51.1%)		
Husband	134 (38.1%)	218 (61.9%)		

Only significant effects are reported. Row percentages are reported. N changes due to missing values. Statistics reported represent measures based on Pearson Chi²- Test for cross tables.

The regression analysis reveals that when the husband rather than the wife decided, children were 2.4 times more likely to be brought to a health facility within the first 48 hours (95% CI 1.4 – 4.1) after adjusting for other factors as indicated in Table 15. The factors "Age of the child", perceived severity and distance remained largely unchanged in comparison with the full study sample, while the factor "Drug store in the village" became insignificant. Corresponding results were found in the regression analysis concerning the antimalarial drug use. After the adjustment for other factors the impact distance and economic status remained largely unchanged. Meanwhile, the likelihood for the use of antimalarial drugs use was 1.6 times higher when the mother, rather than the father, decided on the treatment (Table 16).

Table 15: **Factors significantly influencing the presentation of children with perceived malaria at health post within the first 48 hours after onset of symptoms: A logistic regression analysis**

Dependent variable:	Visit of Health facility: 541 observations 1= Visit of Health facility 0= No visit of Health facility	
Independent variables	Relative risk	95% Confidence Limits for the relative risk
Individual		
Age of child		
<1 year (1)	4.5	1.8 – 11.1
1-5 years (2)	2.6	1.4 – 4.8
>5 years (Reference 0)		
Perceived severity of malaria episode		
Severe (1)	5.4	3.3 - 8.8
Non – severe (Reference 0)		
Structural		
Travel time to next health facility		
<5 minutes (1)	3.3	1.7 - 6.3
6- 45 minutes (2)	1.6	0.9 - 2.9
>45 minutes (Reference 0)		
Decision dynamics		
Final decision of treatment type (married Caretakers only)		
Husband (1)	2.4	1.4 - 4.1
Caretaker (Reference 0)		

Variables entered into equation, but did not attain significance: Age of caretaker, drug-shop in the village, education, economic status, ethnicity.

Table 16: **Factors significantly influencing the antimalarial drug use in perceived malaria within the first 48 hours after onset of symptoms: A logistic regression analysis**

Dependent variable:	Self medication with antimalarials: 523 observations 1= Antimalarial given 0= No antimalarial given	
Independent variables	Relative risk	95% Confidence Limits for the relative risk
Individual		
Economic status		
Low (1)	0,4	0.3 - 0.8
Middle (2)	0,7	0.5 - 1.1
High (Reference 0)		
Structural		
Travel time to next health facility		
>45 minutes (2)	2.0	1.2 - 3.4
6- 45 minutes (1)	1.7	1.0 - 2.9
<5 minutes (Reference 0)		
Decision dynamics		
Final decision of treatment type (married Caretakers only)		
Caretaker (1)	1.6	1.1 – 2.3
Husband (Reference 0)		

Variables analyzed but not significant: Age of caretaker, age of child, ethnicity, education, knowledge, drug-shop in the village, perceived severity.

The investigation of the decision making process was investigated further through more detailed questions concerning different treatment strategies. They covered the topics of why a particular treatment was chosen and the persons advising the caretaker on the treatments.

The reasons for not consulting a facility at the official health sector were mainly associated with the perception of the severity and the financial aspect. 48.6 % (291, N=599) gave the perception of an uncomplicated disease as reason for the preference of self-medicating their child. The second main reason given was the lack of money with 35.2, % (211). 8.6 % (50) interviewed caretakers saw self-medication to be a sufficient treatment and 3.5 % (21) reported a transport problem (distance too far, no transport) as reasons. 2.6 % gave other reasons, such as absence of the spouse, non occupation of the health post or presence of a Primary Health Care Worker in the village at the time of onset of the symptoms.

Concerning the choice of drugs, 53. 9 % (N=625) reported that nobody advised them about what drug to use. 28.2 % percent were advised by the respective drug seller. Another 11.7 % were advised by their spouse, a relative or elderly person, or generally speaking, advised by a medical laymen. Only 4 % received advice from health professionals, such as Primary Health Care Workers. The remaining 2.2 % could not remember who advised them about what drug to use.

3.3.5.2 Costs and Sources of Treatment

Costs of the treatment varied considerably between participants who self–medicated with western drugs and participants who consulted professional help at health posts or hospitals.

Self-medication costs were approximately an average of 6 times lower than the overall costs in the official health sector. At the time of the study, 3,000 Cedis equaled approximately 1 US$.

While the self-medication group paid a mean price of 0.6 US$ (min 0, max 4.7 US$, N = 552) the mean costs at the official health sector where 3.6 US$ (min 0, max 40 US$, N = 164). These overall costs at the official health sector include costs for transport (15 %), drugs (48%), admissions, if admitted (26%), and other additional costs (11%). The above mentioned 0 minimum costs result in the case of self-medication from free drugs (neighbors, etc.). There were 8 cases of free treatment in the self-medication group. In the case of treatment at the hospital, the 0 minimum costs are a result of the “Poor and Needy Fund” of the Agogo Hospital, which 3 of the study participants received.

The main source of drugs for self-medication were chemical stores with 57.5 % of the purchases, followed by drug peddlers with 22.6 % of the purchases. 14.4 % bought drugs from various health professionals like Primary Health Care Workers, Health Post and Hospital staff (N=584).

3.3.6 Quality of Antimalarial Drug Treatment

Both the dosage regime of self-administered antimalarials at home and prescribed antimalarial hospital/health-post outpatient treatment were compared to the recommended dosage regimes of the WHO (revised by the Ministry of Health, Ghana) (WHO, 1999). These dosage regimes give a certain interval for certain ages. Therefore, in the calculation of the correctness of the dosage administered by

caretakers, a ±10% difference to the WHO dosage regime was tolerated. First, the total given dose was calculated and compared to the recommended dose and then the dose was adjusted to the time period of administration. Only completed treatments were included in the calculation, which causes the changes in N compared to the total number of antimalarial use. As Table 17 illustrates, the quality of the antimalarial treatment was poor, be it the home medication or the outpatient antimalarial treatment of an official health provider. Only 5.6 % of the caretakers administered the correct dose of an antimalarial drug at home. The number of sufficient treatments was quite high with 63.6 %, whereby sufficient dose means overdose. 30.8 % of the caretakers gave an insufficient dose of the antimalarial drugs. The antimalarial treatment administered from official health providers offers more correct and sufficient dosages, while Insufficient dosages occur only in 8.7 % of the cases. Nevertheless, the number of correctly administered antimalarials was at 7.5 % of the treatments, extremely small.

Table 17: **Antimalarial dosage regime under the aspect of dosage given and time period of administration**

Antimalarial dosage given	Correct dose	Overdose	Insufficient dose
Self-treatment with Chloroquine (n=250)	5.6 % (14)	63.6 % (159)	30.8 % (77)
Antimalarial outpatient hospital treatment(n=103)	7.8 % (8)	83.3 % (86)	8.7 % (9)

Looking at the **total** antimalarial dosage given (in some cases over a period of more than ten days) at the time of interview, including all the episodes still under treatment, 36.8 % (n=117) caretakers administered a 100-500% overdose and 3.1% (10) of the caretakers administered an overdose of more than 500% compared to the recommended total dose as home treatment. In the outpatient treatment group the overdoses are even more frequent: 47% of the caretakers administered an overdose of 100-500% and 8.8 % an overdose of more than 500%.

Calculating correlations of these variables was not possible, as the number of correctly administered antimalarials was too small. Therefore, the variables were reduced to the categories “sufficient” and “insufficient” dose.

Chi²-tests were performed with the following variables: Age-group of child, age of mother, number of children, education, ethnic group, socio-economic status, drug-shop in the village, source of drugs, advisors on dosage (drug-seller, other laymen) perceived severity and distances to the next health facility. The only significant finding is the correlation to the age-group of the child (Table 18). A tendency towards over dosage of smaller children can be seen (p=0.018).

For the outpatient group of the official health providers, similar results were seen in the Chi²-Tests. Younger children more often received a sufficient dose than older children (p=0.033).

Table 18: **Self-administered doses of antimalarials in age groups**

Variable (N=247)	Sufficient antimalarial dose F (%)	Insufficient antimalarial dose F(%)	Chi value	p-value
Age of child			8.0	0.018
<1 year	15 (83.3%)	3 (16.7%)		
1-5 years	111 (72.5%)	42 (27.5%)		
>5 years	43 (56.6 %)	33 (43.4%)		

Only significant effects are reported. Row percentages are reported. N changes due to missing values. Statistics reported represent measures based on Pearson Chi²- Test for cross tables. Variables analyzed but not significant: Age of mother, number of children, education, ethnic group, socio-economic status, drug-shop in the village, source of drugs, advisors on dosage (drug-seller, other laymen) perceived severity and distances to the next health facility

Looking at factors contributing to the dosages administered more information was raised in the self-medication group. Concerning the dosage of the drug used, 44.9 % (274) of the interviewed caretakers (N=610) claimed to know the dosage themselves. 39.3% (240) caretakers reported to have been advised by the drug seller. Other sources of advice included other laymen (8.0 %, 49) and other health professionals (4.5 %, 26). There was no correlation between the quality of antimalarial treatment and the advising persons, neither drug sellers or other health professionals, nor other laymen.

4. Discussion

The study was designed to gather information on malaria knowledge, perceptions and the treatment strategies of a rural population. Qualitative data was gathered by Focus Group Discussions, quantitative data was obtained through questionnaires. No laboratory investigations were done. In highly endemic areas the number of asymptomatic parasitaemic individuals is known to be high. Therefore, confirmation of malaria parasitaemia would not necessarily confirm the diagnose of malaria. The validity of mothers' history regarding antimalarial drug use for their children was investigated by other authors and found to be not accurate in up to 19 % of the cases (Nyanwanyu et al. 1996). This number seems realistic, considering the high rates of illiteracy among study participants in developing countries, especially in rural areas. The validity of caretakers' history was not investigated in this study. Blood or urine specimens were not evaluated concerning the level of antimalarial drugs.
Major emphasis was laid on the other methods. In our study, a broad spectrum of structural data concerning the health infrastructure (drug shops, distances to nearest health post, drug peddlers) was integrated in the analysis. Qualitative and quantitative methods were used to complement each other, assuming that weakness in either would be compensated by the other. This triangulation of methods, the integration of different data collection methods, provided a broader understanding of both the context and the factors that influence disease recognition and treatment seeking behavior.

The training of the fieldworkers and the supervision during the data collection, entry and analysis was extensive. The results proved to be not contradictory. Therefore, the study team believes the data to be valid.
These results present a broad spectrum of data on malaria knowledge and health seeking behavior. The study population lives in communities which can easily be described as rural, including a substantial number of villages/communities beyond motor vehicle access. The Interviewed Caretakers represent the total study population concerning the features distances to the official health sector, household sizes, number of children < 10 years, age of caretaker, ethnicity and education to a satisfactory extent (Results Tables 2, 3).

The most striking findings during this study were the poor use of antimalarials, be it the home treatment or the treatment of official health providers, as well as the gender aspects of the decision making process. Besides these, the other results give an interesting overview of malaria perceptions, knowledge and practices.

4.1 Perceptions of Malaria

The study participants are quite knowledgeable about the symptoms of uncomplicated malaria. Malaria is described as a manifold symptom complex. Fever is perceived as the leading symptom of malaria (77 % after open question and 98% after probing).

These findings confirm the results of similar studies (Slutsker et al.1994; Ruebush et al. 1995; Baume et al. 2000; Agyepong, 1992; Agyepong et al. 1994), which all found fever to be the leading perceived symptom of malaria, with various co-symptoms reported (Table 5). The Focus Group Discussions revealed that other causes of fever are known, but fever is usually mainly attributed to malaria, because it is so common.

Severe malaria is mainly perceived as an episode with a more severe expression of the symptoms (high fever, severe pallor, extreme weakness, jaundice, excessive vomiting). There was no significant difference between male and female respondents, but males reported slightly more symptoms on the average, especially after probing.

The perception of symptoms such as convulsions or unconsciousness as part of severe malaria is not common and only about 12% of the mothers and 13% of the fathers considered it as a complication of malaria. After probing the number rose to about one third of the respondents.

These findings do not correspond to the results of the Focus Group Discussions, where in all groups convulsion were mentioned. Through the qualitative approach of data collection, the information related to this issue became more detailed. Seeing the questionnaire data one could only assume that these symptoms are widely unknown, while the Focus Group Discussions revealed a certain awareness of this problem. Whether severe malaria attacks with complications such as convulsions or unconsciousness are perceived as a completely different illness entities in themselves within the local concept of febrile illnesses, cannot be explained through the data.

In other studies, (Mwenesi,1994; Ahorlu et al.1997; Nuwaha, 2002) symptoms such as convulsions or coma were found to be attributed to other causes and were mainly explained from traditional (religious) points of view.
Also the approach towards these types of complications were different among the Focus Group Discussions participants. Some emphasized the immediate need for hospital treatment, whilst others saw herbs as the most effective treatment. Others again stated use of herbal treatment as first aid before visiting the hospital. It became obvious that the perceptions of severe complications and the approach towards the problem differs individually and that there is no uniform opinion.
The results indicate, first of all, that uncomplicated malaria symptoms are well recognized in the home. The data show that the WHO guidelines "Integrated management of childhood illnesses", which recommend the treatment of all febrile children with antimalarials in holoendemic malaria areas without immediate access to health services, are appropriate in terms of the malaria perceptions of uncomplicated malaria in this area.
Concerning the severe symptoms, more education is needed to enhance recognition and early referral and subsequently decrease the mortality of these children. Early referral to professional health providers should be the goal. Results of the Focus Group Discussions indicate that an awareness of severe complications exists. Meanwhile, traditional beliefs still have a serious impact and might delay necessary treatment steps.

The problem of fever detection will be discussed later in chapter 4.4.

4.2 Incidence of Perceived Malaria

This study calculated an incidence of 2.6 episodes/person and year for perceived malaria attacks during the rainy season. The rainy season in the study areas usually last from April to November.
The incidence calculated is purely the incidence of perceived malaria, as parasitaemia was not measured in this project.
Data from north Ghana shows an incidence of malaria parasitaemia of 4.7 infections/person –year during the dry season and 7.1 during the wet season for children aged 6 – 24 months (Baird et al. 2002). The risk ratio for parasitaemia >

20,000/microl with fever during the wet season was 2.45 (95% CI = 1.5-4.1; P = 0.0002) in the same study.
It is known that in holoendemic malaria areas parasitaemia does not necessarily correlate with clinical malaria (Greenwood, 1997). Looking at prevalence rates of parasitaemia one can find up to 82% malaria parasite prevalence reported in 8 year old children in the study area (Brown et al. 2000).
Other data from northern Ghana states the incidence of malaria infection to be 7.0 infections/person and year in adults during the wet season. But only 19.5 % of the individuals reported symptoms at the time of parasitaemia (Owusu-Agyei et al. 2001). This would be an incidence of combined parasitaemia with symptoms of 1.4 attacks/person and year during the wet season among adults with already acquired immunity. McGuinness et al. (1998) reports an incidence as low as of 0.69 clinical malaria episodes/person/year in children 12-24 months old in an urban environment in Ghana. Generally the incidence in urban areas is lower, due to a lower mean annual entomologic inoculation rate (EIR) (Trape et al. 1987); which is up to 20 times less than in rural areas (Robert et al. 2003); and a higher use of antimalarial drugs (Glik et al. 1989).

4.3 Clinical Malaria

The incidence reported here is an incidence of perceived malaria.
It seems difficult to develop a concept of clinical malaria adjusted to local perceptions. In holoendemic malaria areas, it is known that the sensitivity of the symptom fever for the diagnose of malaria is high, as well as the specificity is known to be low (Lubanga et al. 1997). The clinical diagnosis of malaria results in substantial over-diagnose of malaria (Bassett et al. 1991). Thus, most definitions of clinical malaria combine fever, or the history of fever with detection of malarial parasitaemia. However, use of this simple definition still leads to gross over-diagnosis of malaria in areas of high endemicity, where most children have malaria parasitaemia, whether they are ill or not (Greenwood, 1997).

Attempts have been made to develop a definition of clinical malaria, which incorporates parasitaemia above a certain level as an essential criterion. This approach is complicated by the fact that in highly endemic areas, the fever threshold is influenced by the level of exposure (Rogier et al. 1996) and varies according to

age and season (Bouvier et al. 1997). In addition, very often there is no diagnostic tool such as a microscope available in Africa, especially in rural areas.

Nowadays a new approach towards malaria control is intermittent treatment. Studies have shown a reduction of clinical malaria attacks through presumptive intermittent treatment with Sulfadoxine- Pyrimethamine on vaccination dates through the existing the EPI (Extended Program of Immunization) system by more than half (Schellenberg et al. 2001). Another study showed a similarly high reduction through treatment in 60 day intervals over 6 months with Amodiaquine (Massaga et al. 2003).
The latter reported that a four-month follow-up did not show rebound morbidity. Other studies are ongoing.
This new approach seems feasible for areas of high endemicity, where parasitaemia is likely and would be subsequently treated without having clinical symptoms. More data would be needed to determine how far a radical cure of asymptomatic parasitaemia places the individual at increased risk of recurrent malaria or causes a reduced acquired immunity. Other data among adults in northern Ghana showed that the clinical attacks of radically cured individuals in a 20-week follow up period were increased. These patients presented lower parasite densities but more symptoms (Owusu-Agyei et al. 2002).

To improve the clinical diagnosis of malaria, the sensitivity and specificity of the diagnosis “perceived malaria” would be interesting to investigate.
Generally, complicated diagnostic tools to measure parasite densities are not feasible in this area. The lack of trained staff, the lack of motivation of the existing trained staff to work in rural areas and the costs involved make the implementation of such a project nearly impossible. New rapid-tests for malaria parasitaemia, as already used for travelers or among western staff in malaria areas, might become cheaper in the future and be a helpful tool for the correct diagnose of malaria.

4.4 Fever Detection

Earlier in this discussion, the questions of sensitivity and specificity of perceived malaria and the problems of the clinical diagnosis of malaria were raised. The problem of over-diagnosis of clinical malaria was discussed, even if diagnostic tools such as microscopes were available. As discussed, the main symptom within the

perceived malaria symptoms was fever. Fever was perceived by 76.4% of mothers and 78.8% of fathers as the leading symptom of malaria.As already stated, in holoendemic malaria areas WHO recommends antimalarial treatment for every child with fever.

Early and reliable diagnosis of fever in households is therefore important.

In Africa, the continent with the highest childhood mortality rate due to malaria, the diagnosis of fever is mostly done by touch. Studies have shown that the specificity of this method is less than 50% (44% and 19%, Whybrew et al. 1998 and Nyanwanwu et al. 1993, respectively). Sensitivity in both studies was more than 80 % (82% and 94%, respectively) A positive predictive value (PPP) of 28% (Einsterz et al. 1997) and 79% (Dunyo et al. 1997) was reported. While lack of sensitivity will adversely affect early treatment of children in need, low specificity will expose children to unnecessary treatment and adverse drug effects. Our findings indicate that fever was well known as the leading malaria symptom among the study participants. Diagnosis of fever was made almost exclusively by touch. Self-medication was by far the predominant treatment strategy. However, while WHO recommends treatment with antimalarials for every child with fever, only 49.7% of children with perceived malaria received antimalarial therapy as part of the self-medication. A substantial proportion of those treated were insufficiently dosed. Given the relatively high sensitivity of diagnosing fever by touch, interventions should concentrate on providing knowledge and tools for caretakers to improve treatment rather than interventions aimed at further improving the correct identification of children with fever.

However, the results also indicate that the majority of children treated with antimalarials received overdoses (63.6 %), particularly frequent and severe among infants. In 5% of the cases the overdose was by factor 5 or higher.

Although only about half of the children treated by self-medication received antimalarials, children seemed to have been exposed to non-recommended treatment with potential adverse effects in an estimated 21% of all perceived malaria episodes, to non -recommended and overdosed treatment in an estimated 13% of all episodes, were only due to wrongly diagnosing fever by touch (assuming a PPP of 50% as mean from the literature and a proportion of overdosed treatment of 63.6% among all antimalarial self-medication episodes). Combining that calculation with the known problem of over-diagnosing clinical malaria in holoendemic malaria areas the negative effect on the specificity of the diagnosis of clinical malaria is even increased.

The dimension of this problem becomes even more obvious at a time when more and more countries need to replace Chloroquine as first-line treatment by other drugs with a less favorable safety profile.
The distribution of fever thermometers to communities and interventions addressing their correct use should therefore be considered as a first step in order to avoid preventable exposure to adverse drug effects, particularly in infants, due to misdiagnosis of fever.

4.5 Treatment Seeking Behavior and Quality of Treatment

One of the most striking findings in this survey on the treatment of perceived malaria is the exceedingly small proportion of children who have been reported to receive antimalarials in a timely fashion and at the correct dosage.

Most households in the study area opted to manage malaria at home (82.6 %), be it drug treatment with various drugs or herbal treatment (13 %). The amount of herbal treatment was unexpectedly small. Other data from WHO reports a much higher use of herbs for the treatment of malaria in Africa (WHO, 2003). In Ghana, the first line of malaria treatment is reported to be the use of herbs in up to 60 % of the cases. People are quite knowledgeable concerning herbs, but do not administer them too frequently for malaria treatment. The Focus Group Discussions indicate, that herbs were rather used as a kind of first aid. Secondly, small children were reported to refuse herbal preparations. In addition, Focus Group Discussion participants reported that certain effective herbs do not grow in that area.
The high figures of home treatment correlate with other findings from Africa which reported similarly high figures of self-medication (Deming et al. 1989; Deressa et al. 2003; Salako et al. 2001; Ruebush et al. 1995; Glik et al. 1989; Mwenesi, 1994; Snow et al. 1992 ; Slutzker et al. 1994).
The rural setting (structural factors such as distances) does not explain the high figures of self-medication in this study, as other studies in Ghana reported similar figures in urban environments (Agyepong et al. 1994, Gardiner et al. 1984; Molyneux et al. 1999).
Early treatment of malaria episodes is one factor which can reduce mortality. This need for early action was recognized by the study participants. Most actions (94.5 %) occurred within 48 hours, predominantly within 24 hours, after onset of symptoms.

Nearly all studies on self-medication reported similar data on this issue (Deming et al. 1989; Deressa et al. 2003; Ruebush et al. 1995; Glik et al. 1989; Mwenesi, 1994; Slutzker et al. 1994).

The factors identified in the logistic regression analysis as the main predictors influencing the treatment strategy were structural (drug shops, distances) and personal (age of child, perceived severity, socio-economic status). Ethnicity and the age of the mother as factors predicting clinic attendance were significant in the Chi Square tests, but lost their significance after logistic regression analysis. Thus, it is not surprising that easy accessibility, absence of drug shops, the young age of the child and the severity of the disease predicted a higher use of the official health sector. These factors were seen to have a certain impact on the treatment seeking behavior in various other studies. Other studies identified accessibility (Glik et al. 1989; Deressa et al. 2003) young age of the child (Glik et al. 1989; Slutzker et al. 1994; Molyneux et al. 1999) and perceived severity (Slutzker et al. 1994; Glik et al. 1989; Mwenesi, 1994) as predictors of clinic attendance.

In contrast to a study in Malawi (Slutsker et al. 1994), a higher degree of education and a higher socio-economic status did not contribute to higher clinic attendance, but rather to a higher number of self-medications with antimalarials. A tendency towards more antimalarial self-medication among educated caretakers was observed (58% vs. 42%, $p=0.03$), although the education lost its significance after the logistic regression analysis. The reason for this could be that ethnicity and education were strongly correlated ($p<0.001$) and showed the same tendencies. The ethnicity with the lowest education was also the group with the lowest rates of antimalarial self-treatment and the highest rates of health facility attendance. The age of the mother was another factor which contributed to the visit of a health facility in Chi Square tests, but lost its significance after logistic regression analysis. Mothers below 30 years were more likely to visit health facilities than older mothers. (27% vs. 19%, $p=0.008$)

Looking at these factors, one could assume that a lower level of knowledge and experience leads to either more severe disease and therefore more clinic attendance, or that these caretakers are not sure of the disease and therefore more often consult professional help. More educated caretakers could be more self confident and

therefore self-medicate. Incomplete information on malaria treatment may, therefore, have adverse consequences.
Another extremely important aspect was finances. Besides the perception of the disease as being uncomplicated (49%), 35% of the caretakers presented lack of money as the reason for not consulting professional health providers. In fact, in this study, the costs for professional treatment were 6 times higher than the costs of home management.

83 % of all malaria episodes were treated at home, and some of them received self treatment as first aid before visiting the health facility (7%). The number of home treatment is quiet high, considering malaria is a potential life threatening disease. All in all, most of the caretakers see malaria as a common treatable disease and try home treatment first. Only in special cases (young child, severe disease), is the hospital the first choice of treatment. The qualitative data emphasizes these points again; especially the need to treat young children early and possibly get professional help was emphasized from the focus group participants. That structural factors, like high distance, contribute to a lower use of official health facilities, is not surprising - taking distances of up to 53 km and the lack of transport into consideration, not to mention financial factors in poor rural communities.

The data indicates that home treatment is by far the first solution in the treatment seeking process. Disease recognition and early treatment are well established as the foundation of malaria treatment at home. The treatment given is not adequate owing to the fact, the main drug used to treat malaria is Paracetamol, which is effective against the fever, but not active against malaria parasites. Moreover among the 41 % of caretakers who administered an antimalarial, only 5.6% gave the correct amount during the correct time period. Meanwhile, the dosage recommendations for Chloroquine within age groups vary up to 30 % compared to a body weight adjusted administration of Chloroquine (WHO Recommendation for the Use of antimalarials). The dosage recommendation gives a relatively wide frame for the administration of the commonly used Chloroquine. However, calculated with the total number of self-medication (82.6 % , N=662), this would be a number of as low as 2.1% malaria episodes treated correctly with antimalarial drugs. This number is striking and interventions are needed to improve the quality of treatment, be it to avoid further

spread of drug resistance or more importantly to avoid severe disease and fatal outcome.

Other studies found higher percentages of correctly administered antimalarials ranging within 4.5% and 38% (Slutzker et al. 1994; Deming et al. 1989; Ruebush et al. 1995; Tumwesigire et al. 2002). These figures support the need for interventions for effective malaria control through home treatment.

However, not only the self-treated malaria episodes were incorrectly treated. Antimalarials administered from health professionals were correctly administered in only 7.8% of the episodes. Therefore, the number of sufficient treatments was higher. The amount of overdoses was also higher as in the self-medication group. A various number of reasons could be responsible for this. Firstly, compliance of caretakers might be lacking; secondly the health professionals might not be accurate in their prescription practice. A study in Uganda found only 34% of the health workers following the prescription guidelines (Nshakira et al. 2001).

Thirdly, the information provided by the dispensing staff might be inadequate, especially when considering the low education level of the study population.

A study in Burkina Faso found several factors which were reducing the effectiveness of antimalarial treatment at the official health services. Among others these were lack of compliance, wrong prescribing practices, not or wrong purchasing of drugs and the effectiveness of the drugs. Taking all these factors into account, the community effectiveness of anti-malarial treatment at official health centers was only 3% (Krause et al. 2000).

From personal work experience at the study site's central hospital, the author would support a multifactorial hypothesis. Prescription practices differ among the staff, and work load is high; therefore, time for information provision on drugs is limited and compliance is poor. In addition, many patients buy drugs stepwise, due to monetary problems. More information would be needed to determine the chain of factors leading to the low quality of outpatient malaria treatment in order to reduce the inaccurate treatment schemes.

Upon examination of the way treatment was incorrectly administered by caretakers who self-medicated, one interesting finding was the number of overdoses administered by caretakers. Over-dosages occurred frequently, especially in children <1year. Nearly 64% of caretakers administered overdoses, either per day or due to an exceeded treatment period, or both. In 5 % of the cases the overdose was by the

factor 5, or higher. This finding contrasts with other studies which mostly found under-dosage of antimalarials to be the problem (Deming at al. 1989), especially in the face of growing drug resistance. One theory is that high drug costs causes people to buy insufficient doses (Keyenda-Kayondo, 1993).

The reason for overdosing, may be due to the form of administration. Our data shows that smaller children, who commonly received syrups, were more often overdosed than older children. Ansah et al. (2001) described that only 42% of caregivers provided with Chloroquine syrup at a clinic adhered to the recommended dosage. He found that only 20% of caregivers who received syrup used an accurate 5 ml measure.

Another reason for the overdosing might be expired or faked drugs. If the treatment is not effective, people might tend to give more of a drug. The number of faked antimalarials was found to be up to 38 % in Southeast – Asia (Newton et al. 2001). The Pharmaceutical Society of Nigeria said that at least 70% of the drugs in circulation in Nigeria are fake (Raufu, 2003). India, as a main drug exporter, even wants to pose the death penalty on drug traffickers dealing in faked drugs (Mudur, 2003).

Considering that Chloroquine was the antimalarial drug chosen more than 95% of the time (in accordance to the treatment policy of the MOH, Ghana), the low figure of correct administration is surprising, as Chloroquine has been known for quite some time and one might assume there to be satisfactory knowledge concerning the usage of Chloroquine. Interestingly, most of the caretakers claimed to know the dosage of Chloroquine. Consultation of drug sellers did not improve the quality of the treatment.

Meanwhile, Chloroquine resistance is on the rise in Ghana; in the early nineties a combined RII/III Chloroquine resistance of 45% was described in the coastal zones of Ghana (Landgraf et al. 1994). More recent studies report up to 57% RI-RIII (Ehrhardt et al. 2002) resistance in the northern savannah zones and 37% combined RII/RIII resistance in the forest zones of Ghana (Driessen et al. 2002). Despite the variations in the extent and degree of such resistance between endemic zones, the change of the first line drug in Ghana is inevitable and urgent. Hospital studies in various African countries have documented a 2- or 3-fold increase in malaria deaths and admissions for severe malaria, an increase related to the emergence of Chloroquine resistance (Trape, 2001).

The question of what is going to happen, if Chloroquine is replaced by a drug with a less favorable safety profile arises. Sulfadoxine Pyrimethamine (SP) has a better chance for compliance as it is administered in a single dose, but it also has more dangerous side effects, especially in populations with erythropathies (G6 deficiency). Resistance is already high in many African countries. In Ghana a RII/III resistance for SP of 37% was described in 1994 (Landgraf et al. 1994). Artemisin might cause problems with compliance, as the mode of administration is complicated and the treatment takes 5 days. Combination therapies are favored at the moment, as they are the only effective treatments in some areas, and as a slower growth of resistance is expected. Currently, a combination therapy of SP and Amodiaquine seems to be the least expensive and most effective regime. At the same time it has an impact on the reduction of subsequent malaria attacks (Dorsey et al. 2002). The combination of Artesunate with Sulfadoxine/pyrimethamine has proven to be less effective (Rwagacondo et al. 2003) and is at the moment more expensive (Dorsey et al. 2002). All of these treatments apart from SP, have more complicated dosage regimes than Chloroquine.

The change of the first line drug(s) might create serious problems concerning increasing adverse effects if the future first line drug is as significantly overdosed as is done with Chloroquine. Data on experiences in other countries which introduced new first line drugs are not available, possibly due to the fact that overdoses were not identified to be a problem. Moreover, misuse of a new first line drug leads to faster growth of resistance. Potential new first line drugs such as Artemisin derivates are already sold in shops in Ghana.

As previously stated, compliance with drugs is not only a problem in the case of self – medication. Prescribed drugs are often administered in an in-correct way (Ansah et al. 2001). To improve the compliance with treatment of prescribed drugs and with drugs bought in shops several approaches are under investigation. The main approaches consist of training shop keepers, pre-packed drugs, an enhanced information provision be it through better drug labeling or pictorial instructions and through training of mothers themselves. All of them show a significant impact on the compliance with antimalarial drugs or a reduction of severe disease and mortality.

More than 80% of the study participants used store bought drugs to treat their children. Snow et al (1992) reported that the preferred choice of treatment for childhood febrile illnesses in Kenya was with drugs bought at shops and kiosks

(72%). Drug dealers have a big impact on the provision and quality of treatment. 40% of the study participants reported that the drug seller advised them on the dosage regime to be given. Meanwhile it is known that drug sellers themselves very often have a lack of knowledge on the correct administration of drugs. Wolf-Gould et al. (1991) found that only 43% of the chemists in rural Ghana knew the correct dose of the drugs they sell. In Tanzania 45% of the drug sellers did not know the correct dosage of Chloroquine in particular (Massele et al. 1993). After training of shop keepers in Kenya the percentage of antimalarial drug sales where an adequate amount of Chloroquine was bought rose from 32% to 90% within a 9 month period (Marsh et al. 1999).

The impact of pre-packed drugs on compliance was described in several recent studies. An adherence to the recommended treatment scheme of 59 % and 91% was documented in Burkina Faso (Sirima et al. 2003) and Ghana (Ansah et al. 2001). In addition a cost reduction of 50% to the patient could be seen in an other study in Ghana (Yeboah-Antwi et al. 2001). In Uganda, the attitude of caretakers towards pre-packed, unit-dosed malaria treatment was investigated. 90% would prefer the pre-packed over the conventional type of treatment and nearly 94% of these were willing to pay between 0.17 (rural) and 0.29 (urban) US dollars more for this treatment. A broad acceptance was seen, which shows the high potential of this approach (Kilian et al. 2003)

Through pictorial presentation of the dosage recommendations and verbal instructions upon purchase of drugs through caregivers a 35% increase of compliance was observed in Nigeria (Okonkwo et al. 2001).

The education of mothers on malaria symptoms and the prompt administration of Chloroquine reduced childhood mortality by 40% in Ethiopia (Kidane et al. 2000).

4.6 Decision Making Dynamics within Households

Although most interventions to improve early treatment of childhood malaria target the female caretaker, their husbands seem to play an important role in the decision pertaining to treatment strategies within the first 48 hours.

The focus group discussion revealed uniformly that the mother is the one who recognizes the disease.

It seems that the mother decided on the first steps of action and the self –medication aspect. If the wife made the final decision the child was 2.2 times more likely to

receive self–medication of any type, while if the husbands rather than the wives decided, children were 2.5 times more likely to be taken to health facilities.

Our results seem to point to the control of the household finances as a vehicle of the husbands influence. 77% of the total treatments and 92% of consultations at the official health sector were paid for by the husband. During the Focus Group Discussions the mothers emphasized this point and there was uniform agreement that the men have to pay for treatment costs.

This could also be the reason why husbands “decided” more often to take the child to professional service providers. Our data indicates a stepwise involvement of the father in the decision process (Involvement in first treatment steps with 35%, final decision on treatment with 62 % and final payment with nearly 78 %). The qualitative data also points towards a stepwise inclusion of the husband. (Ewe women on the question of when she seeks advice if the child is sick: “When it becomes serious.”) Possibly the husbands were involved in the decision at the point when the treatment was believed to become more expensive, e.g. lack of recovery after self-medication and perceived seriousness of the disease. Further investigation in the decision dynamics revealed financial aspects and the perception of severity/non-severity as main causes for the choice of treatment. These findings support the theory that husbands were most likely to be consulted at the point when disease was perceived as severe and therefore additional costs were expected.

Mwenesi (1994) described a similar situation in Kenya where traditionally women do not make decision about their husband’s children. In the Kenyan setting, the decisions for the health care lay exclusively with the male head of the household, who not only decided the final diagnosis of an illness, but also the therapy to be used. The main difference to the Ghanaian setting is the financial aspect. Mwenesi did not find financial considerations as reason for consultation. In our study setting, the social roles, who makes what decision, do not seem to be as clear as in the Kenyan study. Differences between ethnic groups could also be seen in this study. Husbands of the tribes from northern Ghana made the final decision significantly more often than husbands from the Akan tribes (71 % vs. 59 % ,p= 0.033).

During the Focus Group Discussions, the mothers claimed to make many decisions alone, while the fathers claimed to make all the decisions. Similar differences can be seen in the questionnaire results, where fathers claimed that they make the final

decision more often than their wives reported in the interviews concerning the recent illness episode.
Although further investigations into the decision making dynamics on the household level are clearly needed, it seems to be evident that in this study area interventions to improve early and adequate treatment of childhood malaria should include both parents. Any intervention for malaria that are targeted on women alone are likely to have little impact.

4.7 Interventions

Trigg stated 1998 that malaria problems vary enormously from epidemiological, ecological, social and operational viewpoints, and that sustainable, cost-effective programs must, therefore, be based on local analysis. Global blueprints did not work in the past (e.g. malaria eradication). Intervention programs have to be adjusted to local realities. The assessment of local realities, especially in African countries, is a difficult and time consuming venture. First of all, local terms and disease concepts have to be studied, in order to design evaluation tools. This study shows that these local concepts can vary within short distances, mostly influenced by the ethnic origin. Interventions are strongly needed, but will only be efficient if the local realities are integrated into the concepts. The WHO considered this in the RBM program and defined four core strategies which are concerned with early and adequate treatment, the use of appropriate methods to limit human-mosquito contact (e.g. insecticide treated bed nets), the prevention of malaria in pregnant woman and appropriate response to epidemics.
This study focused on the factors of early and adequate treatment and its potential for disease control in this area. Possible intervention strategies are discussed here under the aspect of local realities and study results.
First of all, one has to point out the low income of the rural population in third world countries, especially sub-Saharan African. In addition, diagnostic tools are lacking. A concept which is simple, cheap and sustainable has to be established. Scarce resources have to be distributed effectively and efficiently.
Home treatment is common. Due to financial, infra-structural and perception factors, the strategy of home treatment is likely to remain the first line of malaria treatment. Considering distances to health posts in this study area, not to mention the question

of the presence of a health worker, home treatment is very often the only chance to provide early treatment.
In addition, this study among other studies has revealed the low quality of formal health services.
People perceive fever as the main symptom of malaria and see the need for immediate action. Therefore, a general foundation for the control of malaria due to the high sensitivity of the symptom fever in holoendemic malaria areas, is given. The core problems identified in this study are the lack of knowledge regarding adequate malaria treatment, the recognition of and prompt, effective action in the case of severe disease.
Assuming an effective first line drug exists, two main goals have to be achieved: Higher quality of malaria treatment outside the formal health sector and recognition of danger signs and symptoms if treatment fails, along with pre-defined subsequent actions.

As already discussed, the education of mothers in Ethiopia (Kidane et al. 2000) is one of the approaches which showed a significant reduction in malaria related mortality. As our results indicate, the education should initially include both parents. This would mean that nearly all households should be included. Generally, the author believes that interventions to educate the whole population on treatment policies are not efficient. Too many costs are involved and regular updates on changes of policies seem too difficult to implement. Too much data on the target population has to be considered. In addition, the high level of illiteracy would make an educational effort, targeting the population itself, extremely difficult.
However, the education of drug sellers is an intervention which has proven successful in other areas (Marsh et al. 1999). This model does not seem to be not feasible in rural Ghana because the majority of drugs, at least in our study, were provided by illegal drug peddlers or illegal shops that lack official license. Only 11 of the 19 registered drug stores in the study area were licensed, and they were found in close range of health centers. One can assume there is a high number of unknown stores; one can see traders selling drugs of all kinds at every market. Interventions addressing legal chemists and pharmacies would not address large parts of the target population. Amendment of laws would, however, be useful.

As has been shown in Ghana and other countries, pre-packed drugs have a significant impact on compliance and outcome. The acceptance of pre-packed drugs has been described and some authors even found a cost reduction of 50% and more through pre-packing of drugs (Kilian et al. 2003; Ansah et al. 2001; Sirima et al. 2003; Yeboah –Antwi et al. 2001). This could be the most feasible approach in Ghana for improvement of the proper administration of antimalarials.

As training all fathers and mothers seems too arduous, this approach could be embedded in the community health worker (CHW) concept, in order to improve the diagnosis, management of danger signs and referral. The Integrated Management of Childhood Illnesses (IMCI) could serve as guideline. In Kenya, the established system of CHW was assessed from 1997 to 2001. Malaria was adequately treated in 90.5% of the encountered malaria cases (the most commonly encountered disease) (Kelly et al. 2001). Unfortunately, existing data on community health workers does not draw a clear, positive picture of this concept. Besides problems in the quality of their performance, the malaria morbidity could be reduced, while mortality remained the same in an evaluation in Zaire (Delacollette et al. 1996). Treatment practices in an assessment of PHC workers in Nigeria were found to be poor as only 55% and 63% health workers respectively prescribed Chloroquine and Paracetamol correctly (Fawole et al. 2001).

The quality of treatment should be positively influenced by pre-packed treatment. The studies introducing pre-packed treatment to communities, for example trained key persons like older mothers, about the correct administration achieved the described increase in compliance and the reduction of mortality.

At least fever thermometers should be accessible in each village in order to avoid gross over diagnosis of malaria. Regular workshops need to be held to maintain a satisfactory level of know-how. Another factor which could contribute to the improvement of the malaria situation is the improved operation of Primary Health Care Units (PHC). For example, the unit at the study site did not work effectively (unpublished observation). Improvements especially concerning financial transparency, could have a substantial impact on the efficient use of existing resources.

At this point, the author wants to briefly emphasize the need for a multilateral approach. Other malaria control tools are available. As indicated in the result section of this paper, the use of bed-nets is not common (max. of 32 % among husbands)

and knowledge of the mosquito vector is poor (43 % mothers, 54 %.husbands).This study did not specifically evaluate the use of insecticide-treated bed-nets, and also did not specifically ask for the use among children. Nevertheless, the low use in the adult population indicates that the introduction of insecticide-treated bed-nets could have a major impact on morbidity and mortality in this area. The impact of bed-nets on morbidity and mortality is widely discussed in several studies (Alonso et al. 1991; Choiet al. 1995; D'Allessondroet al. 1995; Binka et al. 1998) and is, therefore, not discussed here. Our data indicate that the possession of a radio contributes significantly to the knowledge of the malaria vector ($p<0.001$). Mass media (radio) should be integrated in malaria education programs. Another approach is the use of schoolchildren for distribution of information on malaria. Involvement of schoolchildren in a disease vector control program had significant impact in a study in India (Bhati et al. 1995).

4.8 Conclusions

Various control tools have proven to be effective in the reduction of malaria related morbidity and mortality. In the future, home treatment is likely to remain the first choice of treatment taken especially in countries with poor resources and health infrastructure. The core problems with home treatment are the timely recognition of severe disease and the inadequate administration of antimalarials. Possible interventions were discussed above. Our data now shows new insights concerning the role of the husband in the treatment decision process and the importance of the correct diagnose of fever.

Training of mothers alone is, therefore, not the ideal intervention strategy. Training of mothers and fathers seems not possible due to financial constraints. To improve the diagnose of fever similar problems would be encountered. Whole communities would need training, in addition, the appropriate tools as fever thermometers would be needed. Tools which reach large numbers of the population without the need to educate the complete population would be preferable. Therefore, the concept of CHW seems to be most feasible to improve the situation. These CHWs could be trained on the IMCI and supplied with minor diagnostic tools, such as fever thermometers. Additionally, they should have an impact on the control of other diseases. Furthermore, the promotion of other malaria control tools, insecticide-treated bed-nets for example, could be integrated. This concept is not novel, but

seems to be the most effective and efficient intervention tool in countries with scarce financial resources and a population with high illiteracy rates.

The training of drug sellers is another tool capable of reaching large parts of the population without major area-wide education effort. The training of drug sellers could have an impact in urban and semi-urban settings in Ghana, but the effect in rural settings is doubtful, as most of the drugs are sold through unofficial/illegal channels. However, even these can be reached, if a policy is developed

Financial constraints are most likely to be the limiting factor of malaria control in this area, as the existing health system is lacking financial resources.

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6. Summary

6.1 English Version

Malaria: Perceptions and Treatment Practices among Mothers of Children below 10 years in rural Ghana

Background: Malaria is one of the diseases which contributes significantly to morbidity and mortality in Africa. 90% of the estimated 300-500 Million malaria cases per year worldwide occur in sub-Sahara Africa. There are at least one million deaths attributed to malaria every year in Africa. To reduce childhood mortality, early and adequate treatment of malaria is essential. In areas of intense transmission, WHO, therefore, recommends all children with fever to be presumptively treated with antimalarials, as part of the strategy of Integrated Management of Childhood Illnesses(IMCI). The need for early adequate treatment, the poor accessibility of health posts and the economic situation, especially in Sub-Saharan Africa, make self-medication and treatment at home often the only option for receiving any kind of treatment.

This paper describes health seeking behaviors, as well as perceptions of malaria used as diagnostic criteria and judgment on severity of malaria. The quality of drug treatment is investigated in detail (self medication and outpatient treatment at official health providers) and compared to the treatment standards. Factors contributing to the actual treatment seeking behavior, in particular inner-household decision making dynamics among mothers and fathers, are analyzed.

Methods: The study was carried out in the Juansa and Agogo sub-districts of Asante Akim North District in the Asante Region of Ghana. The Asante Akim North district is a holoendemic malaria area. In the Asante Region an overall prevalence of parasitaemia of 49.7-50.7 % was found in the period February – April 1998 with Plasmodium falciparum as the predominant species.

The study was designed as a cross sectional survey. This study combined both qualitative and quantitative data collection methods to provide a broad understanding of factors and the context influencing mothers´ and fathers´ definition and treatment of childhood malaria. Besides Focus Group Discussions, 1;885 caretakers of children <10 years old and 955 of their husbands were interviewed using a structured

questionnaire. Treatment strategies were investigated for perceived malaria episodes within the last 4 weeks preceding the interviews.

Results: Fever was perceived as the leading symptom of malaria by 76.4% of mothers and 78.8% of fathers. All study methods applied indicated that fever was solely measured by touch. Out of 801 perceived malaria episodes reported, self-treatment was done within 48 hours after onset of symptoms in 662 (82.6%), non-layperson treatment in 168 (21%). As self-medication, only 329 children (49.7%) received antimalarials, the majority of them Chloroquine. Out of 250 children who received self-administered antimalarials and for whom information on dosage was available, only 14 (5.6%) received a correct dosage. Over-dosages occurred frequently.

576 (71.9%) of the caretakers were married; information on decision dynamics was available from 573 of them. In about two thirds of these cases, the final treatment decision was made by the husband, who was also responsible for the payment in 77.5% of the cases.

Conclusions: Self-treatment at home is the most prevalent action taken to manage malaria. The quality of home treatment is low. Efforts should be made to improve home treatment and drug compliance through the availability of pre-packed drugs and the introduction of community health workers. In the face of frequently encountered over-dosages, particularly in infants and the low specificity of the symptom fever, the diagnosis of fever should be more accurate. The use of fever thermometers by community health workers should therefore be considered in order to avoid unnecessary exposure to adverse drug effects due to misdiagnosis of fever, particularly in infants. Furthermore the role of the husband has to be given more adequate consideration in the planning of malaria control programs. Although further investigations into the decision dynamics at household level are clearly needed, it seems to be evident that interventions to improve early treatment of childhood malaria should include both parents.

6.2 German Version

ZusammenfassungMalaria: Praxis der Erkennung und Behandlung bei Müttern von Kindern unter 10 Jahren in ländlichen Teilen Ghanas

Hintergrund: Malaria ist in signifikantem Ausmaß für Morbidität und Mortalität in Afrika verantwortlich. Von geschätzten jährlich 300-500 Millionen Malariafällen weltweit treten 90% im Afrika südlich der Sahara auf. Mindestens 1 Million Todesfälle sind jedes Jahr der Malaria zuzuschreiben. Um die Kindersterblichkeit zu senken, ist eine frühzeitige und adäquate Behandlung der Malaria unerläßlich. In Gebieten mit sehr hoher Transmissionsrate rät die WHO daher, als Teil der *Integrated Management of Childhood Illnesses (IMCI)*- Strategie, alle Kinder mit Fieber als Malariaverdachtsfall mit Antimalariamitteln zu behandeln. Die Notwendigkeit einer frühen adäquaten Behandlung, die schlechte Erreichbarkeit von Gesundheitsposten und die schlechte wirtschaftliche Situation vor allem im Afrika südlich der Sahara, machen Selbstmedikation und –behandlung der Malaria oft zur einzigen Option. Die vorliegende Arbeit beschreibt Art des Gesundheitsverhaltens und vorhandenes Wissen über Malaria, das als diagnostische Grundlage zur Einschätzung der Schwere der Malariaerkrankung dient. Die Qualität der Pharmakotherapie der Malaria wird im Detail untersucht (Selbstmedikation und ambulante Behandlung bei offiziellen Gesundheitsversorgern) und mit den offiziellen Behandlungsstandards verglichen. Desweiteren werden Faktoren analysiert, die zum Gesundheits- und Behandlungsverhalten beitragen, insbesondere haushaltsinterne Entscheidungsdynamiken bei Müttern und Vätern.

Methoden: Die Studie wurde in den Bezirken Juansa und Agogo des Asante Akim North Districts der Ashanti-Region in Ghana durchgeführt. Im Asante Akim North District tritt Malaria holoendemisch auf. In der Zeit von Februar bis April 1998 wurde in der Asante-Region eine Parasitämieprävalenz von 49.7-50.7 % ermittelt. Die prädominante Parasitenspezies war dabei Plasmodium falciparum.

Die Studie wurde als Querschnittsstudie konzipiert. Um ein umfassendes Verständnis der Faktoren zu erhalten, die seitens der Eltern die Erkennung und Behandlung der Malaria ihrer Kinder beeinflussen, kamen dabei sowohl qualitative wie quantitative Datenerhebungsmethoden zum Einsatz. Neben Fokus-Gruppendiskussionen wurden 1885 Mütter von Kindern unter 10 Jahren sowie 955 Ehemänner mit Hilfe eines

strukturierten Fragebogens befragt. Es wurden die Behandlungsstrategien von erkannten Malariaepisoden bis 4 Wochen vor dem Interview untersucht.

Ergebnisse: Fieber wurde von 76.4% der Mütter und 78.8% der Väter als Leitsymptom der Malaria angesehen. Alle angewandten Studienmethoden zeigten, daß Fieber nur durch Auflegen der Hand “gemessen” wurde. Von berichteten 801 erkannten Malariaepisoden wurde eine Selbstbehandlung innerhalb 48 Stunden in 662 (82.6%) Fällen und eine professionellen Behandlung in 168 (21%) Fällen durchgeführt. Als Selbstmedikation erhielten nur 329 Kinder (49.7%) Antimalaria-Medikamente, mehrheitlich davon Chloroquin. Von 250 Kindern, die selbstverabreichte Antimalaria-Medikamente erhielten und bei denen Dosierungsinformationen ermittelt werden konnten, erhielten nur 14 (5.6%) die richtige Dosierung. Überdosierungen kamen häufig vor. 576 Mütter (71.9%) waren verheiratet und Informationen über Entscheidungsdynamiken waren bei 573 erhältlich. In ungefähr 2/3 der Fälle wurde die endgültige Behandlungsentscheidung vom Ehemann getroffen, der dann auch in 77.5% der Fälle für die Bezahlung der Behandlung verantwortlich war.

Schlußfolgerung: Häusliche Selbstbehandlung ist die häufigste Maßnahme, die zur Malariatherapie ergriffen wird. Die Qualität der häuslichen Selbstbehandlung ist niedrig. Es sollten Anstrengungen unternommen werden, die die häusliche Selbstbehandlung und die Medikamentencompliance verbessern, wie etwa vorgepackte Medikamente und die Einführung von Community-Gesundheitsarbeitern. Angesichts der insbesondere bei Säuglingen häufig vorkommenden Überdosierungen und der niedrigen Spezifität des Symptoms Fieber, sollte die Diagnose Fieber akkurater gestellt werden. Es sollte daher der Einsatz von Fieberthermometern durch die Community-Gesundheitsarbeiter erwogen werden, um nicht die Kinder und vor allem Säuglinge durch die Fehldiagnose Fieber unnötig dem Risiko schwerer Medikamentennebenwirkungen auszusetzen. Desweiteren muß bei der Planung von Malaria-Kontrollprogrammen die Rolle des Ehemannes adäquater beachtet und untersucht werden. Obgleich weitere Untersuchungen der Entschlußdynamiken in den Haushalten auf jeden Fall erforderlich sind, scheint es evident zu sein, daß bei Maßnahmen zur Verbesserung der Frühbehandlung der kindlichen Malaria beide Elternteile einbezogen werden müssen.

7. Annex:

7.1 Abbreviations

CHW	-	Community Health Worker
EPI	-	Expanded Programme of Immunization
IMCI	-	Integrated Management of Childhood Illnesses
PHC	-	Primary Health Care
MOH	-	Ministry of Health
NGO	-	Non-Governmental Organization
PPP		Positive Predictive Value
RBM	-	Roll Back Malaria
SP	-	Sulfadoxine – Pyrimethamine
UNDP	-	United Nations Development Programme
UNICEF	-	United Nations Children's Fund
WB	-	World Bank
WHO	-	World Health Organization

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Meinen Eltern, ohne deren Hilfe und Beistand dies alles nicht möglich gewesen wäre.

7.3 Lebenslauf

Name:	Stefan Eckhardt
Geburtstag:	09.03.1972
Geburtsort:	Frankfurt am Main
Wohnort:	Kepler Str. 1, 35390 Giessen
Familienstand:	ledig, keine Kinder

Schulbildung:

1978 – 1982	Pestalozzi – Grundschule, Herborn
1982 – 1991	Johanneum Gymnasium, Herborn Abschluss: Allgemeine Hochschulreife

Hochschulstudium:

WS 1991/92	Immatrikulation als Student der Humanmedizin an der Justus Liebig Universität, Giessen
13.09.1994	Physicum
15.04.1996	Erster Abschnitt der Ärztlichen Prüfung
01.04. 1998	Zweiter Abschnitt der Ärztlichen Prüfung
Mai 1998 – April 1999	Thematische und praktische Vorbereitungen auf die Promotionsarbeit im Themenbereich „ Malaria: Perceptions and treatment strategies amongst mothers of children < 10 years in rural Ghana“ unter Supervision von Herrn Prof. Dr. Korte/GTZ
Mai 1999 – April 2000	Datenerhebung in Agogo, Ghana, in Zusammenarbeit mit dem Kumasi Centre for Collaborative Research into Tropical Medicin (KCCR) in Kumasi, Ghana und dem Bernhard Nocht Institut (BNI) für Tropenmedizin in Hamburg
02.05. – 23.08. 2000	PJ Abschnitt Inneren Medizin in der Klinik der Justus - Liebig Universität Gießen

24.08. – 24.12. 2000	PJ Abschnitt Chirurgie im Korle-Bu Teaching Hospital der University of Ghana, Accra
08.01. – 29.05. 2001	PJ Abschnitt Anästhesie im Evangelischen Krankenhaus, Giessen
29.05.2001	Ärztliche Prüfung Gesamtnote : Gut

Zusätzliche Kurse und Prüfungen:

10.7.- 24.8.2001	Orientierungskurs in den Bereichen Child Health, Medicine, Surgery, Obstetrician Gynaecology und Community Health. im Korle Bu Teaching Hospital, Accra , Ghana
25.8.01	Successful Pre- registration examination for foreign trained medical graduates in Ghana

Arbeitserfahrung:

12.08.2002 - 20.05.2003	Internship als House Officer in Chirurgie, Presbyterian Mission Hospital, Agogo – Asante Akim, Ghana
01.07.2003 – 31.08.2004	AiP und Assistenz in Innerer Medizin im Kreiskrankenhaus Alsfeld, Hessen
Seit September 2004	Medical Officer, Presbyterian Mission Hospital, Agogo – Asante Akim, Ghana

Fremdsprachen:	Englisch auf hohem Niveau in Wort und Schrift Französisch auf mäßigem Niveau in Wort und Schrift Spanisch mit Grundkenntnissen in Wort und Schrift

7.4 Data Entry Forms

7.4.1 Questionnaire

Date: _____ Fieldworker: _____

Name of Household Head:……. HH ID No.: | | | | | | | | | | |

Name of Caretaker:…… CT ID No.: | | | | | | | | | | |

Name of Husband:……. HU ID No.: | | | | | | | | | | |
(*if a husband exists)*
Caretaker not available on second follow up visit:
Reason:_____

Sex of Caretaker: O Male 1 O Female 2 Sex

Age in years:_____ Age
How many children 0-9 years living in this household is the participant taking care of?_____No. Children 0-9
Literacy: O Yes 1 O No Literacy

1.Properties:

1.1 What type of house is the household living in?
O mud walls 1 O stone walls 2 O Others 3 1.1

1.2 Which of the following transport facilities belong to this household?

1.2.1	Bicycle	O Yes 1	O No 2		1.2.1
1.2.2	Motorbike	O Yes 1	O No 2		1.2.2
1.2.3	Car/Truck/Tractor	O Yes 1	O No 2		1.2.3
1.2.4	Others	O Yes 1	O No 2	_____	1.2.4

1.3 How many buildings, which are not used to live in (like storerooms, stables etc), does this household have?
No.:_____ 1.3

1.4 How many sleeping rooms do you have? _____ 1.4
1.4.1 How many people sleep these rooms? _____ 1.4.1

1.5 Do the following things exist in the household:

1.5.1	Radio	O Yes 1	O No 2		1.5.1
1.5.2	TV	O Yes 1	O No 2		1.5.2
1.5.3	Fridge	O Yes 1	O No 2		1.5.3

2. Questions concerning the Caretaker:

2.1 Are you familiar with the term 'Malaria'?
O Yes 1 O No 2 2.1

2.2 What symptoms can a child present, if it has 'Malaria'?
Let the participant answer on her own first, then probe for the remaining symptoms on the list!

		1 – mentioned	2 after probing,	3 – no symptom	4 - don't know	
2.2.1	Fever/hot body	O	O	O	O	2.2.1
2.2.2	Chills/Shivering	O	O	O	O	2.2.2
2.2.3	Child won't play	O	O	O	O	2.2.3
2.2.4	Weakness	O	O	O	O	2.2.4
2.2.5	Muscle Pain/Joint pain	O	O	O	O	2.2.5
2.2.6	Headache	O	O	O	O	2.2.6
2.2.7	Loss of appetite	O	O	O	O	2.2.7
2.2.8	Abdominal discomfort (*Vomiting/loose stools)*	O	O	O	O	2.2.8
2.2.9	Cough	O	O	O	O	2.2.9
2.2.10	Jaundice (yellowish colour)	O	O	O	O	2.2.10
2.2.11	Pallor (inside hand/general)	O	O	O	O	2.2.11
2.2.12	Yellowish urine	O	O	O	O	2.2.12
2.2.13	Others_____	O		O		2.2.13

2.3 What symptoms make you alarmed that the malaria is serious? *(Alarming signs)*

		1 – mentioned	2 after probing,	3 – no symptom	4 - don't know	
2.3.1	Convulsions	O	O	O	O	2.3.1
2.3.2	Unconsciousness/Coma	O	O	O	O	2.3.2
2.3.3	Rapid breathing/ Difficulties in getting air	O	O	O	O	2.3.3
2.3.4	Severe jaundice	O	O	O	O	2.3.4
2.3.5	Persistent cough	O	O	O	O	2.3.5
2.3.6	Persistent vomiting	O	O	O	O	2.3.6
2.3.7	Persistent diarrhoea	O	O	O	O	2.3.7
2.3.8	Pass no more or very few urine	O	O	O	O	2.3.8
2.3.9	High fever	O	O	O	O	2.3.9
2.3.10	Dark red nearly black urine	O	O	O	O	2.3.10
2.3.11	Anaemia (*severe pallor of palms, conjunctiva*)	O	O	O	O	2.3.11
2.3.12	Others _____	O			O	2.3.12

2.4 Did one of your children suffer from 'Malaria' in the last 4 weeks?

	Names of all children <10 years:	ID-No.:	Malaria: Yes –1	No-2	
2.4.1	…….……		O	O	2.4.1
2.4.2	……..……		O	O	2.4.2
2.4.3	….……..……		O	O	2.4.3
2.4.4	……..……		O	O	2.4.4
2.4.5	……..……		O	O	2.4.5
2.4.6	……..……..		O	O	2.4.6
2.4.7	……..……..		O	O	2.4.7
2.4.8	……..……..		O	O	2.4.8
2.4.9	……..……..		O	O	2.4.9
2.4.10	……..……		O	O	2.4.10

2.5 How many children have you born alive? _____ 2.5

2.5.1 Are they all alive?

O Yes	1	
O No	2	
O I don't know	3	2.5.1
O No answer	9	

2.5.1.1 Total Number of children <10 years died: 2.5.1.1

2.5.2a At what age did he/she die? 2.5.2b Was the cause of death Malaria?

	Yes – 1	No – 2	Don't know – 3	No answer - 9	
2.5.2.1_____	O	O	O	O	2.5.2.1a 2.5.2.1b
2.5.2.2_____	O	O	O	O	2.5.2.2a 2.5.2.2b
2.5.2.3_____	O	O	O	O	2.5.2.3a 2.5.2.3b
2.5.2.4_____	O	O	O	O	2.5.2.4a 2.5.2.4b
2.5.2.5_____	O	O	O	O	2.5.2.5a 2.5.2.6b

2.5.3 Total number of children <10 years died because of malaria: 2.5.3

2.6 What do you think causes 'Malaria'?

1 – mentioned 9 – not mentioned

2.6.1 Mosquito	O	O	2.6.1
2.6.2 Sun	O	O	2.6.2
2.6.3 Bad Nutrition(Food/Water)	O	O	2.6.3
2.6.4 Dirty Surrounding	O	O	2.6.4
2.6.5 Others_____		O	2.6.5

2.7 What do you do to prevent 'Malaria'?

	1 – mentioned	9 – not mentioned	
2.7.1 Use mosquito nets	O	O	2.7.1
2.7.2 Clean/weed surrounding	O	O	2.7.2
2.7.3 Take drugs	O	O	2.7.3
2.7.4 Take herbs	O	O	2.7.4
2.7.5 Avoid too much sun	O	O	2.7.5
2.7.6 Rest enough	O	O	2.7.6
2.7.7 Burn herbs	O	O	2.7.7
2.7.8 Mosquito Coils	O	O	2.7.8
2.7.9 Good nutrition	O	O	2.7.9
2.7.10 Others_____		O	2.7.10

If a Malaria Episode was reported skip next question!

2.8 What do you usually do, if your chil d has Malaria?

	1 - mentioned	9 - not mentioned	
2.8.1Chloroquine/Resochin Tabs	O	O	2.8.1
2.8.2Paracetamol Tabs	O	O	2.8.2
2.8.3Cloroquine/Resochin Syrup	O	O	2.8.3
2.8.4Paracetamol Syrup	O	O	2.8.4
2.8.5Herbs/Herbalist	O	O	2.8.5
2.8.6Go to health post	O	O	2.8.6
2.8.7Go to hospital	O	O	2.8.7
2.8.8Nothing	O	O	2.8.8
2.8.9Others_____	O	O	2.8.9

2.9 Pleae tell me: How can the child be better treated for Malaria. What would need improvement?

	1 - mentioned	9 - not mentioned	
2.9.1 Close health posts/hospitals	O	O	2.9.1
2.9.2 Better streets	O	O	2.9.2
2.9.3 More staff at clinic/hospital	O	O	2.9.3
2.9.4 Better education of drug sellers	O	O	2.9.4
2.9.5 Better education of population	O	O	2.9.5
2.9.6 Cheaper treatment at clinic/hospital	O	O	2.9.6
2.9.7 Better treatment at clinic	O	O	2.9.7
2.9.8 Cheaper drugs	O	O	2.9.8
2.9.9 Others……	O	O	2.9.9

2.9.10 What language did the participant speak?

O Twi	1	2.9.10
O Others_____	2	

2.9.11 How long do you walk from your house to the center of this village?_____ minutes 2.9.11

Signature field worker: _____

Date_____ Fieldworker:_____

Name of Caretaker: _____ CT ID No.:

Name of Child _____ CH ID No.:

Sex of Child: O Male 1 O Female 2 Sex

Age _____ *in years if child > 1 year otherwise specify(months/weeks/days)* Age

3 Questions concerning the child <10 (asked for each child with an episode of malaria in the last 4 weeks!)

3.1 Do you have your weighing card *(under 5 vaccinations card)* here?

O Yes 1→*Q3.2* 3.1

O No 2

If yes make sure that you see the card and check question 3.2

3.1.1 Why don't you have it here?

O Lost 1→*Q3.4*

O Can't find 2→*Q3.4* 3.1.1

O Never had one3→*Q3.3*

O At home, but forgotten 4→*participant should go for card→3.1.2*

O Others_____ 5→*Q3.4*

3.1.2 Card presented later? O Yes 1

O No 2 3.1.2

3.2 According to the weighing card *(under 5)*, check card for:

	1- Yes→*Q3.4*	2 – No→*Q3.3*	
3.2.1 BCG 1x *(Tuberculosis)*	O	O	3.2.1
3.2.2 DPT 3x *(Diphtheria, Polio, Tetanus)*	O	O	3.2.2
3.2.3 OPV 3x *(Oral Polio)*	O	O	3.2.3
3.2.4 Measles 1x	O	O	3.2.4
3.2.5 YF 1x *(Yellow Fever)*	O	O	3.2.5
3.2.6 Low weight at last entry	O	O	3.2.6

3.2.7 Age at last entry _____ *in years if child >1 year, otherwise specify(months/weeks/days)* 3.2.7

3.3 What is the **main** reason, why the vaccination is not complete/not carried out?

O Due to financial problems 1

O Due to lack of transport/access 2

O Forgot vaccination dates 3

O No vaccination program in area 4 3.3

O Not important 5

O Others_____ 6

O No answer 9

3.4 Did the child have one or more 'Malaria' attacks in the last four weeks*? More attacks means that there is a new illness after a 1-week period without symptoms! Clarify the time period without symptoms, if the participant report more than one 'malaria' attack! If there are more periods administer accordingly more questionnaires!*

Number of 'Malaria' episodes: ____ 3.4

3.4.1 When did the first Malaria start and end (within the last four weeks)?

3.4.1.1 Start _____ days ago 3.4.1.1

3.4.1.2 End _____ days ago 3.4.1.2

If only one episode was reported skip next question.

3.4.2 When did the second Malaria start and end (within the last four weeks)?

3.4.2.1 Start _____ days ago 3.4.2.1

3.4.2.2 End _____ days ago 3.4.2.2

The follwing questions 3.5 – 9 refer to illness episode No.: Illness episode N

For the second illness episode fill out header of child questionaire again, but skip question part Q 1 - Q3.4.2.2

3.5 For this illness episode we are talking about now, did you perceive the Malaria as serious?

O Yes 1 O No 2→*Q4* 3.5 ☐

3.6 Which symptoms made you perceive the Malaria to be serious?

		1 – mentioned	2 after probing,	3 – no symptom	4 - don't know	
3.6.1	Convulsions	O	O	O	O	3.6.1 ☐
3.6.2	Unconsciousness/Coma	O	O	O	O	3.6.2 ☐
3.6.3	Rapid breathing/ Difficulties in getting air	O	O	O	O	3.6.3 ☐
3.6.4	Severe jaundice	O	O	O	O	3.6.4 ☐
3.6.5	Persistent cough	O	O	O	O	3.6.5 ☐
3.6.6	Persistent vomiting	O	O	O	O	3.6.6 ☐
3.6.7	Persistent diarrhoea	O	O	O	O	3.6.7 ☐
3.6.8	Pass no more or very few urine	O	O	O	O	3.6.8 ☐
3.6.9	High fever	O	O	O	O	3.6.9 ☐
3.6.10	Dark red nearly black urine	O	O	O	O	3.6.10 ☐
3.6.11	Aneamia(*severe pallor of palms/ conjunctiva)*	O	O	O	O	3.6.11 ☐
3.6.12	Others_____	O	O	O	O	3.6.12 ☐

3.7 What Symptoms did your child present, when it had that malaria episode we are talking about now?

Asked for malaria episodes which were not perceived as severe

Let the participant answer on her/his own first, then probe for the remaining symptoms on the list!

		1 – mentioned	2 after probing,	3 – no symptom	4 - don't know	
3.7.1	Fever/hot body	O	O	O	O	3.7.1 ☐
3.7.2	Chills/Shivering	O	O	O	O	3.7.2 ☐
3.7.3	Child won't play	O	O	O	O	3.7.3 ☐
3.7.4	Weakness	O	O	O	O	3.7.4 ☐
3.7.5	Muscle Pain/Joint pain	O	O	O	O	3.7.5 ☐
3.7.6	Headache	O	O	O	O	3.7.6 ☐
3.7.7	Loss of appetite	O	O	O	O	3.7.7 ☐
3.7.8	Abdominal discomfort (*Vomiting/loose stools)*	O	O	O	O	3.7.8 ☐
3.7.9	Cough	O	O	O	O	3.7.9 ☐
3.7.10	Jaundice (yellowish colour)	O	O	O	O	3.7.10 ☐
3.7.11	Pallor (inside hand/general)	O	O	O	O	3.7.11 ☐
3.7.12	Yellowish urine	O	O	O	O	3.7.12 ☐
3.7.13	Others_____	O		O		3.7.13 ☐

4. **Treatment Strategies**

4.1 When you recognized your child was sick, when did you start your treatment?

O Immediately after recognition 1→*Q4.3*

O Later (*more than 6 hours)* 2 4.1 ☐

4.2 What was the **main** reason for the delay in the treatment?

O no drugs at home 1

O no money to buy drugs 2

O not serious 3

O no drug supplier around 4 4.2 ☐

O no health facility open 5

O usually first wait and see 6

O Others_____ 7

O No answer 9

4.2.1 How long was the delay? _____ hours

4.3 What actions did you take, when your child had Malaria? Please tell me what you did specifically for that last illness episode! (***Action 1*** *is anything done within* ***24*** *hours,* ***Action 2*** *is anything done after 24 hours to* ***48*** *hours* ***since treatment started***).

	Action-**1**	Action-**2**	after probing–**3**	don't know-**4**	no action-**5**	
4.3.1Chloroquine/Resochin tablet self medication	O→*Q4.4*	O→*Q4.4*	O→*Q4.4*	O	O	4.3.1
4.3.2Paracetamol tablet self medication	O→*Q4.4*	O→*Q4.4*	O→*Q4.4*	O	O	4.3.2
4.3.3 Cloroquine/Resochin syrup self medication	O→*Q4.4*	O→*Q4.4*	O→*Q4.4*	O	O	4.3.3
4.3.4Paracetamol syrup self medication	O→*Q4.4*	O→*Q4.4*	O→*Q4.4*	O	O	4.3.4
4.3.5Herbs/Herbalist	O→*Q6*	O→*Q6*	O→*Q6*	O	O	4.3.5
4.3.6Go to health post	O→*Q7*	O→*Q7*	O→*Q7*	O	O	4.3.6
4.3.7Go to hospital	O→*Q7*	O→*Q7*	O→*Q7*	O	O	4.3.7
4.3.8Nothing	O→*Q8*					4.3.8
4.3.9Drug given, but not known	O→*Q4.4*	O→*Q4.4*	O→*Q4.4*	O	O	4.3.9
4.3.10Others_____	O	O			O	4.3.10

_____

If Others is ***NOT*** *concerned with drugs, herbs or hospital/health post →Q8*
If two actions are mentioned take care that you go through <u>both</u> sections of the questionnaire!
If only Don't know and No action is mentioned → Q8

4.4 Did anybody advice you what drug to use?

	Yes – 1	No - 2	
4.4.1Drug seller	O	O	4.4.1
4.4.2Spouse	O	O	4.4.2
4.4.3Neighbours/elder person	O	O	4.4.3
4.4.4Nobody	O	O	4.4.4
4.4.5Other	O	O	4.4.5
4.4.6Don' know	O	O	4.4.6

5. Drug Treatment Questions:

All question in this section are only concerned with drugs taken on a self medication basis! Please clarify if the participant is not talking about a drug he got prescribed from Hospital/Health Post etc for this illness episode!.

5.1**Antimalarial Drug Treatment only**: *(any drug containing Chloroquine/Amiodiaquine/Fansidar/, if no Antimalarial drug was given skip this section)*

5.1.1Brandname of drug _____ 5.1.1

5.1.2How did you administer the drug**?**

O Teaspoons	1
O Tablespoons	2
O Caps of syrup	3
O Tablets	4
O Injections	5
O Others	6
O Don't know	7

How much of this drug did you give to your child for the treatment? Please try to remember as exactly as possible, when you gave what dosage! If you don't remember, please tell me. *Enter the number in the spaces. If there was no drug given at that time enter 0! For Don't remember enter 99!*

Day 1: morning___afternoon___evening___
Day 2: morning___afternoon___evening___
Day 3: morning___afternoon___evening___
Day 4: morning_.._afternoon___evening___
For more days: How many <u>more</u>? _____
total _____
Dosage per day (*for the days more than* 4)_____

5.1.3 Recommended total dosage according to WHO Age/ Dosage table (mg) 5.1.3

5.1.4 Dosage taken: 5.1.4

5.1.5 Total No. of days under medication 5.1.5

5.2 **Paracetamol Treatment only** (*for any drug containing paracetamol, if no drug containing paracetamol was given, skip this section)*

5.2.1Brandname _____

5.2.2How did you administer the drug?

O Teaspoons	1
O Tablespoons	2
O Caps of syrup	3
O Tablets	4
O Injections	5
O Others	6
ODon't know	7

5.2.2

How much of this drug did you give to your child for the treatment? Please try to remember as exactly as possible, when you gave what dosage! If you don't remember, please tell me. *Enter the number in the spaces. If there was no drug given at that time enter 0! For Don't remember enter99!*

Day 1: morning___afternoon___evening___
Day 2: morning___afternoon___evening___
Day 3: morning___afternoon___evening___
Day 4: morning___afternoon___evening___
For more days: How many more? _____
Dosage per day (*for the days more than* 4)_____

5.2.3 Recommended daily dosage: 5.2.3 ☐

5.2.4 mg taken daily average _____ 5.2.4 ☐

5.2.5 Total No. of days under medication 5.2.5 ☐

5.3 Additional drugs: (*Name of drug, dosage and for how long/how many days)*

_____
_____ 5.3 ☐
_____

5.4 When it came to the dosage of that drug, did you know how much to give or did you get intructions how to use the drug(s)?

		Yes – 1	No – 2	
5.4.1	Intructions from drug seller	O	O	5.4.1 ☐
5.4.2	Instruction from spouse	O	O	5.4.2 ☐
5.4.3	Intruction from neighbour/elder person	O	O	5.4.3 ☐
5.4.4	Intructions on packing/bottle	O	O	5.4.4 ☐
5.4.5	Know dosages myself	O	O	5.4.5 ☐
5.4.6	Others _____	O	O	5.4.6 ☐
5.4.7	Don't know	O	O	5.4.7 ☐

5.5 Did you have that drug(s) at home?

O Yes 1
O No 2 5.5 ☐
O Don't know 3

5.6 From where did you get the treatment for your child?

O Chemical store 1
O Pharmacy 2
O Drug peddler 3
O Neighbour 4 5.6 ☐
O Others _____ 6
O Don't know 7

5.7 How much did you pay for the drugs

	Name of drug	Amount (¢)	
5.7.1	Contains Chloroquine _____	_____	5.7.1 ☐
5.7.2	Contains Paracetamol _____	_____	5.7.2 ☐
5.7.3	Other drugs (*specify*) _____	_____	5.7.3 ☐
5.7.4	_____	_____	5.7.4 ☐
5.7.5	_____	_____	5.7.5 ☐
5.7.6	**Total**	_____	5.7.6 ☐

5.8 What was the **main** reason for not going to the hospital/health post?

O Disease uncomplicated 1
O No Money 2
O Home treatment was sufficient 3
O Too much time involved *(Waiting hours etc)* 4
O No transport 5 5.8 ☐
O Others _____ 7
O Don't know 8
O No answer 9

6.Herbal Treatment

6.1From where did you get the herbs for your child?	Yes – 1	No – 2	
6.1.1 Collected myself	O →*Q6.3*	O	6.1.1
6.1.2 Spouse	O →*Q6.3*	O	6.1.2
6.1.3 Herbalist	O	O	6.1.3
6.1.4 Neighbor/elder person	O	O	6.1.4
6.1.5 Others_____	O	O	6.1.5

6.2 What did you pay for the herbs _____Cedis 6.2

6.3 What herbs did you use _____1 6.3

_____

O Don't know 2

6.4What parts did you use and how did you prepare and apply it?

_____

1_____ 6.4

_____

O Don't know 2

6.5 For how long did you give the herb to the child? _____days 6.5

O Don't know 99

6.6 What was the **main** reason for you not to use drugs?

O No money 1
O No drugs available 2
O More trust in herbs 3 6.6
O Illness not serious 4
O Others_____ 5
O No answer 9

6.7 What was the **main** reason not to go to hospital/health post?

O Disease uncomplicated 1
O No money 2
O Home treatment is sufficient 3 6.7
O Too much time involved 4
(Waiting hours etc)
O No transport 5
O Others _____ 6
O No answer 9

7. Hospital Treatment

7.1 How many days after the start of that illness episode did you go to the clinic/hospital?
Same day is 0 _____ days 7.1

7.2 What was the **main** reason why you seek treatment at the hospital/health post?

O Disease was severe 1
O Always go to hospital 2
O Child is very young 3 7.2
O Others _____ 4
O No answer 9

7.3 What means of transport did you use to bring your child to hospital?

	Yes –1	No – 2	
7.3.1 Car/Truck	O	O	7.3.1
7.3.2 Tractor	O	O	7.3.2
7.3.3 Motorbike	O	O	7.3.3
7.3.4 Bicycle	O	O	7.3.4
7.3.5 Foot (longer than 1hour)	O	O	7.3.5
7.3.6 Others_____	O	O	7.3.6

7.4 How much did the transport to the hospital cost?
Add up all costs _____Cedis 7.4

7.5 What diagnosis was made at the hospital?

O Malaria 1
O Don,t know 2

O Others…… 3
O No answer 9

7.6 What treatment did you receive at the hospital?

O Outpatient Drug Treatment 1
O Admission 2
O Others…… 3 7.6 ☐
O Don't know 4
O No answer 9

7.7 Which drug(s) did you get at the hospital?

	Yes – 1	No – 2	after probing-3	Don't know-4	
7.7.1Chloroquine tablet	O	O	O	O	7.7.1 ☐
7.7.2Paracetamol tablet	O	O	O	O	7.7.2 ☐
7.7.3 Cloroquine syrup	O	O	O	O	7.7.3 ☐
7.7.4Paracetamol syrup	O	O	O	O	7.7.4 ☐
7.7.5Vitamins	O	O	O	O	7.7.5 ☐
7.7.6Iron	O	O	O	O	7.7.6 ☐
7.7.7Amiodiaquin	O	O	O	O	7.7.7 ☐
7.7.8 Others_____	O	O	O	O	7.7.8 ☐

7.8**Antimalarial Drug Treatment only**: *(any drug containing antimalarial drugs, if no antimalarial was given skip this section)*

7.8.1Brandname of drug _____ ☐

7.8.2How did you administer the drug**?**

O Teaspoons 1
O Tablespoons 2
O Caps of syrup 3
O Tablets 4 ☐
O Injections 5
O Others 6
O Don't know 9

How much of this drug did you give to your child for the treatment? Please try to remember as exactly as possible, when you gave what dosage! If you don't remember, please tell me. *Enter the number in the spaces. If there was no drug given at that time enter 0! For Don't remember enter 99!*

Day 1: morning___afternoon___evening___
Day 2: morning___afternoon___evening___
Day 3: morning___afternoon___evening___
Day 4: morning___afternoon___evening___
For more days: How many <u>more</u>? _____
Dosage per day (*for the days more than* 4)_____

7.8.3 Dosage: O right 1
O wrong 2 7.8.3 ☐
O not known 3

7.8.4 mg of ingredient
total _____ 7.8.4 ☐

7.8.5 Time period of medication
O right 1
O to long 2
O to short 3 7.8.5 ☐
O not known 4

7.9 **Paracetamol Treatment only** (For all drugs containing paracetamol, if no drug containing paracetamol was given, skip this section!)

7.9.1 Brandname _____ 7.9.1 ☐

7.9.2 How did you administer the drug?

O Teaspoons 1
O Tablespoons 2
O Caps of syrup 3 7.9.2 ☐
O Tablets 4
O Injections 5
O Others 6
O Don't know 9

How much of this drug did you give to your child for the treatment? Please try to remember as exactly as possible, when you gave what dosage! If you don't remember, please tell me. *Enter the number in the spaces. If there was no drug given at that time enter 0! For Don't remember enter99!*

Day 1: morning___afternoon___evening___
Day 2: morning___afternoon___evening___
Day 3: morning___afternoon___evening___
Day 4: morning___afternoon___evening___
For more days: How many <u>more</u>? _____
Dosage per day (*for the days more than* 4)_____

7.9.3 Dosage:
O right 1
O wrong 2 7.9.3 ☐
O not known 3

7.9.4 mg of ingredient
total _____ 7.9.4 ☐

7.9.5 Time period of medication
O right 1
O to long 2
O to short 3 7.9.5 ☐
O not known 4

7.10 Additional drugs: (*Name of drug, dosage and for how long/how many days)*

_____
_____ 1 7.10 ☐
_____

7.11 How much did you pay for the drugs

	Name of drug (Don't know – 1)	Amount (¢)	
7.11.1 Contains Chloroquine	_____	_____	7.11.1 ☐
7.11.2 Contains Paracetamol	_____	_____	7.11.2 ☐
7.11.3 Other drugs (*specify*)	_____	_____	7.11.3 ☐
7.11.4	_____	_____	7.11.4 ☐
7.11.5	_____	_____	7.11.5 ☐
7.11.6 **Total**	_____		7.11.6 ☐

7.12 Who did give you intructions on the dosage of the drug?

O Doctor 1
O Other Health Staff 2
O Dispensary Staff 3 7.12 ☐
O Nobody 4
O Others…….. 5
O No answer 9

Skip question if not admitted. →Q7.15

7.13 What treatment was given on admission?

(*which drug(s)* 1
…….
…….
O Don't know 2 7.13 ☐
O No answer 9

7.14 Was the child discharged?

O Yes
O No, still on admission
O No, died 7.14 ☐
O Others _____

7.15 How much did you pay for the treatment at the hospital? *Add up all cost*

7.15.1	Drugs _____	Cedis	7.15.1 ☐
7.15.2	Admission _____	Cedis	7.15.2 ☐
7.15.3	Transport _____	Cedis	7.15.3 ☐
7.15.4	Other Costs_____	Cedis	7.15.4 ☐
7.15.5.	Total _____	Cedis	7.15.5 ☐

8. After these actions, was there a need for further treatment?

O No further treatment necessary, child without symptoms for 7 days or more 1→*Q9*
O No further treatment was necessary, Malaria episode ended within last 6 days 2→*Q9*
O Further treatment was necessary 3 **8** ☐
O Child died 4→*Q9*
O Child still sick, but no additional action taken up to now 5→*Q9*
O No answer 9→*Q9*

8.1 When there was the need for further treatment, what symptoms did the child have at this stage of the Malaria episode?

	1 – mentioned	2 after probing,	3 – no symptom	4 - don't know	
8.1.1 Fever was persisting	O	O	O	O	8.1.1 ☐
8.1.2 Convulsions	O	O	O	O	8.1.2 ☐
8.1.3 Unconsciousness/Coma	O	O	O	O	8.1.3 ☐
8.1.4 Rapid breathing/ Difficulties in getting air	O	O	O	O	8.1.4 ☐
8.1.5 Severe jaundice	O	O	O	O	8.1.5 ☐

8.1.6	Cough	O	O	O	O	8.1.6
8.1.7	Vomiting	O	O	O	O	8.1.7
8.1.8	Diarrhoea	O	O	O	O	8.1.8
8.1.9	Pass no more or very few urine	O	O	O	O	8.1.9
8.1.10	High fever	O	O	O	O	8.1.10
8.1.11	Dark red nearly black urine	O	O	O	O	8.1.11
8.1.12	Sever Anaemia(severe pallor of handinside, conjunctivas)	O	O	O	O	8.1.12
8.1.13	Others_____	O	O	O	O	8.1.13

8.2 What treatment actions did you take, when there was the need for further treatment? Please tell me all everything you did from that point of the Malaria episode!

		Yes–1	No-2	after probing-3	Don't know-4	
8.2.1	Chloroquine /Resochin Tabs self medication	O	O	O	O	8.2.1
8.2.2	Paracetamol Tabs self medicaton	O	O	O	O	8.2.2
8.2.3	Cloroquine/Resochin Syrupself medication	O	O	O	O	8.2.3
8.2.4	Paracetamol Syrup self medication	O	O	O	O	8.2.4
8.2.5	Herbs	O	O	O	O	8.2.5
8.2.6	Go to herbalist	O	O	O	O	8.2.6
8.2.7	Go to health post/hospital	O →*Q8.4*	O	O →*Q8.4*	O	8.2.7
8.2.8	Nothing	O	O	O	O	8.2.8
8.2.9	Others_____	O	O			8.2.9

8.3 What was the main reason for you not to go to hospital? →*Q8.5*

O Disease uncomplicated	1	
O No money	2	
O Home treatment is sufficient	3	
O Too much time involved *(Waiting hours etc)*	4	8.3
O No transport	5	
O No answer	6	
O Others _____	7	

8.4 What was the main reason to go to hospital now?

O Severe symptoms appeared	1	
O Did not recover after treatment	2	
O No answer	3	8.4
O Others _____	4	

8.5 Did the child recover?

O Yes, no symptoms since 7 days or more	1	
O Yes, episode ended within last 6 days	2	
O Still sick	3	8.5
O Died	4	
O No answer	9	

8.6. List of all costs involved in the further treatment excluding the cost of the first actions Q4-7

8.6.1	Drugs _____Cedis	8.6.1	
8.6.2	Herbs _____Cedis	8.6.2	
8.6.3	Admission _____Cedis	8.6.3	
8.6.4	Transport _____Cedis	8.6.4	
8.6.5	Other costs _____Cedis	8.6.5	
8.6.6	**Total** _____Cedis	8.6.6	

9. Treatment decision process

9.1Who was involved in the initial choice of the treatment you mentioned as your first actions?

		Yes –1	No -2	
9.1.1	Caretaker	O	O	9.1.1
9.1.2	Spouse	O	O	9.1.2
9.1.3	Neighbours/elder person	O	O	9.1.3
9.1.4	Others	O	O	9.1.4
	specify……	O	O	
9.1.5	No answer	O	O	9.1.5

9.2 Who had the final saying what to do?

O Caretaker	1	
O Spouse	2	
O Neighbour/elder person	3	9.2 ☐
O Others	4	
O Caretaker and Spouse	5	
O No answer	9	

9.3 Who paid the bill?

O Caretaker	1	
O Spouse	2	9.3 ☐
O Others_____	3	

Signature field worker: _____

Caretaker's Name:……. CT Id No

Husbands/Partner's Name:……. HU Id No.:

Husband not available at second follow up:
Reason:…….

10 Questions concerning the Husband:

10.1 Are you familiar with the term 'Malaria'?

O Yes 1 O No 2 10.1

11 What symptoms can a child present, if it has 'Malaria'?

Let the participant answer on his own first, then probe for the remaining symptoms on the list!

		1 – mentioned	2 after probing,	3 – no symptom	4 - don't know	
11.1	Fever/hot body	O	O	O	O	11.1
11.2	Chills/Shivering	O	O	O	O	11.2
11.3	Child won't play	O	O	O	O	11.3
11.4	Weakness	O	O	O	O	11.4
11.5	Muscle Pain/Joint pain	O	O	O	O	11.5
11.6	Headache	O	O	O	O	11.6
11.7	Loss of appetite	O	O	O	O	11.7
11.8	Abdominal discomfort (*Vomiting/loose stools)*	O	O	O	O	11.8
11.9	Cough	O	O	O	O	11.9
11.10	Jaundice (yellowish colour)	O	O	O	O	11.10
11.11	Pallor (inside hand/general)	O	O	O	O	11.11
11.12	Yellowish urine	O	O	O	O	11.12
11.13	Others *specify*_____	O	O	O	O	11.13

12 What symptoms make you alarmed that the Malaria is serious? *(Alarming signs)*

		1 – mentioned	2 after probing,	3 – no symptom	4 - don't know	
12.1	Convulsions	O	O	O	O	12.1
12.2	Unconsciousness/Coma	O	O	O	O	12.2
12.3	Rapid breathing/ difficulties in getting air	O	O	O	O	12.3
12.4	Severe jaundice	O	O	O	O	12.4
12.5	Persistent cough	O	O	O	O	12.5
12.6	Persistent vomiting	O	O	O	O	12.6
12.7	Persistent diarrhoea	O	O	O	O	12.7
12.8	Pass no more or very few urine	O	O	O	O	12.8
12.9	High fever	O	O	O	O	12.9
12.10	Dark red nearly black urine	O	O	O	O	12.10
12.11	Anaemia (*severe pallor of palms, conjunctiva*)	O	O	O	O	12.11
12.12	Others *specify*	O	O	O	O	12.12

13 What do you think causes 'Malaria'?

		mentioned-1	not mentioned-2	
13.1	Mosquito	O	O	13.1
13.2	Sun	O	O	13.2
13.3	Bad Nutrition(Food/Water)	O	O	13.3
13.4	Dirty Surrounding	O	O	13.4
13.5	Others_____	O	O	13.5

14 What do you do to prevent 'Malaria'?

mentioned–1 not mentioned-2

14.1	Use mosquito nets	O	O	14.1
14.2	Clean/weed surrounding	O	O	14.2
14.3	Take drugs	O	O	14.3
14.4	Take herbs	O	O	14.4
14.5	Avoid too much sun	O	O	14.5
14.6	Rest enough	O	O	14.6
14.7	Burn herbs	O	O	14.7
14.8	Mosquito Coils	O	O	14.8
14.9	Good Nutrition	O	O	14.9
14.10	Others_____	O	O	14.10

15 What do you usually do, if your chil dhas Malaria?

		mentioned-1	not mentioned-2	
15.1	Chloroquine/Resochin Tabs	O	O	15.1
15.2	Paracetamol Tabs	O	O	15.2
15.3	Cloroquine/Resochin Syrup	O	O	15.3
15.4	Paracetamol Syrup	O	O	15.4
15.5	Herbs/Herbalist	O	O	15.5
15.6	Go to health post	O	O	15.6
15.7	Go to hospital	O	O	15.7
15.8	Nothing	O	O	15.8
15.9	No answer	O	O	15.9
15.10	Others_____	O	O	15.10

16 If your child then does not recover, what do you usually do next?

O Chloroquine /Resochin Tabs	1	
O Paracetamol Tabs	2	
O Cloroquine/Resochin Syrup	3	
O Paracetamol Syrup	4	
O Herbs	5	
O Go to herbalist	6	16
O Go to health post	7	
O Go to hospital	8	
O Nothing	9	
O No answer	10	
O Others_____	11	

17 Treatment decision process

17.1 Who is normally involved in the choice of the treatment for the child if it has Malaria?

		Yes–1	No-2	
17.1.1	Husband	O	O	17.1.1
17.1.2	Spouse	O	O	17.1.2
17.1.3	Neighbours/elder person	O	O	17.1.3
17.1.4	Others……	O	O	17.1.4
17.1.5	No answer	O	O	17.1.5

18. Who had the final saying what to do?

O Spouse	1	
O Husband of caretaker	2	
O Neighbour/ elder person	3	18
O Others……	4	
O No answer	9	

19 Pleae tell me: How can the child be better treated for Malaria. What would need improvement?

		Mentioned-1	Not mentioned-2	
19.1	Close health posts/hospitals	O	O	19.1
19.2	Better streets	O	O	19.2
19.3	More staff at clinic/hospital	O	O	19.3

19.4	Better education of drug sellers	O	O	19.4
19.5	Better education of population	O	O	19.5
19.6	Cheaper treatment at clinic/hospital	O	O	19.6
19.7	Better treatment at clinic	O	O	19.7
19.8	Cheaper drugs	O	O	19.8
19.9	Others……	O	O	19.9

19.10 What language did the participant speak?

O Twi 1
O Others_____ 2

19.10

Signature field worker: _____

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