KNOWLEDGE AND PRACTICE OF HOME MANAGEMENT OF MALARIA AMONG MOTHERS OF UNDER-FIVES ATTENDING HADEJIA GENERAL HOSPITAL, JIGAWA STATE

BY

AHMED UMAR
MPH/MED/2303/2009-2010

DECEMBER, 2012

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MPH/MED/2303/2009-2010

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DECLARATION

This is to declare that this research work on "KNOWLEDGE OF HOME MANAGEMENT OF MALARIA AMONG MOTHERS OF UNDER-FIVES ATTENDING HADEJIA GENERAL HOSPITAL" was carried out by me, under the supervision of Dr. M.A. Abdul Department of Obstetrics and Gynaecology, Faculty of Medicine, Ahmadu Bello University, Zaria.

All the original ideas by me are reflected in the work alongside, other contributors are fully acknowledged as well.

Dr Ahmed Umar **Date**

CERTIFICATION

This thesis entitled "KNOWLEDGE OF HOME MANAGEMENT OF MALARIA AMONG MOTHERS OF UNDER-FIVES ATTENDING HADEJIA GENERAL HOSPITAL" by Ahmed Umar meets the regulations governing the award of the degree of Master in Public Health of Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This work is dedicated with love to all under-five children of Jigawa State. It is also dedicated to my wife Hajara, and my beloved children Tijjani, Fatima and Abdul'azeez for all their love and support.

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ABSTRACT

Background: One of the key interventions proposed under the Roll back malaria initiative is improvement of case management of malaria at the home and community levels to reduce malaria burden.

Objective: The objective of the study is to ascertain mother's knowledge and practice regarding home management of malaria fever in under five children in Hadejia town, Jigawa State.

Methods: This was a descriptive cross sectional study conducted in 2011. A systematic sampling method was used to select the 350 respondents. A respondent who had at least one living child under 5years old was included in the study. Data was collected using interviewer administered questionnaires and analyzed with SPSS version 20.0.

Result: Majority of the respondents were between the age of 18-40yrs. Less than One fifth (17.1%) of the respondents have correct knowledge of the causation of malaria and 71% have correct knowledge of the prevention of malaria. Forty two percent of the respondents used one or more of the five treatment modalities. The commonest treatment practice by respondents for their young children with malaria was taking them to health centers (39.8%) followed by home treatment with antimalarial drugs (17.1%). Only 31.4% of the children were treated with artemisinin combine therapy.

Conclusion: The findings of this study have shown that knowledge of mothers on treatment of malaria as well as practices of preventive measures is low. Artemisinin combine therapy is not widely used as the treatment for perceived malaria at home.

Key words: Malaria, children, mothers, treatment, prevention.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND INFORMATION

The vast majority of malaria deaths occur in Africa, south of the Sahara, where malaria also presents major obstacles to social and economic development. Malaria has been estimated to cost Africa more than US$ 12 billion every year in lost GDP, even though it could be controlled for a fraction of that sum.[1]

There are at least 300 million acute cases of malaria each year globally resulting in more than a million deaths. Around 90% of these deaths occur in Africa, mostly in young children.[2] Malaria is Africa's leading cause of under-five mortality (20%) and constitutes 10% of the continent's overall disease burden. It accounts for 40% of public health expenditure, 30-50% of in-patient admissions, and up to 50% of outpatient visits in areas with high malaria transmission.[1] Malaria accounts for over 60% of outpatient visit in Nigeria and other sub-Saharan African countries.[3] Prompt access to effective anti-malarial treatment is one of the major strategies for reducing the burden of malaria. Prompt access means having treatment available as near to home as possible so that it is given within 24hrs of onset of symptoms.

1.2 MAGNITUDE OF THE PROBLEM

In Africa where the mortality burden from malaria is greatest, the majority of children die before they reach health facilities. Factors such as distance from home, poverty, the demands of domestic life, perceived low quality of services, drug stock outs, attitude of health workers has led to the by-passing of public health care facilities in favor of health care from private or informal sector with inadequate or poor quality of drugs.[4]

Nigeria is among African countries that have committed it self to ensure that at least 60% of those suffering from malaria have prompt access to affordable and appropriate treatment within 24hrs of onset of symptoms (Roll Back Malaria strategy).[1] This challenge could only be attained through scaling up of home-based management of malaria.

Experience and lesson learnt in scaling up home management of malaria (HMM) in Burkina Faso, Ghana, Kenya, Nigeria, Uganda and Zambia was shown to be both feasible and effective in ensuring prompt access to appropriate treatment in the African region.[1]

It was generally agreed that it was time to scale up HMM in endemic countries to cover the majority of their populations. This will in turn help the populations to access quality drugs at appropriate dosages within 24hrs of onset of symptoms especially in remotest areas of Africa.[2]

It has been recognized that, in endemic countries, most malaria episodes are treated outside public health facilities, mainly at home.[1] Health facility-based treatment do not reach majority of the population. As a result, the provision of improved home – based management of uncomplicated malaria has become a key strategy for meeting Roll Back malaria (RBM) country targets.[2]

Many childhood febrile illnesses are treated at home prior to presentation. This is a very common practice among mothers in Nigeria and other malaria endemic countries in sub-Sahara Africa.[5]

In Nigeria between 60 and 80% of children would have been treated at home prior to reporting at health facilities.[5]

Going by the large population of children in Nigeria and a small proportion of functional health facilities available to cater for them, there is need to involve mothers in the management of minor disease conditions presenting with fever. Such conditions include malaria and respiratory tract infections; the two common causes of fever in Nigerian children.[6] There are wide regional disparities existing in child health indicators with the North-East and North-West geopolitical zones of the country having the worst child survival figures.[7]

1.3 JUSTIFICATION OF THE STUDY

It is now widely acknowledged that access to appropriate and effective treatment for malaria should be provided within 24 hours of onset of symptoms. A strategy to provide such access should take into account poor rural populations in malaria-endemic countries who are particularly inadequately served by the health system. This is the access gap that the HMM strategy addresses, enabling the home to be the first "hospital".[8]

Evidence from Nigeria shows that most episodes of fever are initially self-treated and over 70% of cases rely exclusively on it.[9] However of this proportion only 15% of the actions taken were adjudged as appropriate. This pattern has been consistent across the Country as documented in several other reports.[8] A study of health seeking behavior for childhood illnesses in 3 rural Nigerian communities showed that the most common form of first line treatment was drugs from a patent medicine vendor (49.6%), while only 3.6% did nothing.[10] In a study conducted at Igbo Etiti and Ibarapa North in Nigeria on 105 preschool children, Brieger et al found that 74% of parents took treatment action under 8 hours of onset of illness, while nearly 96% acted within 24 hours. Unfortunately only 14.3% of these actions were judged to have been appropriate.[4] Studies in rural areas have

shown the feasibility of home management and its positive impact on the burden of malaria.[4] There is also paucity of data on HMM in Northern Nigeria.

1.4 AIM AND OBJECTIVES

1.4.1 Goal

To ascertain mother's knowledge and practice regarding home management of malaria fever in under five children in Hadejia town, Jigawa State.

1.4.2 Specific objectives

1. To document the proportion of mothers who are able to recognize and respond appropriately to malaria at home.
2. To document the knowledge of mothers on prevention of malaria.
3. To determine the mothers' treatment practices in cases of episodes of malaria.

CHAPTER TWO

LITERATURE REVIEW

2.1 HISTORICAL BACKGROUND

Malaria parasites have been with us since the dawn of time. They probably originated in Africa (along with mankind), and fossils of mosquitoes up to 30 million years old, show that the malaria vector, the malaria mosquito, was present well before the earliest history.[11] Hippocrates, a physician born in ancient Greece, today regarded as the "Father of Medicine", was the first to describe the manifestations of the disease, and related them to the time of year and to where the patients lived.[12] Before this, the supernatural was blamed. The association with stagnant waters (breeding grounds for the Anopheles mosquito) led the Romans to begin drainage programs, the first intervention against malaria.[12]

The first recorded treatment dates back to 1600, when the bitter bark of the Cinchona tree in Peru was used by the native Peruvian Indians. By 1649, the bark was available in England, as "Jesuits powder," so that those suffering from "agues" might benefit from the chemical substance quinine, which it contained.[13]

Not until 1889 was the protozoal (single celled parasite) cause of malaria discovered by Alphonse Laveran working in Algeria, and only in 1897 was the Anopheles mosquito demonstrated to be the vector for the disease by Ronald Ross.[14]

2.2 ANNUAL DATA ON EPIDEMIOLOGY OF MALARIA

The WHO estimates that in 2010 there were 219 million cases of malaria resulting in 660,000 deaths,[15] equivalent to roughly 2000 deaths every day.[15] Using a different set of

predictive models to estimate mortality, a 2012 study determined the number of documented and undocumented deaths in 2010 to be 1.24 million.[16] The majority of cases (65%) occur in children under 15 years old.[16] About 125 million pregnant women are at risk of infection each year; in Sub-Saharan Africa, maternal malaria is associated with up to 200,000 estimated infant deaths yearly.[17] There are about 10,000 malaria cases per year in Western Europe, and 1300–1500 in the United States.[18] About 900 people died from the disease in Europe between 1993 and 2003.[19] Both the global incidence of disease and resulting mortality have declined in recent years. According to the WHO, deaths attributable to malaria in 2010 were reduced by over a third from a 2000 estimate of 985,000, largely due to the widespread use of insecticide-treated nets and artemisinin-based combination therapies.[20]

Malaria is presently endemic in a broad band around the equator, in areas of the Americas, many parts of Asia, and much of Africa; in Sub-Saharan Africa, 85–90% of malaria fatalities occur.[21] An estimate for 2009 reported that countries with the highest death rate per 100,000 of population were Ivory Coast with 86.15, Angola (56.93) and Burkina Faso (50.66).[22] An estimate for 2010 said the deadliest countries per population were Burkina Faso, Mozambique and Mali.[16] The Malaria Atlas Project aims to map global endemic levels of malaria, providing a means with which to determine the global spatial limits of the disease and to assess disease burden.[23,24] This effort led to the publication of a map of *P. falciparum* endemicity in 2010.[25] As of 2010, about 100 countries have endemic malaria.[15,26] Every year, 125 million international travelers visit these countries, and more than 30,000 contact the disease.[19]

The geographic distribution of malaria within large regions is complex, and malaria-afflicted and malaria-free areas are often found close to each other.[27] Malaria is prevalent in tropical and subtropical regions because of rainfall, consistent high temperatures and high humidity, along with stagnant waters in which mosquito larvae readily mature, providing them with the environment they need for continuous breeding.[28] In drier areas, outbreaks of malaria have been predicted with reasonable accuracy by mapping rainfall.[29] Malaria is more common in rural areas than in cities. For example, several cities in the Greater Mekong Sub region of Southeast Asia are essentially malaria-free, but the disease is prevalent in many rural regions, including along international borders and forest fringes.[30] In contrast, malaria in Africa is present in both rural and urban areas, though the risk is lower in the larger cities.[31]

2.2.1 The epidemiology of malaria in Nigeria

Malaria is a major public health problem and indeed a cause and consequence of underdevelopment in Nigeria.[32]

Incidence of malaria varies by weather, which affects the ability of the main carrier of malaria parasites, anopheline mosquitoes, to survive or otherwise.[33]

Tropical areas including Nigeria have the best combination of adequate rainfall, temperature and humidity allowing for breeding and survival of anopheline mosquitoes. Of the five species of Plasmodium that infect humans - *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium malariae*, *Plasmodium Knowlesi* and *Plasmodium ovale*, *Plasmodium falciparum* causes most of the severity and deaths attributable to the disease, which is most prevalent in Africa south of the Sahara, where Nigeria has the

largest population. Country-specific evidence shows that Nigeria has the largest population at risk of malaria in Africa and therefore most vulnerable to the risk of missing MDGs target.[34]

Malaria endemicity is determined by parasitemia rate and palpable Spleen rate in 2-9 year old. Nigeria is a malaria holoendemic area.[35]

2.2.2 Malaria zones in Nigeria

Nigeria can be divided into three major malaria epidemiological zones, namely, forest, savannah and grass-land zones. The forest zone consists of coastal areas stretching from Lagos in the South-Western Nigeria to the forest areas in the Eastern Nigeria up to the Northern portion of the forest zone of Oyo state. [36] The Savannah zone consists of areas north of Oyo state to the central areas of Kogi and Benue states and the Grass-land zones consists of the most northern parts of Nigeria – Katsina state and areas to its north.[36] The most dominant species of anopheles mosquito in Nigeria are anopheles funestus, anopheles gambiae complex, anopheles arabiensis and anopheles melas. The dominant vector in the forest zone is anopheles melas while the dominant vectors in the savannah zone are a combination of anopheles melas and anopheles arabiensis; the dominant vector in the grass-land zone is anopheles arabiensis.[36]

2.2.3 Endemicity and early malariometry

The very etymology of endemic ("in" the population) versus epidemic ("upon" the population) shows the early recognition that the level of a disease, and therefore its character, vary between populations and places.

The first method used to quantify malaria endemicity - and thus the first method of malariometry - was introduced in India in 1848 and involved determining the spleen rate (the proportion of a sampled population with palpable enlargement of the spleen) found during a malariometric survey (an investigation of selected age-groups of a randomly sampled population to assess the degree of malarial endemicity in a location).[37] The term "rate" has unfortunately always been used in the context of malariometric surveys despite the quantity measured being a prevalence. Thus, from the very beginning of malariometry attention was focused on the clinical manifestations of malaria infection in the human population.[37]

However, to classify the malaria prevalence estimates obtained by surveys in an epidemiologically meaningful manner was subject to active and prolonged debate. It took over 100 years to reach a consensus that characterized prevalence values from spleen rate surveys as follows: holoendemic more than 75%, hyperendemic 51–75%, mesoendemic 11–50%, and hypoendemic less than 10%, when measured in the 2–9-year-old age-group.[12] Shortly after this consensus, however, it was suggested that examination of the peripheral blood for asexual malaria parasites by microscopy during malariometric surveys to provide a parasite rate had increased specificity for malaria infection.[37]

2.2.4 Pathophysiology and lifecycle of the malaria parasite

The life cycle of the malarial parasite is very complex. *P. falciparum* and, to a much lesser extent, *P. vivax* are the main causes of disease and death due to malaria. Mosquitoes inject parasites in the form of sporozoites into the subcutaneous tissue and less frequently, directly into the bloodstream and from there, they travel to the liver.

Recent evidence indicates that sporozoites pass through several hepatocytes before invasion is followed by parasite development.[38]

The co-receptor on sporozoites for invasion involves, in part, the thrombospondin domains on the circumsporozoite protein and on thrombospondin-related adhesive protein (TRAP). These domains bind specifically to heparin sulfate proteoglycans on hepatocytes in the region in apposition to sinusoidal endothelium and Kuppfer cells. Within the hepatocyte, each sporozoite develops into tens of thousands of merozoites, the merozoites released from the liver recognize, attach, and enter the red blood cells (RBCs) by multiple receptor–ligand interactions in as little as 60 seconds. This quick disappearance from the circulation into the red cells minimises the exposure of the antigens on the surface of the parasite, thereby protecting these parasite forms from the host immune response.[39,40,41] The invasion of the merozoites into the red cells is facilitated by molecular interactions between distinct ligands on the merozoite and host receptors on the erythrocyte membrane. *P. vivax* invades only Duffy blood group-positive red cells, using the Duffy-binding protein and the reticulocyte homology protein, found mostly on the reticulocytes. The more virulent *Plasmodium falciparum* uses several different receptor families and alternate invasion pathways that are highly redundant. Varieties of Duffy binding-like (DBL) homologous proteins and the reticulocyte binding-likehomologous proteins of *Plasmodium falciparum* recognize different RBC receptors other than the Duffy blood group or the reticulocyte receptors. Such redundancy is helped by the fact that *plasmodium. falciparum* has four Duffy binding-like erythrocyte-binding protein genes, in comparison to only one gene in the DBL-EBP family as in the case of *P. vivax*, allowing *P. falciparum* to invade any red cell in human.[43,44]

Distribution of Plasmodia: Nearly 85% of cases in Africa are caused by *P. falciparum*, the remaining cases being caused by the other three strains. *P. vivax* is now the most geographically widespread of the human malarias, occurring in much of Asia, Central and South America, the Middle East, where 70–90% of the malaria burden is of this species and the rest due to *P. falciparum*.[38] *P. malariae* causes sporadic infections in Africa, parts of India, western Pacific and South America, whereas *P. ovale* is restricted to tropical Africa, New Guinea, and the Philippines.[38] *P. knowlesi* has been reported from South East Asian countries such as Malaysia, Thailand, Vietnam, Myanmar and Philippines.[42]

2.3 PRESENTATION OF MALARIA

Malaria disease is caused by parasites that are spread by mosquitoes. The anopheles mosquitoes transmit the malaria parasites that cause malaria in humans.[38]

Fever, vomiting and anorexia were the commonest malaria symptoms in children, while headache, fever, chills and rigors were the commonest malaria symptoms in adults. Fever, vomiting and cough were found to be more associated with malaria parasitaemia in children, while in adults fever was found to be more associated with malaria parasitaemia.[45]

In addition to the above-mentioned symptoms, it may also manifests in more than normal sleeping, nausea and vomiting. It is a serious disease affecting children and adults but its consequences are graver among children and pregnant women.[45]

Nigeria is known for high prevalence of Malaria and it is a leading cause of morbidity and mortality in the country. Available records shows that at least 50 per cent of the

population of Nigeria suffers from at least one episode of malaria each year and malaria accounts for over 45 per cent of all out-patient visits. It is reported that malaria prevalence (notified cases) in 2000 was about 2.4 million.[3] The disease accounts for 25 per cent of infant mortality and 30 per cent of childhood mortality in Nigeria.[3] Therefore, it imposes great burden on the country in terms of pains and trauma suffered by its victims as well as loss in outputs and cost of treatments. The disease is often treated in Nigeria by self-medication, use of local herbs, use of the services of spiritualists/traditional priests or/and the use of clinic/hospital services.[46,47]

Similarly, common preventive measures include use of chemo-prophylaxis, insecticides (coils and sprays), mosquito nets, insecticide-treated nets (ITNs) and window and door nets.[48]

2.4 INTEGRATED VECTOR MANAGEMENT (IVM)

New strategies for malaria prevention and control are emphasizing 'integrated vector management' (IVM). This approach reinforces linkages between health and environment, optimizing benefits to both.[49]

Integrated vector management is a dynamic and still-evolving field. IVM strategies are designed to achieve the greatest disease-control benefit in the most cost-effective manner, while minimizing negative impacts on ecosystems (e.g. depletion of biodiversity) and adverse side-effects on public health. Possible health risks range from acute exposures to pesticides and their residues to bio-accumulation of toxic chemicals, as well as the development of vector resistance to some widely-used pesticides and drugs.[49]

A new WHO Global Strategic Framework for Integrated Vector Management defines IVM as a strategy to improve the efficacy, cost-effectiveness, ecological soundness and sustainability of disease vector control. IVM encourages a multi-disease control approach, integration with other disease control measures and the considered and systematic application of a range of interventions, often in combination and synergistically.[49]

Relying on a single method of vector control (e.g. chemical spraying), IVM stresses the importance of first understanding the local vector ecology and local patterns of disease transmission, and then choosing the appropriate vector control tools from the range of options available.[49]

These include environmental management strategies that can reduce or eliminate vector breeding grounds altogether, through improved design or operation of water resources development projects; and the use of biological controls (e.g. bacterial larvicides and larvivorous fish) that target and kill vector larvae without generating the ecological impacts of chemical use.[49]

At the same time – when other measures are ineffective or not cost effective – IVM makes judicious use of chemical methods of vector control, such as indoor residual sprays, space spraying, and chemical larvicides and adulticides. These approaches reduce disease transmission by shortening or interrupting the lifespan of vectors.[51]

IVM also provides a framework for improved personal protection/prevention strategies that combine the use of environmental management tools/physical barriers with chemical tools for new synergies, e.g. insecticide-treated nets (ITNs). Trials using insecticide-

treated bednets in some malaria-endemic African countries have shown very substantial reductions in child and infant mortality.[52] Finally, IVM supports more accessible and affordable disease diagnosis and treatment with effective anti-malarial drugs, within the framework of a multi-disease control approach.

IVM therefore requires a fundamental restructuring of existing vector control programmes into a flexible, multi-pronged, multisectoral approach to vector-borne disease control that engages a range of government actors, communities, and agencies.[52]

IVM is not a panacea for malaria – which is responsible for approximately 11% of the total disease burden in Africa[53] – or for vector-borne disease in general.

However, the large annual death toll from malaria, and the heavy burden of disease from other vector-borne diseases, the development of vector resistance to some widely-used insecticides and drugs, and the costs of developing new insecticides or insecticide-based control campaigns – all are indicators that a more multi-faceted approach to vector-borne disease is indeed warranted.[54]

In many settings, the use of biological and environmental modification/management strategies – alongside or even in the place of insecticides – has yielded sustainable reductions in disease and transmission rates. The judicious use of insecticides, via careful and targeted application, also can preserve their long-term efficacy, slowing development of vector resistance.[54]

In addition, a number of IVM field experiences have been documented as particularly cost effective in control of disease transmission. IVM strategies also have generated

significant co-benefits to local economies in terms of development and growth – although more work is yet to be done, linking health and economic outcomes.[55]

2.4.1 Human toll and economic costs of malaria

Over 1.2 million people – overwhelmingly children – died of malaria in 2002. This figure reflects an increase in mortality in absolute terms over the previous year, according to data published by the World Health Organization (WHO) in its World health report 2004.[53] Also in 2002, the total burden of disease from malaria was estimated by WHO to be 46 486 000 Disability Adjusted Life Years (DALYs) lost. This figure represents the combined toll of death, illness, and disability from the disease.[53]

Over 85% of malaria deaths, disease, and disability occur in the African Region, with the South-East Asia and Eastern Mediterranean Regions being the second and third hardest-hit by malaria.[53,56] Some experts suggest an even higher incidence of malaria cases than that reported by countries, both in Africa and globally.[54]

Malaria-related illness, in turn, has a direct impact on economic productivity. In the Côte d'Ivoire, farmers diagnosed as sick from malaria for more than two days out of a growing season had 47% lower yields and 53% lower revenues than farmers who missed no more than two days of work.[57,58,59] In general, families highly affected by disease of various kinds may turn from growing higher value crops to less labour demanding and yield-sensitive products – with consequences for household income and nutrition.[59] An analysis of economic growth over 25 years found that countries with intense malaria had rates of GDP growth that were 1.3% lower than those in comparable countries with less intense malaria.[60] Another analysis found that countries with more than 50% of the population

living at risk of infection from malaria parasites had average income levels that were one third of those in countries with less intense rates of disease, even when other confounding factors were removed.[52]

2.4.2 Vector control tools within an IVM framework

In integrated vector management, appropriate vector control solutions are highly dependent on the local behaviour of malaria vectors, on local ecological, hydrological and environmental conditions, and on patterns of disease transmission. Continuous feedback on vector breeding requirements and behaviour and on disease incidence, and subsequent fine-tuning of strategies, is a prerequisite to applying IVM principles to more effective vector control. Indeed, the early history of environmental management offers ample evidence of projects that failed because the local vector behaviour was poorly understood, i.e. bush-clearance programmes carried out for a vector that thrives in sunlight. Below are brief summaries of key issues that may arise.[61]

2.4.3 Environmental modification

Better engineering design of dams, irrigation schemes that allow for alterations in level and flow of water, and flushing of reservoirs can help reduce the availability of vector habitats.[51] In addition, irrigation schemes that permit intermittent irrigation of fields, as well as alternation between cycles of irrigated and non-irrigated crops, have proven very successful in controlling Anopheles mosquitoes in rice-growing regions of China, India, and other parts of Asia.[63,63] Such schemes control vectors by disrupting breeding cycles.[63,64] However, improved design or redesign of water resource systems, irrigation systems, and dams is most likely to occur when major infrastructure investments are being planned, and thus it is critical that health and environment issues be considered by

development actors at the outset of design processes through effective health impact assessment.[64]

2.4.4 Environmental manipulation

In specific settings, time-limited changes in local vegetation, shade, and drainage patterns provide an effective way to reduce vector habitats. For instance, the creation of shade over the breeding grounds of malaria vectors that prefer sunny locales can help reduce vector propagation. Conversely, for malaria vectors that thrive in shadier habitats, the removal of overgrowth, weeds, and aquatic plants may significantly reduce breeding potential and thus vector abundance. In Oaxaca, Mexico, the clearance of algae from rivers, in a sustained community action programme, has been an important component in an integrated nationwide malaria control programme that has reduced malaria incidence from 15 121 cases in 1998, to 4996 cases in 2001.[65]

2.4.5 Human settlement sitting and management

More strategic placement of new human settlements away from potential malaria-breeding areas can also reduce transmission, since malaria vectors typically do not travel more than a few kilometers from their breeding grounds. Better management and control of man-made sites where malarial mosquitoes may easily reproduce – such as water wells and bore holes – may help reduce malaria breeding close to human settlements.[51,66] Some vectors prefer to take blood meals from animals – instead of, or along with, human hosts. Therefore, strategic placement of animal pens and corrals may potentially divert vectors from human to animal hosts (zoo prophylaxis). Ongoing research in Kenya on the interactions between malaria, livestock, and agriculture is examining if and how different

patterns of livestock management may actually help reduce malaria disease transmission to humans.[67]

2.4.6 Applying IVM in rural versus urban settings

In tropical Africa, where malaria is most widespread, some environmental management strategies will work best in areas of relatively low and more seasonal transmission (such as urban locales and their periphery), at certain altitudes, and also at the northern and southern fringes of malaria distribution. Here, breeding sites may be fewer, more easily identifiable, and more amenable to control.[51] For instance, environmental management may have potential in urban centres and port cities of Africa south of the Sahara, where large populations are aggregated on relatively small surfaces and where urban development has already degraded major vector breeding grounds.[68]

2.4.7 Cost-effectiveness of IVM

There is a need for more frequent and rigorous economic analysis of malaria-control programmes at field and country level, so that the costs and benefits of alternative approaches may be compared.[69] Many malaria vector-control programmes lack the capacity to carry out thorough cost-effectiveness evaluation of the intervention options at their disposal, even though WHO guidelines for such analysis have been available for over a decade.[69]

In a recent study, in Sri Lanka, has indicated that the costs of periodic river flushing to eliminate mosquito breeding habitats compared favourably with the use of insecticide-impregnated bed nets as a mosquito-control measure.[70] When the broader

macroeconomic benefits of such approaches are considered, then the benefits of integrated vector control may outweigh additional costs to an even greater extent.

2.5 STRATEGIES FOR MALARIA CONTROL MEASURE

Malaria control is too complex to be addressed by a single approach, and any attempt to do so is fraught with danger. It is important to tailor the strategy to the prevailing ecological and epidemiological conditions.[71] To illustrate this, definitions of the four main patterns of epidemiology - namely; Hypoendemic-sporadic transmission (10%); Mesoendemic-periodic transmission (11-50%); Hyperendemic-intense transmission (51-75%) and Holoendemic-high transmission (75%) are based on indicators which can be measured in the community.[72]

Of significance, the immune status of the population and the patterns of malaria seen will be different in these four situations and will also affect the strategy for control. Therefore,

these will be dictated by the prevailing transmission patterns and will be orientated to the following outcomes: (i) mortality control, (ii) transmission control, and (iii) eradication.

2.5.1 Mortality control

The major impact of malaria in any community is that of the death of individuals. To prevent a person dying from the disease, appropriate treatment is necessary.[72]

The strategy of mortality control involves detecting presumptive cases, determining which cases are parasites positive, and administering effective treatment. Such a strategy has little impact on morbidity due to malaria and has little or no effect on the overall transmission of the disease. In areas of holoendemic infection, this morbidity results in a major burden on the population.[73] Mortality control is the main thrust of the current

"Global Malaria Control Strategy".[72] Since it relies on chemotherapy, no particular program is required, nor is there any need for nationwide strategies and the development of local priorities. All that is required is some means for record keeping and a system for distribution of the drugs of choice to the peripheral clinics. Training is minimal and could also involve local commercial outlets for anti-malaria drugs. It is an effective stopgap strategy to cope with epidemics of malaria when emergency situations arise.[74] In crisis situations such as severe flooding or epidemic outbreaks, it is the strategy of choice because the tools can be mustered simply and quickly.[75]

The main problem is that chemotherapy alone is not a means of controlling malaria and is not sustainable in the long term. There are good data to indicate that treatments obtained from unskilled sources are frequently inappropriate and often ineffective and may promote drug resistance in the parasite population.[73,76] The first-line drugs in current use, chloroquine and pyrimethamine-sulfadoxine, are becoming less effective due to increasing resistance. Replacement drugs are costly and may not be acceptable for use in understaffed clinics.[77]

Effective diagnosis would help with this problem. However, despite the availability of rapid diagnostics that are readily interpreted by unskilled clinic workers.[75] Little effort is made to introduce them into widespread use. Persistence with chemotherapy alone will buy time but will create very serious problems in the future. This global strategy was endorsed by the technical expertise present to advise Ministers at the Amsterdam Conference, but it was not without its critics. Honorable Timothy Stamps, Minister of Health for Zimbabwe, noted "If one considers the final tables in the Global Strategy, one can only presume these to be sterile impractical assumptions of a disintegrating scientific

technology. No significant guidance was offered for countries like Zimbabwe which needs to protect her precious human resources." As a result of the adoption of the Global Strategy, the Zimbabwe Ministry of Finance refused to continue with the old programs and reduced annual expenditure on malaria control from 3 million to 0.8 million U.S. dollars.[78] Such concerns are currently expressed, perhaps with greater discretion but nevertheless with the same urgency, by Baird.[74]

2.5.2 Transmission control

The transmission control strategy recognizes that malaria is an important cause of morbidity as well as mortality. The disease is extremely debilitating and extracts a high price from the communities affected. Children are anemic and unable to concentrate at school,[75] and society as a whole is debilitated. Whereas appropriate treatment is one aspect of the transmission control strategy, vector control is also a major player, and, properly applied, these aspects together have an impact on both the mortality and morbidity of malaria. This approach is effective in most epidemiological conditions and is an effective control strategy for a sustained attack on the malaria problem. It is adaptable to the use of insecticide-treated mosquito nets as well as indoor spraying of insecticide.[79] It can be implemented in specific circumstances where malaria is a local priority or on a wide scale as part of a major program of intervention. Transmission control requires coordination and the development of strategic plans to intervene against malaria.[79] A high level of expertise is needed with personnel trained in epidemiology and vector control as well as in planning, mapping, and communications to coordinate and supervise the operations. However, these would be the prerequisites in countries which have made commitments to controlling malaria.

Concerns have been raised by some health authorities[76] that transmission control will eventually reduce local immunity acquired from long standing infection in the population. This is true. Effective transmission control will reduce the incidence of infection and reinfection in the community, and eventually people will lose their acquired immunity.[72] Therefore, such interventions should be planned in a sustainable manner.[76]

It is incumbent on the local government to recognize this when making commitments to malaria control. However, the technique can be incorporated into national malaria control schemes on a stage-structured basis in areas of high priority. It is even possible to create barriers to seasonal encroachment of vector populations and the potential for transmission to invade populated areas or towns.[72]

2.5.3 Eradication of malaria

Eradication can be considered only in certain areas, e.g., in places where malaria has been eradicated and where it has been reintroduced and in areas of hypoendemic malaria where there are sufficient resources to undertake the process and where there is little likelihood of future introduction. The advantage of an eradication program is that it is time limited and, once it has achieved its objective, can be terminated with little further oversight.[80] The relative successes of the various malaria control activities commenced in the mid-20th century period. Clearly, eradication programs were extremely successful, but eradication could not be achieved in many places and the technique must be considered not appropriate in most areas of endemic infection.[72]

2.6 TOOLS TO CARRY OUT MALARIA CONTROL

2.6.1 Personnel and Strategy Development

Malaria control is a scientific, technical activity that requires skilled and dedicated staff with training in epidemiology, entomology, mapping and planning, and manpower management.[72]

Since much work is in the field, it requires personnel prepared to undertake field work. This is not an arena for pure clinicians or laboratory scientists, and although all play a role in the fight against malaria, the control operations are the realm of malariologists.[81] The most important tools to control malaria consist of properly trained personnel with authority to coordinate and carry out their scientific work.[82] The rest of the tools to control malaria are still fundamentally similar to those used for eradication and control programs, i.e., the use of insecticides directed against adult mosquitoes to reduce the pressure of transmission in the human population and effective treatment to cure cases as they are diagnosed. In spite of years of research, there are no new techniques; in fact, with the advent of drug-resistant *Plasmodim falciparum*, we now have a less effective battery of drugs which can be applied safely in community-wide programs.[81]

What has been learned over the past several decades is that specific control strategies should be developed for specific country conditions and that there is not a "one set fits all" method available. We now understand the ecological conditions which affect and regulate the distribution and abundance of mosquito populations.[72] Essentially, efforts to control malaria must be sustainable and rely on the double-pronged attack while the sustainability of programs will depend greatly on the local resources available and should not depend only on donor support. The extent of a sustainable control program will, of

necessity, depend mainly on local resources, which will then dictate local priorities. The simplest approach, therefore, is to rely on widespread chemotherapy in populations at risk.[71]

However, wherever possible (and even in areas of restricted priority) this should be combined with vector control.[80] The use of vector control is not an ancillary factor that can be conveniently disregarded. It is essential not only to reduce transmission but also to prevent the development of drug resistance within the parasite population.[73] There are good examples from Zimbabwe of the synergistic effects of the two methods where malaria integrated control has been in effect in selected areas for over 50 years.[77]

In a recent nationwide survey, chloroquine resistance has been found to occur with any frequency in only three districts in spite of its use as the first-line drug for all that time and in spite of the advent of widespread chloroquine-resistant *P. falciparum* parasites in surrounding countries, e.g., Zambia.[73,77,81] Additionally, combined vector control and prophylaxis using Deltaprim (pyramethine-dapsone) has been under way on a large sugar estate covering a resident population of 50,000 persons for over 40 years. The local Chief Medical Officer indicates that there is no transmission of malaria or breakthrough in prophylaxis on the estate, whereas transmission does occur in adjacent areas.[72]

2.6.2 Roll back malaria partnership

In response to this present day insidious genocide, the African Heads of State and Government during the Roll Back Malaria Summit committed themselves to actions targeted at ensuring that:[82]

- Sixty percent (60%) of those suffering from malaria have prompt access to appropriate treatment within 24 hrs.
- Sixty percent (60%) of children < 5yrs and pregnant women use insecticides treated nets.
- Sixty percent (60%) pregnant women use Intermittent Preventive Treatments (IPTs).

Following the declaration by Africa Heads of States on malaria prevention and control in the context of African economic recovery and development in June 1997, RBM partnership was introduced in 1998 by the WHO Director General with UNICEF, UNDP, and the World Bank and currently has more than 100 partners from all sectors active in malaria field.[82]

2.6.3 What is roll back malaria (RBM)?

The Roll Back Malaria partnership is a new social movement that aims at building and strengthening the capacity of health services to help communities tackle the malaria problems. It focuses special attention on women and children in poor communities[19] and the vulnerable adult in both rural and unsafe urban areas.[83]

The key interventions therefore proposed under the Roll Back Malaria Initiative (FMOH Strategic Plan 2001) border on:

- Improving case management of malaria at the home and the community levels where up to 70% of malaria illnesses are handled.

- Promotion of the use of insecticide treated nets to reduce man-vector contact and thereby reduce transmission of the parasite.

- Promotion of the use of intermittent preventive treatment of malaria in pregnancy

The thrust of the current Country strategic plan (FMOH Strategic Plan 2005) of which home management of malaria (HMM) is complimentary has the following targets:

- Eighty percent (80%) coverage for effective case management
- Eighty percent (80%) coverage of population at risk for ITN
- Hundred percent (100%) coverage for Intermittent Preventive treatment for pregnant women.

The concept of home management of malaria is therefore based on early recognition, prompt and appropriate response (treatment) to malarial illness in children under 5 years of age in the home or community achieved through:[34]

- Enabling caretakers to recognize malaria illness early and take the appropriate response;
- Ensuring that care providers have adequate knowledge and capacity to respond to febrile illness or malaria; and
- Creating an enabling environment to implement the strategy.

2.6.4 The invention and uses of dichlorodiphenyltrichloroethane (DDT) to eradicate malaria

Discovery of the insecticide DDT (dichlorodiphenyltrichloroethane) in 1942, by Paul Muller the Nobel Prize Laureate in Physiology or Medicine, 1948, and its first use in Italy in 1944, made the idea of global eradication of malaria seem possible. Subsequently, widespread systematic control measures such as spraying with DDT, coating marshes with paraffin (to kill anopheles mosquito larvae), draining stagnant water, and the widespread use of nets and cheap, effective drugs such as chloroquine were implemented - with impressive results.

Despite initial success, there was a complete failure to eradicate malaria in many countries due to a number of factors. Although technical difficulties such as mosquito and parasite drug resistance have played a part, the main failure to reduce the disease is probably due to social and political factors preventing efficient application of control measures.[84]

Despite the setbacks, up until 1969, when the global eradication policy was finally abandoned, the following European countries had managed to completely eradicate endemic malaria by interrupting transmission: Hungary, Bulgaria, Romania, Yugoslavia, Spain, Poland, Italy, Netherlands and Portugal.[85]

From the early 1970s, the malaria situation has slowly and progressively deteriorated and reduced control measures between 1972 and 1976, due to financial constraints, led to a massive 2-3 fold increase in cases globally.[84]

2.7 MALARIA TREATMENT

The treatment of malaria depends on the severity of the disease. Uncomplicated malaria may be treated with oral medications. The most effective strategy for *P. falciparum* infection is the use of artemisinins in combination with other antimalarials (known as artemisinin-combination therapy, or ACT), which reduces the ability of the parasite to develop resistance to any single drug component.[86] These additional antimalarials include amodiaquine, lumefantrine, mefloquine or sulfadoxine/pyrimethamine.[87]

Another recommended combination is dihydroartemisinin and piperaquine.[87,88] ACT is about 90% effective when used to treat uncomplicated malaria.[86]

To treat malaria during pregnancy, the WHO recommends the use of quinine plus clindamycin early in the pregnancy (1st trimester), and ACT in later stages (2nd and 3rd trimesters).[89] In the 2000s (decade), malaria with partial resistance to artemisins emerged in Southeast Asia.[90,91]

Severe malaria requires the parenteral administration of antimalarial drugs. Until the mid-2000s the most used treatment for severe malaria was quinine, but artesunate has been shown to be superior to quinine in both children and adults.[92] Treatment of severe malaria also involves supportive measures that are optimally performed in a critical care unit, including management of high fevers (hyperpyrexia) and the subsequent seizures that may result from it, and monitoring for respiratory depression, hypoglycemia, and hypokalemia.[92] Infection with *P. vivax*, *P. ovale* or *P. malariae* is usually treated on an outpatient basis (while a person is at home). Treatment of *P. vivax* requires both treatment of blood stages (with chloroquine or ACT) as well as clearance of liver forms with primaquine.[93]

2.7.1 Recommended treatment in Nigeria

The Federal Government policy on malaria control in Nigeria focuses on the following main strategies: 1) management of cases, 2) prevention of malaria with insecticide-treated nets (ITN), and 3) use of intermittent preventive treatment (IPT) during pregnancy.[94]

The first strategy entails diagnosis to ensure that at least 80 percent of the people at risk of malaria take prompt and effective treatment within 24 hours of start of illness due to malaria. Under this scheme, the children under five will receive free Artmether-Lumefantrine (AL) through public sector and faith based health facilities. A home based

case management strategy has been planned especially for the children less than 5 years of age.[94]

The second intervention strategy is called the Integrated Vector Management system. This process is designed to ensure that at least 80 percent of the population at risk of malaria sleeps under insecticide treated nets. Other programmes meant for children such as, Immunization Plus Days (IPDs) and Measles campaigns had been used as an opportunity to reach a larger number of children in the country. Under this scheme it is proposed that the Long Lasting Insecticide Nets (LLINs) be given to pregnant women attending first ante natal care (ANC).[94]

In coherence with the third strategy, another program focused on control of malarial prevalence during pregnancy. Two specific drugs, i.e., Intermittent Prevention Therapy (IPT) and Sulphadoxine-Pyrimethamine (SP) have been introduced to fight malaria in pregnant women. The minister of state for health reiterated an increased access of at least 80% of pregnant women to these drugs.[94]

In connection, some areas of particular states susceptible to very high prevalence throughout the year, have initiated a pilot Indoor Residual Spraying (IRS) programme. This is particularly conducted since, vector population control or suppression has been crucial to effective malaria control program elsewhere in the world. Through Roll Back Malaria programme, Nigeria is committed to drastically reducing by half the social and economic burden of malaria by 2010.[94]

To fight back this high prevalence of malaria in the country, the Federal Government of Nigeria has received a sizable amount of credit from the World Bank. As a measure of malarial prevention it is stressed by the federal government that the country's population at large and women and children in particular should sleep under mosquito net, at all times.[94]

Based on a survey carried out to identify states with extremely high burden of malaria, seven states have been identified; i.e., Akwa Ibom, Anambra, Bauchi, Gombe, Jigawa, Kano, and River state.

On a pilot basis several programmes are run to fight back malaria in these states. However, as it has been observed that the impediments to curb down the disease so far have been; lack of effective legislation on sanitation control, illiteracy among the residents, poverty, poor environmental health, unsuccessful effort to ensure that larger population sleep under mosquito bed-nets. So far the progress in malarial prevalence had been extremely slow, resulting today in only 30 percent of the children receiving anti-malarial drug, less than one-fifth of these children receiving intermittent preventive therapy and only seven percent of the children below five-years and pregnant women sleeping under bed-nets. It is estimated that a successful target of curbing down the total country malarial prevalence by the half by 2010, would create a spiraling effect of reducing 20 percent of the total child-mortality in the country. Hence, a massive scale up of vector control interventions for all- at risk population has been targeted. [94]

It is believed that a strong focus on preventive measures, coupled with the introduction of more effective case management which also includes the use of artemisinin-based combination therapies (ACTs) for treatment of uncomplicated malaria cases, with an initial focus on children under five, will return an immense progress towards this direction.[94]

It is clear from this recent focus of malaria control programme in Nigeria that overall the major at-risk population for malaria in the country had been children under five and the pregnant women; who already had attained the due programmatic attention. As had been believed that, prevention of any disease is more cost effective than the curative measures, where malaria is no exception. The coverage of preventive measures of malaria across different states of the country can provide a clear understanding of the situation, particularly if a focus is maintained on children under five and the pregnant women.[94]

Recently, antimalarial treatment policies in Africa have undergone a major transition; most countries have adopted Artemisinin Combination Therapies (ACTs) as first-line treatment for uncomplicated malaria. This consists of the use of an Artemisinin derivative and another effective anti-malarial medicine. Recommended ACT for uncomplicated malaria is Artemether-lumefantrine.[95,96]

2.8 FACTORS AFFECTING SCALING UP HMM

It was generally agreed that it was time to scale up HMM in endemic countries to cover the majority of their populations and that, this would result in prompt access to good quality anti-malarial drugs at appropriate dosages within 24 hours of onset of symptoms, especially in the most remote areas of Africa. However, training and provision of

information to all those involved in the process – from the manufacturer to the caregiver, from the trained health care worker to the volunteer – as well as supervision, monitoring, and evaluation would be required. It was also recognized that the following factors are key in scaling up HMM:[97]

- **Availability**: Unit-dose pre-packaged antimalarial tablets must be produced by the manufacturer at a reasonable price. Use of pre-packaged tablets in scaling-up studies increased the number of children receiving treatment within 24 hours from 46% to 54.4% in Uganda, and from 67% to 89.6% in Nigeria. But making the drug supply sustainable is one of the challenges of HMM.[4]
- **Compliance**: Ensuring availability of treatment does not in itself lead to effective use and compliance. Pre-packaged tablets have been shown to be better for ensuring compliance than loose tablets and antimalarial syrups, the mainstay of malaria treatment for children under five in many African countries.[4]

Experience has shown that more effective and better compliance results from home visits and follow up of sick children by community-based volunteers. In Nigeria, after introduction of the intervention package, 26.7% of children received correct dosage, as opposed to 14.3% at baseline.[97]

- **Information**: Core to the HMM package is production of effective information, education and communication (IEC) materials, to improve health seeking behaviour, use of pre-packs, ensure referral of severe cases to health workers, etc. Experience has shown that the better the IEC for communities, the better the programme output.[4]
- **Training and re-training**: Training of all types of personnel, from health care workers within the formal health system to community agents, e.g. mothers, mother coordinators, teachers, shopkeepers, patent medicine vendors, drug distributors, voluntary health workers, was emphasized by all participants at the meeting.[4]

Experience has shown that regular training and updates for community-based agents are necessary to ensure strict adherence to treatment guidelines.[4,97]

- **Motivation**: Experience shows that, to ensure continued motivation of community-based agents, some form of remuneration is necessary, as well as support for transport and resources, which need not be monetary.
- **Community ownership**: This was highlighted as an important ingredient for success of the HMM package.[97]
- **Supervision**: Effective supervision by health staff is essential for success, but fitting supervision into the routine activities of health workers is one of the challenges of HMM.[4]
- **Monitoring and evaluation**: Sales of drugs, patterns of drug use, side effects and resistance must be monitored. Key to monitoring the performance of community-based agents is to evaluate record-keeping.[97]

- **Integration**: All countries scaling up HMM are integrating these activities with ongoing community-based health care programmes such as those for acute respiratory infections, diarrheal diseases, nutrition education, Expanded Programme of Immunization monitoring, disease surveillance.[97]

Large-scale research studies have shown that scaling up HMM is both feasible and effective. HMM is already being practiced on a limited scale in some countries in Africa, and several countries now have technically sound national strategic plans and action plans in which a great deal of emphasis is placed on HMM.[4]

CHAPTER THREE

METHODOLOGY

3.1 BACKGROUND TO THE STUDY AREA

This study was carried out in Hadejia LGA, one of the 27 LGAs in Jigawa State. The state is bordered on the west by Kano State, on the east by Bauchi and Yobe States and on the north by Katsina, Yobe States and by the Republic of Niger. The state came into being on Tuesday August 27, 1991, when the Federal government announced the creation of nine additional states in the country to bring the total number of states then to thirty. This announcement was given a legal backing through the State Creation and Transitional Provisions Decree No. 37 of 1991. Jigawa State was excised from Kano State. Both states are located in the north-west geopolitical zone. Jigawa State, with its capital at Dutse, has twenty seven (27) local government areas (LGAs) and a total population of 4,361,002 (2006 census).

The state is divided into five emirates each administered by a traditional ruler called Emir. These emirates are: Hadejia, Kazaure, Gumel, Ringim and Dutse. The emirs are assisted by district heads, village heads and ward heads. The Emirs and district heads, unlike other functionaries, do not exercise political power but serve as custodians of culture and advisers to the government on traditional affairs. They are quite influential in mobilizing people in their various emirates and districts.

Hadejia emirate comprises of 8 LGAs including Hadejia LGA which is the seat of the emirate. Hadejia town is the base of the LGA council as well as the General Hospital that serves most of the populace within and outside the emirate.

Hadejia town is virtually located on the banks of Hadejia river and has a population of 104,286 (2006 census).

Hadejia LGA comprises of eleven (11) political wards. The people of Hadejia are largely Muslim, although some follow indigenous belief systems.

3.2 STUDY DESIGN

This study was a cross-sectional descriptive study.

3.2.1 Study population

The study population was estimated to be a thousand (1000) which consists of mothers from the Hospital catchment's area attending General Hospital Hadejia, Jigawa State, North-Western Nigeria.

3.2.2 Study inclusion and exclusion criteria

3.2.2.1 Inclusion

1. The study inclusion criteria were mothers attending Hadejia General Hospital who have consented to participate in the study.
2. Women of reproductive age group (15-49) including ante-natal care clients attending Hadejia General Hospital who had at least one living child who is under five years old , these groups are used to properly ascertain the desired result of the research work, since the severity of malaria affect these certain group mostly, due to level of exposure to integrated disease.

3.2.2.2 Exclusion

1. Mothers who were selected, but did not wish to participate in the study were excluded.

2. Primigravida and nulliparae were also excluded.

3.3 SAMPLE SIZE DETERMINATION

The sample size was arrived at using the formula, ($n = Z^2 p q/d^2$)[8]

Where:

n = the desired sample size

Z = the standard normal deviate, usually set at 1.96, which corresponds to the 95% confidence interval

p = the proportion in the target population estimated to have a particular characteristic (prevalence of 33% was taken from recent study in Nigeria in which the proportion of under five children with fever receiving anti-malarial drugs was found to be '33%').[6]

q = 1.0 – p= 0.67

d = degree of accuracy desired, set at 0.05.

Thus $n = (1.96)^2 (0.33) (0.67) / (0.05)^2$

= 340.

Non-respondent (attrition) rate = 10% of the sample size.[8]

= 340 x10/100 = 34

Thus, the non-response rate of 34 has been showed in detailed above; with 10% of the sample size (340) resulted to non-response rate value of 34.

Therefore, for desire sample size to be used; the value of non-response rate (34) will be added to the value of n (340).

Desire sample size = n (340) + attrition rate (34) = 374

3.4 SAMPLING TECHNIQUE

Women that fulfilled the inclusion criteria were sampled using the systematic sampling method. The attendance register was used to determine the number of clients per day, the first respondent was selected, there after a mother is selected systematically out of every three mothers.

kth = N/n = 1000/374 = 2.6 ≈ **3**.

Where

N = Total population of women within reproductive age group who have under-five children)

n = desired sample size

Thus, at every three (3) mother with under five child or children, one (1) is selected systematically for the research.

3.5 DATA COLLECTION

The tool for data collection was essentially the Questionnaire.

It was administered by face to face interview to eligible mothers in the study area. The questionnaires were written in English, but the interviews were conducted predominantly in Hausa.

The questionnaire is composed of 22 questions in the general section (1, 2 & 3) and 7-15 questions in section 4 (optional).

Section 1 is about the background of respondent (mother), while section 2 is on knowledge and prevention of malaria. Section 3 is about recognition of symptoms and signs during febrile episode in under fives, while section 4 is on treatment options during an episode of malaria fever. Questions in section 1 include age, level of education,

marital status, occupation and decision making to seek for assistance. Section 2 covers questions on types of malaria, season it occurs most and preventive practices. Questions covered in section 3 include age of child, when the child had fever last, how long fever lasted, signs and symptoms of uncomplicated malaria, other diseases that could cause fever. In section 4 questions covered include time of commencement of treatment, dosage of drugs, mode and frequency of administration, level of satisfaction which may lead to seeking assistance or not etc.

Treatment options are the possible actions taken by mothers during an episode of fever. These includes serving herbs at home, taking child to traditional medicine man, giving orthodox drugs at home, taking child to chemist/Patent Medicine Sellers (PMS) and taking child to the health centre/dispensary.

Five experienced Community Health Extension Workers (CHEWs) that have previously attended workshops on Inter-Personal Communication skills (IPC) who were trained on interviewing techniques for a day conducted the interviews. The training took place on 1st and 2nd July, 2011 and included a day of testing the questionnaire (pre-test) in one health centre (Kanya) which was not part of the study area. About 10 respondents were interviewed and it took an average of 20-30 minutes to administer each questionnaire. The training was organized and conducted by researcher and the malaria focal person of the health council. The administration of questionnaires continued from 4th July, to 8th July, 2011.

The work of the team was coordinated by researcher and the malaria focal person.

3.6 DATA ANALYSIS

All data collection forms were checked by the researcher for completeness. The data were entered and analyzed using SPSS version 20. Univariates were analyzed using descriptive method. Bivariates were analyzed using cross tabulation to determine the chi square, p value and differential factor (df).

3.7 LIMITATIONS

1. Findings of this study are based on self reporting – what they say may not be what is practiced at home; the clients might try to impress some interviewers who are known to them as health workers.
2. Possibility of interviewers influencing respondents' responses as some of them were health-workers.
3. The questionnaires were in English and each research assistants was expected to interpret the questions from English to Hausa. There could have been variations in the interpretation of the questions which could affect the responses given by the clients.

3.8 ETHICAL CONSIDERATION

Formal permission was sought (letter of request for consent dated 25th June, 2011) from the authority that offers permission to conduct studies (Gunduma Health System Council, Hadejia) before conducting the study. Approval was granted in a letter of introduction dated 1st July, 2011.

Traditional rulers were also informed and their informal permission obtained.

Verbal informed consent was obtained from all respondents who participated in the study after explaining the purpose and objectives of the study in the local language.

Provisions of Helsinki Declaration were also adhered to as participation in the study was voluntary and confidentiality of the information was assured both during and after data collection. The respondents were informed about their right either to or not to participate in the study.

CHAPTER FOUR

RESULTS

4.1 SOCIO-DEMOGRAPHIC DATA OF THE RESPONDENTS

Table 4.1: Socio-demographic data

Age (yrs)	**Frequency**	**Percent (%)**
18-30	191	54.6
31-40	122	34.9
41-50	17	4.9
Do not Know	20	5.7
Total	**350**	**100.0**
Level of Education		
None	124	35.4
Primary	80	22.9
Secondary	105	30.0
Post-Secondary	41	11.7
Total	**350**	**100.0**
Religion		
Muslim	333	95.1
Christian	15	4.3
Traditional Religion	2	0.6
Total	**350**	**100.0**
Marital Status		
Single	17	4.9
Married	316	90.3
Separated	7	2.0
Widow	10	2.9
Total	**350**	**100.0**
Occupation		
House wife	200	57.1
Trader	99	28.3
Farmer	4	1.1
Civil servant	36	10.3
Artisan	5	1.4
Not Employed	6	1.7
Total	**350**	**100.0**

About 55% of the respondents belong to the age group 18-30yrs, 41-50yrs were 5% and some of the respondents do not know their age which comprises of about 6%.

Thirty percent (30%) of the respondents had secondary education level, with post secondary level at about 12%, while 35% of the respondents do not had any education background and only about 23% had primary education level.

Majority of the respondents were Muslim (95%) by religion, thus this is in accordance with the history of the study area with majority of the dissidents were Muslims.

Majority of the respondents (90%) are married, with separated and widow contributing insignificantly, to the marital status level, and also about 5% were single.

Fifty seven percent (57%) of the respondents were housewives, 28% are traders and 10% are civil servants.

Table 4.2: Respondents response on who take care of the sick child

Care for sick child	Frequency	Percent (%)
Father	156	44.6
Mother	149	42.6
Maternal grand-parent	3	0.9
Both father and mother	40	11.4
Other	2	0.6
Total	350	100.0

Father and mother showed in the above table are responsible for the well being of their children with 44.6% and 42.6% respectively. Also those that show both father and mother were 11.4%.

Table 4.3: Respondents response on who make decision on where to take sick child to

Who make decision on where to take sick child to	Frequency	Percent (%)
Father	196	56.0
Mother	80	22.9
Paternal grand parents	1	0.3
Both father & mother	71	20.3
Others	2	0.6
Total	350	100.0

In the above table, the father (56%) makes the most of the decision making on where to take the child/children to when they are sick, while the mother is about 23%. And for both the father and mother is 20%.

4.2 KNOWLEDGE ON MALARIA AND ITS PREVENTION

Table 4.4: Respondents knowledge on illnesses that could cause fever in children

Fever in children	Frequency	Percent (%)
Cough	64	18.3
Vomiting	21	6.0
Diarrhea	17	4.9
Abdominal Pain	26	7.4
Headache	33	9.4
Measles	62	17.7
Typhoid	32	9.1
Malaria	60	17.1
Other	35	10.0
Total	350	100.0

Cough, measles and malaria were the most selected by the respondents been the illness that can cause fever in children with 18.3%, 17.7% and 17.1% respectively.

Table 4.5: Respondents knowledge on type of illness in children when they develop fever

Types of illness in children when they develop fever	Frequency	Percent (%)
Malaria	204	58.3
Pneumonia	16	4.6
Measles	43	12.3
Typhoid	13	3.7
Schistosomiasis	4	1.1
Teething	46	13.1
Others	24	6.9
Total	350	100.0

Most of the respondents (58%) described malaria as the type of illness in children when they developed fever.

Table 4.6: Respondents knowledge on type of malaria

Malaria type	Frequency	Percent (%)
Mild or uncomplicated	156	44.6
Severe	5	1.4
Both	189	54.0
Total	350	100.0

In the above table, the respondents response showed both (severe, mild or uncomplicated) with 54% and mild or uncomplicated is 44.6% of the knowledge on type of malaria.

Table 4.7: Respondents knowledge on mild malaria symptoms

Mild malaria symptoms	Frequency	Percent (%)
Fever	142	40.6
Cough	49	14.0
Vomiting	53	15.1
Diarrhea	19	5.4
Abdominal Pain	33	9.4
Weakness	8	2.3
Hotness	40	11.4
All	6	1.7
Total	350	100.0

Among the symptoms of mild malaria is fever which is indicated by the respondents with 41% and is the highest among the listed/mentioned symptoms.

Table 4.8: Respondents knowledge on mild malaria season

Mild malaria season	Frequency	Percent (%)
Rainy	145	41.4
Hot	16	4.6
Dry Season	109	31.1
Do not know	62	17.7
All	18	5.1
Total	350	100.0

About 42% of the respondents believed rainy season is the season for mild malaria, while dry season comprises of 31%.

Table 4.9: Respondents knowledge on how children contact mild malaria

How children contact mild malaria	Frequency	Percent (%)
Mosquitoes	178	50.9
Taking bath with cold water	32	9.1
Drinking contaminated water	23	6.6
In playing ground	78	22.3
Sudden fever	11	3.1
Do not know	28	8.0
Total	350	100.0

The respondents showed that, children contact malaria through mosquitoes (51%), which is the majority, while other are sudden fever, drinking contaminated water, playing ground and taking bath with cold water.

Table 4.10: Respondents knowledge on Mild malaria treatment

Mild malaria treatment	Frequency	Percent (%)
Chloroquine	56	16.0
Paracetamol	93	26.6
Ammoxyl	18	5.1
ACT	82	23.4
Chloroquine-Para-Ammo	16	4.6
Tab Coatem	40	11.4
Do not know	32	9.1
All	13	3.7
Total	350	100.0

ACT (23%), paracetamol (26%) and chloroquine (16%) is sited by the respondents as the drugs for the treatment of mild malaria, with Coartem (11%) and Amoxyl (5%).

Table 4.11: Respondents knowledge if malaria can be prevented

Can malaria be prevented	Frequency	Percent (%)
Yes	249	71.1
No	47	13.4
Do not know	54	15.4
Total	350	100.0

Two third of the respondents (71%) believed malaria can be prevented.

Table 4.12: Respondents knowledge on ways to prevent malaria

Ways to prevent malaria	Frequency	Percent (%)
Uses of ITN	38	15.3
Do not allow stagnant water	39	15.6
Administration of drugs to prevent malaria	41	16.4
Do not allow children to stay long in the sun	31	12.5
Uses of insecticides	43	17.3
Rub repellants	15	6.0
Others	42	16.9
Total	249	100.0

In the above table, various ways are listed for the prevention of malaria, whereas the uses of ITN (15.3%), uses of insecticides (17.3%) and others were listed as the formal ways of malaria prevention.

Table 4.13: Respondents knowledge on reason why malaria cannot be prevented

Reason why malaria cannot be prevented	Frequency (n=47)	Percent (%)
No clean environment	24	51
No Idea	6	12.8
No proper drainage system	7	14.9
Govt. not concerned	4	8.5
Lack of mosquito net	6	12.8
Total	47	100.0

Unclean environment (51%) is sited by the respondents as part of the reasons why malaria cannot be prevented. Among which include the improper drainage system (15%) which is believed to be the breeding ground for malaria. Lack of mosquito net (13%) also contributed.

Table 4.14: Respondents knowledge on ways to prevent malaria

Ways to prevent malaria	Frequency	Percent (%)
Has knowledge	260	74.3
No knowledge	50	14.3
Do not know	40	11.4
Total	350	100.0

Two third of the respondents (74%) has knowledge on ways to prevent malaria.

Table 4.15: Respondents knowledge on difficulty in using method to prevent malaria

Difficulty in using method to prevent malaria	Frequency	Percent (%)
Cost	171	48.9
Power	85	24.3
Cost and Power	34	9.7
Do not know	60	17.1
Total	350	100.0

Almost half of the respondents (49%) mentioned cost as a factor for difficulty in using methods to prevent malaria. While 24% mentioned power.

4.3: FEBRILE EPISODE/MALARIA (CHILD THAT HAD FEBRILE ILLNESS)

Table 4.16: Respondents response of age of child at the time of last febrile illness

Age (yrs)	Frequency	Percent (%)
1-2	125	35.7
3-4	222	63.4
5	3	0.9
Total	350	100.0

The age group 3-4 yrs (63%) was last affected most with febrile illness.

Table 4.17: Respondents response of sex of child at the time of last febrile illness

Febrile illness sex	Frequency	Percent (%)
Male	198	56.6
Female	152	43.4
Total	350	100.0

At the time of last febrile illness the male are 57% while the female are 43%.

Table 4.18: Respondents response if any fever occurred to child within the last two weeks

Did fever occurred within the last 2 weeks	Frequency	Percent (%)
Yes	211	60.3
No	139	39.7
Total	350	100.0

Sixty percent (60%) of the children were affected by fever within the last two weeks of the time of the conduction of this research work.

Table 4.19: Respondents response on the period of how long the fever lasted

Period in days	Frequency	Percent (%)
1-3	114	54
4-6	61	29
7 – 14	19	9
Do not know	17	8
Total	211	100.0

The fever which lasted within 1-3 days (54%) as indicated by the respondents, showed is more than half of the children, as presented.

Table 4.20: Respondents response if any other illness occurred to the child apart from fever

Any other illness apart from fever	Frequency	Percent (%)
Yes	78	37
No	135	63
Total	211	100.0

Thirty seven percent (37%) of the respondents indicated other illness apart from fever.

Table 4.21: Respondents response of other signs and symptoms the child had apart from fever

Signs and symptoms	Frequency	Percent (%)
Chills/rigors	4	5.1
Diarrhoea	9	11.5
Vomiting	10	13
Cough	5	6.4
Difficulty in breathing	1	1.3
Convulsion	4	5.1
Skin rash	5	6.4
Restless	9	11.5
Weakness/not playing	6	7.7
Headache	5	6.4
Yellow eyes	6	7.7
Anorexia	9	11.5
Others	5	6.4
Total	78	100.0

Anorexia (11.5%) was seen as one of the illness apart from fever, likewise other illness mentioned in the above table respectively.

Table 4.22: Respondents response of what could be the type of illness the child had last

What type of illness do you think the child had last	Frequency	Percent (%)
Malaria	146	69.2
Measles	23	10.9
Pneumonia	5	2.4
Yellow fever	7	3.3
Typhoid fever	4	1.9
Ordinary cough	8	3.8
Others	13	6.2
Do not know	5	2.3
Total	211	100.0

Majority of the respondents thought the child had malaria (69%) and measles (11%), while others were pneumonia, yellow fever, typhoid fever and ordinary cough with 2.4%, 3.3%, 1.9% and 3.8% respectively.

Table 4.23: Respondents response if the malaria the child had was severe

Is the Malaria severe	Frequency	Percent (%)
Yes	58	39.7
No	88	60.3
Total	146	100.0

About forty percent (40%) of the respondents responded that the malaria was severe.

Table 4.24: Respondents response of signs and symptoms of severe malaria

Sign and symptoms of severe malaria	Frequency	Percent (%)
Chills/rigors	9	6.2
Convulsion	21	14.4
Child not eating/anorexia	26	17.7
Persistent fever	10	6.8
Diarrhea	16	11
Very high fever	27	18.5
Breathless	7	4.8
Yellow eyes	5	3.4
Pallor	5	3.4
Coca cola urine	2	1.4
Don't know	16	11
Others	2	1.4
Total	146	100.0

Very high fever (18.5%), anorexia (17.7%), convulsion (14.4%) are all seen as signs and symptoms of severe malaria, rigors (6.2%) and other are also listed in the table.

Table 4.25: Respondents response for the first treatment given to the child

First treatment given to the child	Frequency	Percent (%)
Gave herbs at home	25	17.1
Child taken to traditional medicine man	7	4.8
Gave orthodox drugs at home	25	17.1
Took child to chemist/PMS	31	21.2
Took child to the health centre/dispensary	58	39.8
Total	146	100.0

The respondents that gave herbs as the first treatment to the child were 17.1%, those that gave orthodox drugs at home were also 17.1%, while those that took child to the chemist and health center were 21.2% and 39.8% respectively. And finally, those that took the child to herbalist were 4.8%.

Table 4.26: Respondents response of the most important drug when child had febrile illness

Important drug when child had febrile illness	Frequency	Percent (%)
ACT	110	31.4
Antimalarial (CQ, Fansidar etc)	106	30.3
Haematinics/Vitamins	19	5.4
Butazolidine/phensic	29	8.3
Antibiotic	13	3.7
Paracetamol	73	20.9
Total	350	100.0

ACT (31%), antimalarial (30%) and paracetamol (21%) was sited by the respondents as major important drugs when child had febrile illness.

Table 4.27: Respondents response of the effectiveness of the drugs used to cure febrile illness

Effectiveness of the drugs	Frequency	Percent (%)
It gives relief	154	44.0
It cure quickly	105	30.0
Recommended by doctor	47	13.4
Do not know	44	12.6
Total	350	100.0

The respondents responded that the drugs gives relief (44%) and also cure quickly (30%), while those that are recommended by the doctors (13%) were also noted.

4.4 TREATMENT OPTIONS WHICH INCLUDES TRADITIONAL MEDICINE (HERBS), HERBALISTS, ORTHODOX DRUGS, CHEMISTS AND HEALTH CENTERS

Table 4.28: Caregiver treated child at home using traditional medicine

Period spent for the commencement of traditional medicine (herbs)	Frequency	Percent (%)
1 hour	15	60
2-12 hours	4	16
12-24 hours	3	12
Do not know	3	12
Total	**25**	**100.0**
Where do you get the traditional herbs		
Prepared by self at home	8	32
From traditional healers	17	68
Total	**25**	**100.0**
Name of the herbs used to prepare the medicine		
Ogouba	4	16
Tagaroade	2	8
Harrararbi	2	8
Danya	14	56
Do not know	3	12
Total	**25**	**100.0**
Number of time the medicine is administered in a day		
1-5 times	16	64
6-10 times	3	12
11-15 times	2	8
16-20 times	2	8
21-25 times	1	4
Any time	1	4
Total	**25**	**100.0**
Measures of medicine given to a child under five years		
1-2 tea spoons a day	4	16
3-4 tea spoons a day	5	20
5-6 tea spoons a day	11	44
No measurement	5	20
Total	**25**	**100.0**
Number of days the medicine is been administered		
1-5 days	15	60
6-10 days	3	12
11-15 days	3	12
16-20 days	2	8
21-above	2	8
Total	**25**	**100.0**
Uses of other drugs with the herbal medicine		
Yes	15	60
No	10	40
Total	**25**	**100.0**
Other drugs used		
Drugs from Hospital	9	60
Chloroquine	3	20
Paracetamol	2	13.3
Do not know	1	6.7
Total	**15**	**100.0**
Reasons for using other drugs		
Because there is no improvement	6	40
To get recovery	5	33.3
Quick relieve	4	26.7
Total	**15**	**100.0**
Outcome of the treatment been administered		
Got well	10	66.7
Got a little better	4	26.7
There was no improvement in child's condition	1	6.6
Sickness got worse	-	0
Total	**15**	**100.0**

The caregivers whom are mostly the mothers, sometimes it takes some period of time to notice any changes in the child which in return affect the time for the commencement of the drug, either by 1hr, 2-12hrs and even 12-24hrs as shown in the table above for administration of herbs with respondents response of 60%, 16% and 12% respectively. And as such some of the caregivers do not even know the time (12%).

Sometimes the herbs are been prepared by the caregiver at home (32%), but mostly it is gotten from the traditional healers (68%) with instruction for its uses.

Some of the caregivers do not know the names of the herbs (12%) since they are been collected from the traditional healers, and those that knew the herbs such as danya (56%), ogouba (16%), tagargade (8%) and Harrararbi (8%).

The herbs which are been prepared either by self or by traditional healers do all have prescriptive for its uses, some 1-5 times (64%) which is mostly/widely prescribed for the number of the times the herbs should be used.

The measurement for the medicine/herbs is very important; some do gives either 1-2 tea spoons/day (16%), 3-4 tea spoons/day (20%), 5-6 tea spoons/day (44%) and some do not gives any measurement (20%) as shown in the table above.

The number of days also depends on the effectiveness of the herbs, but as shown in the above table, mostly 1-5 days (60%) were been administered.

In the case of ineffectiveness, the caregiver do administered other drugs other than the herbs to the child which is 60% of the respondents. Thus, drugs from the hospital accounted for 60% while chloroquine and paracetamol accounted for 20% and 13% respectively.

The reasons for using these drugs were because there was no improvement in the herbs (40%) which was been administered, while others gives reasons for quick relief (27%) and recovery (33%). Thus, the outcomes of these drugs showed that those that got well were 67% and those that got little better were 27% and just only 6% showed no improvement in child's condition.

Table 4.29: Child taken to a traditional healer/herbalist

Period spent for the commencement of herbalist medicine	**Frequency**	**Percent (%)**
1-5 hour	4	57.1
6-10 hours	2	28.6
11-15 hours	1	14.3
16-20 hours	-	0
21 and above	-	0
Total	**7**	**100.0**
Number of days the medicine is been administered		
Less than 3 days	5	71.4
3 days	1	14.3
More than 3 days	1	14.3
Total	**7**	**100.0**
Uses of other drugs with the herbalist drug		
Yes	4	57.1
No	3	42.9
Total	**7**	**100.0**
Other drugs used		
Drugs from Hospital	4	100
Chloroquine	-	0
Paracetamol	-	0
Total	**4**	**100.0**
Reasons for using other drugs		
Because there is no improvement	4	100.0
To get recovery	-	0
Quick relieve	-	0
Total	**4**	**100.0**
Outcome of the treatment been administered		
Got well	4	100.0
Got a little better	-	0
There was no improvement in child's condition	-	0
Sickness got worse	-	0
Total	**4**	**100.0**

The herbalist also play its role, especially in this region/area were the research is carried out. Though due to improved enlightment and exposure only few of the caregivers do patronizes the herbalists as shown in table 4.23 and the outcomes for effectiveness is described in the above table.

Out of the fewer caregivers 4(57%) did used other drugs other than the herbalist drugs and all of the sick child taken to the hospital got well.

Table 4.30: Treat child at home using orthodox drugs

Period spent for the commencement of orthodox drugs	**Frequency**	**Percent (%)**
1-5 hour	18	72
6-10 hours	2	8
11-15 hours	7	28
16-20 hours	4	16
21 and above	-	0
Total	**25**	**100.0**
Drug(s) bought from chemist/PMS or drug hawkers		
Naviquine/Chloroquine	9	36
Paracetamol	3	12
Aspirin	4	16
Antibiotics	3	12
Phenergan/piriton	3	12
Vitamin/blood tonic	1	4
ACT	2	8
Others	-	0
Total	**25**	**100.0**
Where did you buy the drug(s) from?		
Chemist/PMS	19	76
Drug hawkers	4	16
Dispensary/health centre	2	8
Total	**25**	**100.0**
Level of satisfaction after using the drug(s)		
Very satisfied	16	64
Satisfied	4	16
Not satisfied	2	8
50/50 (between both satisfied and not satisfied)	3	12
Total	**25**	**100.0**

The caregivers are mostly used to given their child drugs at home, thus the orthodox drugs where bought from chemist/PMS or drug hawkers. Most drugs been administered are Naviquine/chloroquine (36%), aspirin (16%), paracetamol (12%), piriton (12%) and antibiotics (12%).

The caregivers did satisfied with the drug been administered with 64% very satisfied and 16% satisfied. Only 8% do not satisfied.

Table 4.31: Child is taken to a chemist

Period spent before taken the child to a chemist	Frequency	Percent (%)
1-5 hour	16	51.6
6-10 hours	5	16.1
11-15 hours	6	19.4
16-20 hours	3	9.7
21 and above	1	3.2
Total	**31**	**100.0**
How the chemist attendance know the type of illness		
Ask for what I notice in child	19	61.3
Examined the child	3	9.7
Did a laboratory test (blood and urine)	3	9.7
Checked the temperature of the child	4	12.9
Others	2	6.3
Total	**31**	**100.0**
Drug(s) the chemist prescribed		
Gripe water	2	6.5
Chloroquine	18	58.1
Amoxyl	8	25.8
Do not know	3	9.6
Total	**31**	**100.0**
Did the chemist prescribed how to use the drug(s)		
Yes	22	71
No	9	29
Total	**31**	**100.0**
If No, then how did you learned to used the drug		
Read the literature in the drug pack	4	44.4
Ask from a friend/neighbour	1	11.1
Used it as in the past	3	33.4
Others	1	11.1
Total	**9**	**100.0**
Level of satisfaction after using the drug(s)		
Very satisfied	14	45.1
Satisfied	8	25.8
Not satisfied	7	22.6
50/50 (between both satisfied and not satisfied)	2	6.5
Total	**31**	**100.0**
Outcome of the treatment been administered		
Got well	18	58.1
Got a little better	6	19.4
There was no improvement in child's condition	4	12.9
Sickness got worse	3	9.6
Total	**31**	**100.0**
Is the child been referred to the health center		
Yes	5	71.4
No	2	28.6
Total	**7**	**100.0**

Many caregivers do take their child to the chemist for quick relief as expected by the caregivers. In return many chemist do either ask for what is wrong or has been noticed in the child and this is accounted for about 61% as showed in the table above. Just few of the chemist do checked for either body temperature or laboratory test (blood and urine).

In the case of any illness such as malaria, the chemist mostly did prescribed chloroquine (58%) and ammoxyl (26%). And sometimes the caregivers only administered the drug to the child with no knowledge of the type of the drug (10%) as showed in the table above.

Most of the caregivers agreed the chemist do prescribed the drug (71%) and just only 29% of the respondents responded that the chemist do not prescribed. Therefore, 44% do read the literature in the drug pack which also indicates level of literacy. Many other caregivers did use the drugs as in the past (33%).

Forty five percent (45%) of the respondents were very satisfied and 26% were satisfied with the drug been prescribed by the chemist, and about 22% are not satisfied, which further leads to referring the child to health center. Thus, those been referred to the health center got well.

Table 4.32: Child is taken to health centre

Period spent before taken the child to health center	**Frequency**	**Percent (%)**
1-5 hour	19	32.8
6-10 hours	14	24.1
11-15 hours	11	19.0
16-20 hours	9	15.5
21 and above	5	8.6
Total	**58**	**100.0**
Drug(s) the attendant (health worker) prescribed		
Paracetamol	13	22.4
Amoxyl	15	25.9
Coatem tab/syrup	24	41.4
Do not know	6	10.3
Total	**58**	**100.0**
Did the attendant prescribed how to use the drug(s)		
Yes	51	87.9
No	7	12.1
Total	**58**	**100.0**
If No, then how did you learned to used the drug		
Read the literature in the drug pack	-	-
Ask from a friend/neighbour	**3**	42.9
Used it as in the past	4	57.1
Others	-	-
Total	**7**	**100.0**
Level of satisfaction after using the drug(s)		
Very satisfied	45	77.6
Satisfied	5	8.6
Not satisfied	5	8.6
50/50 (between both satisfied and not satisfied)	3	5.2
Total	**58**	**100.0**
Outcome of the treatment been administered		
Got well	52	89.7
Got a little better	4	6.9
There was no improvement in child's condition	2	3.4
Sickness got worse	-	-
Total	**58**	**100.0**

About a third of the respondents normally spent between 1-5hrs before taken the sick child to health center.

Coatem tab/syrup (41%) is mostly prescribed by the health worker.

The respondents mentioned that the health worker did prescribed how to use the drug (88%). Many of the respondents are very satisfied after using the drug(s) (78%), therefore the outcome is impressive due to, majority of the sick child got well (90%).

4.5 CAREGIVERS PREDICTORS ON RESPONSE TO MALARIA AT HOME, KNOWLEDGE ON MALARIA PREVENTION AND DETERMINANT OF MOTHERS TREATMENT PRACTICES.

Table 4.33: Relationship between caregivers predictors (malaria symptoms) and appropriate response (administered orthodox drugs) for malaria at home

Predictors (Malaria Symptoms)	Appropriate response (administered orthodox drugs) for malaria at home							Total
	Naviquine/ Chloroquine	Paracetamol	Aspirin	Antibiotics	Phenergan/ piriton	Vitamin/ blood tonic	ACT	
Fever	0	0	2	2	2	1	1	8
Cough	1	2	1	1	1	0	1	7
Vomiting	3	1	0	0	0	0	0	4
Abdominal Pain	3	0	1	0	0	0	0	4
Weakness	1	0	0	0	0	0	0	1
Hotness	1	0	0	0	0	0	0	1
Total	9	3	4	3	3	1	2	25

$\chi^2 = 23.065$, df = 30, p = 0.813

There is no significant relationship between administered orthodox drugs for malaria at home and malaria symptoms. The caregivers (mothers) prediction for symptoms when child/children are sick in regards to the orthodox drugs been administered, do not gives any guarantee that the child will get well, thus, the caregivers do seek for alternative means such as visiting health facility.

Table 4.34: Relationship between caregivers predictors (malaria symptoms) and appropriate response (administered herbal drugs) for malaria at home

Predictors (Malaria Symptoms)	Appropriate response (administered herbal drugs) for malaria at home					Total
	Danya	Ogouba	Tagaroade	Harrararbi	Do not know	
Fever	0	2	0	2	0	4
Cough	3	2	0	0	1	6
Vomiting	4	0	1	0	2	7
Abdominal Pain	4	0	1	0	0	5
Weakness	2	0	0	0	0	2
Hotness	1	0	0	0	0	1
Total	14	4	2	2	3	25

$\chi^2 = 26.185$, df = 20, p = 0.160

There is no significant relationship between administered herbal drugs for malaria at home and malaria symptoms. Thus, the caregivers (mothers) prediction might not corresponds with the herbal medicine been administered.

Table 4.35: Relationship between level of education (predictors) and knowledge of malaria prevention

Predictors (Level of Education)	Knowledge on malaria prevention							Total
	Uses of ITN	Do not allow stagnant water	Administration of drugs to prevent malaria	Do not allow children to stay long in the sun	Uses of insecticides	Rub repellants	Others	
None	20	10	16	11	17	8	6	88
Primary	8	12	17	12	13	5	8	75
Secondary	10	16	8	7	12	0	15	68
Post-Secondary	0	1	0	1	1	2	13	18
Total	38	39	41	31	43	15	42	249

$\chi^2 = 68.111$, df = 18, p = 0.000

There is a significant relationship between level of education and the knowledge of malaria prevention by the caregivers, thus; the higher the education level the better the level of exposure to the prevention of malaria.

Table 4.36: Level of education and type of first treatment given to the child

Level of Education	Type of first treatment given to the child					Total
	Gave herbs at home	Child taken to traditional medicine man	Gave orthodox drugs at home	Took child to chemist/PMS	Took child to the health centre/dispensary	
None	11	4	6	13	21	55
Primary	7	1	6	11	23	48
Secondary	7	1	13	6	14	41
Post-Secondary	0	1	0	1	0	2
Total	25	7	25	31	58	146

$\chi^2 = 22.297$, df = 12, p = 0.034

There is a significant relationship between level of education and the type of first treatment given to the child, thus; the higher the education level the lower the chance of the use of herbal treatment. Therefore, education level is the major determinants in respect to the treatment been practiced by the caregivers.

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATION

5.1 DISCUSSION

Prompt treatment with effective antimalarial is a cornerstone of malaria control in Africa. HMM has the potential to improve treatment delivery and decrease malaria-associated morbidity and mortality.[34]

More than half (55%) of the respondents are within the age group (18-30yrs) which is in agreement with NDHS 2008,[35] which says the same age group covers 55% among women of reproductive age group (15-49yrs). It is a feature of developing countries' population structure. Here mothers are predominantly younger compared to other parts of the world. This is due to the fact that early marriage is still common in some parts of the world especially in the rural areas. A few of them don't know their dates of birth at all. They could not even relate it to any particular event.

In this study 2/3 of the respondents had at least primary education which is in contrast to a study conducted in Malawi that says 81% of women had at least primary level of formal education.[36] This shows that the proportion of women who have attended primary and secondary level of education in Malawi is higher than what is obtained in Nigeria.

Despite the study participant's moderate knowledge of malaria, the educational level of the respondents was low which is in agreement with NDHS 2008 that puts women literacy level in poor households at 13%, implying the need for intensifying the expansion of schools for raising the level of women's education.

Evidences show that educational attainment is associated with better malaria knowledge.[98] For example, in Nigeria, higher levels of education in some regions were associated with improved knowledge and practice about the appropriate malaria prevention and control interventions[98]. In this study the proportion of those without any education and primary level of education (as in table 4.36) is high hence the relatively limited knowledge of malaria among the respondents.

Almost 90% of the respondents were married and the rest were single, divorced or separated. Among these 57% were full-time house wives enjoying almost full support from husbands in this society, while the remaining were engaged in one type of occupation or the other including civil service which may also be of economic help to the husband and the family in general. This shows that women that have support in one way or the other are more likely to report to hospitals.

The respondents have a fair understanding of the cause of malaria as 50% believe that it is transmitted through mosquito bites. Forty percent (40%) of the respondents identified fever as a symptom of malaria and more than 41% believe that the peak of occurrence is rainy season, a time that mosquitoes breeds well in the area. This is in consonance with a study conducted in rural Tanzania where 56% of the respondents associated the disease with mosquito bites. Stagnant water was also mentioned by almost 2/3 of respondents to be the main site for mosquito breeding.[99]

Although mosquitoes were recognized to be the main agents in the transmission of malaria in this study, 22% of the respondents believe that children contact malaria at play ground. This is in contrast to a report from Ghana where 52% of the respondents

presumed that working close to a heat source like fire or in the sun or eating too much oil and starch could cause malaria.[99] People's perceptions and understandings about the perceived cause and transmission of malaria have strong implications on the preventive measures used in the households.[95]

Forty percent (40%) of the respondents mentioned fever, about 15% mentioned vomiting and 14% recognized cough as symptom of malaria. This is in contrast to a study conducted in Ethiopia where 97% of the respondents identified fever as a symptom of malaria and 11.4% of them identified vomiting.[6] This is of obvious importance in a home-based management of malaria among children under the age of five years.

However, in this study there was a low level of knowledge of malaria by type as only 1.4% knows the term severe malaria. Based on this, respondents are most likely missing complicated malaria which may be fatal. Despite that, ninety percent of the respondents mentioned at least one sign/symptom of severe malaria correctly. Of those 90%, only 14.4% and 17.7% of the respondents mentioned convulsion and anorexia respectively as sign of severe malaria, which similar to a study conducted in Kampala city (Uganda) that showed only 20% of the respondents mentioned convulsion as a sign of severe malaria while 26% mentioned anorexia and 25% mentioned lethargy.[23] A study have identified a strong belief that convulsions are due to supernatural causes and best treated by traditional medicine.[100]

The uses of herbal/traditional remedies at home were found to be 17.1% in this study. This is similar to a clinical review study conducted in about 30 countries which shows that about 20% of malaria cases were treated using herbs at home.[35]

In this study nearly 40% of the mothers first sought treatment for malaria from a health facility, suggesting that more than half of the people with malaria do not seek care from the public health sector. The most common reasons for utilizing health facilities were greater proximity and free treatment. This is in agreement with a study conducted in Ethiopia that reported 50% of the mothers first sought treatment for malaria from a health facility, suggesting that about half of the people with malaria do not seek care from the public health sector.[101]

Despite the moderate level of general knowledge on malaria and high knowledge on the existence of preventive measures, the use of appropriate malaria preventive measures was low in our study setting considering the fact that about 50% of the respondents mentioned cost as a major barrier militating against the use of preventive measures. This proves that malaria is indeed associated with poverty, the study area being an agrarian society. This can be explained by the fact that as at independence 75% of the country's labor force was engaged in agriculture, which also provided gainful employment and satisfactory livelihood to over 90% of the populace unlike the current situation of agriculture that is unattractive to the youth. This is in agreement with the results of a study conducted in Gambia which shows that households spend large amounts of money on malaria prevention. The average fortnightly expenditure on prevention was more than the average expenditure on education and healthcare by more than 30% and 50% respectively. High expenditure on coils and aerosols has also been reported in Burkino Faso, Ghana and Tanzania.[102]

This study shows that draining of mosquito breeding sites, cleaning the environment and blockages of mosquito entry holes were reported as common practices of households to

prevent malaria. This is in agreement with the report of a study conducted in western Kenya where the commonest household practices to prevent malaria cited are: use of bed net, bush clearing, removal of water containing borrow pits and 13% did nothing to prevent malaria.[103]

When assessing the treatment options used by the respondents in this study, 40% of them claimed to be reporting to health facility for treatment. This is in agreement with NDHS, 2008 that says almost 50% of children with fever were taken to a health facility for treatment in all the geo-political zones with the exception of south-east zone where, 72% of children with fever were said to have been reported to health facilities.

Among the respondents who resort to giving orthodox drugs for treatment at home 25(17.1%), 9(36%) buys chloroquine/Nivaquine and 2(8%) uses ACT. This is in agreement with NDHS 2008 report which reported 19% took chloroquine even though is no longer recommended as first line drug, while 6% took SP (fansidar), 2% took ACT and 5% took other antimalarial drugs.[104] This implies that ACT is yet to become the first line treatment of malaria as recommended by the Federal Ministry of Health in Nigeria hence the need for adequate social marketing about the latest recommendation especially at community level.

5.2 CONCLUSION

The findings of this study have shown that knowledge of mothers on treatment of malaria as well as practices of preventive measures is low. ACT is not widely used as the treatment for perceived malaria at home.

5.3 RECOMMENDATIONS

Based on the findings of this study, the following are recommended:

1. There is need to enlighten the public on the importance of practicing preventive measures at home and community levels.
2. Intensify social marketing on use of artemisinin combined therapy and its advantage.

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APPENDICES

APPENDIX I

Knowledge and Practice of Home Management of Malaria (Hmm) Fever In Under-Fives among Mothers Attending Hadejia General Hospital

Eligible Mothers' Questionnaire

Introduction

Dear mother,

This questionnaire is designed to determine mothers' knowledge about malaria and their treatment practice. The information to be gathered from this interview will guide us in the planning of a health education programme to improve mothers' knowledge and ability to treat a child with malaria correctly. All information will be treated with highest confidentiality.

Thanks for your cooperation.

IDENTIFICATION	
Name of respondent	
Household address	
Household identification number (ward/house no)	
Household questionnaire number (hin/hhold roster no)	

SECTION 1: BACKGROUND OF RESPONDENT

Q101. Date of birth, if known? Day:____ Month_____ Year _____

(probe: if day, month or year of birth are unknown, leave blank)

(if date is known, skip to Q103)

Q102. How old are you? _____years 77. DK

Q103. Highest level of education?

1. None 2. Primary School 3. Secondary4. Post secondary

Q104. Religion?

1. Muslim 2. Christian 3.Traditional religion 4. Others_____

Q105. Marital status?

1. Single 2. Married 3. Separated 4. Widow 5.Others _____

Q106. Occupation ?

1. House wife 2. Trader 3. Farmer 4. Junior civil servant 5. Senior civil servant 6. Teacher 7. Artisan/apprentice 8. Professional 9.Not employed 10. Others_____

Q107. Who is the key person that takes care of children when they are sick?

1. Father 2. Mother 3. Maternal grand-parents 4. Paternal grand-parents

5. Both father and mother 88. Others _____

Q108.Who takes the final decision on where to take a child to when he/she is sick?

1. Father 2. Mother 3. Maternal grand-parents 4. Paternal grand-parents

5. Both father and mother 88. Others _____

SECTION 2: KNOWLEDGE ON MALARIA AND ITS PREVENTION

Q201. Fever is common among children; please tell us some of the illnesses that could cause fever in children.

_____

_____

Q202. What type of illness do you think your child could be having whenever he/she develops fever. 1.Malaria 2. Pneumonia 3. Measles 4. Typhoid 5. Schistosomiasis 6. Teething 7. Others _____

Q203. Please tell us what you know about malaria by type (uncomplicated/severe), signs and symptoms, season it most occurring, how children get malaria and the treatment.

Type	Sign/symptom	Season it occurs most	How children contract malaria.	Treatment of malaria
	1. 2. 3. 4. 5. 6. 7. DK(Don't know)		1. 2. 3. 4. 5. 6. 7.DK	
	1. 2. 3. 4. 5. 6. 7. DK		1. 2. 3. 4. 5. 6. 7.DK	

Q204. Can malaria be prevented?

1.Yes 2. No 3. Don't know [If yes go to Q 206)

Q205. If no, why did you say malaria cannot be prevented?

_____

_____

Q206. If yes to Q 204, please answer the following question on methods of preventing malaria. (Interviewer, please do not probe)

Ways to prevent malaria (circle) (put asterisk* on the most important one)	Which ways do you use (circle)	Is there any difficulty in using the method you use?(do not prompt)
1.Use of ITN 2. Do not allow stagnant water 3. Drug to prevent malaria 4. Do not allow children to stay long in the sun 5. Use of insecticides 6. Rub repellents 88. Others---------- 77. Don't know Combination _____	1. Use of ITN 2. Do not allow stagnant water 3. Drug to prevent malaria 4. Do not allow children to stay long in the sun 5. Use of insecticides 6. Rub repellents 7. Nothing 88. Others---------- 77. Don't know Combination_____	1. cost 2. power failure 3. odour 4. ITN odour 5. Unavailable for purchase 88. others_____ 7. None 77.DK Combination_____

SECTION 3: FEBRILE EPISODE/MALARIA (CHILD THAT HAD FEBRILE ILLNESS LAST)
(Complete for each child < or 5yrs)

Name of child _____ Household number_____

Q301. Age: _____ SEX: (1) MALE (2) FEMALE

Q302. When did ..... [name of child] had fever last? _____

Q302b. Last episode of fever occurred within the last four weeks? 1. Yes2. No

Q303. When .....had fever last, how long did it last?

1. Has fever at time of interview 2. 1-3 days 3. 4-6 days

4. One to two weeks 77. Don't know

88. Others_____

Q304. What are the other signs and symptoms (apart from the fever) he/she had?

1. Yes 2. No 77. Don't know

a. chills/rigors

b. Diarrhoea

c. Vomiting

d. Cough

e. Difficulty in breathing

f. Convulsion

g. Skin rash

h. Restless

i. Weakness/not playing

j. Headache

k. Yellow eyes

l. Anorexia

88. Others _____

Q305. What type of illness do you think .....had when he/she had fever last?

1. Malaria _____

2. Measles 3. Pneumonia 4. Yellow fever 5. Typhoid fever

6. Ordinary cough 77. Don't know 88. Others_____

(If not malaria, GO TO Q307)

Q306. Do you think the malaria he had was severe?

1. Yes 2. No 77. Don't know

Q307. What are the signs and symptoms of severe malaria that you know?

(circle all responses) (do not prompt)

1. Chills/rigors 2. Convulsion 3. Child not eating/anorexia 4. Persistent fever

5. Diarrhoea 6. Very high fever 7. Breathless 8. Yellow eyes

9. Palor 10. Coca cola urine 77. Don't know 88. Others_____

Q308. What was the first treatment you gave to ....

1. Gave herbs at home (Ask Q410- Q424)

2. Child taken to traditional medicine man (Ask Q 425 - Q433)

3. Gave orthodox drugs at home (Ask Q 434- Q441)

4. Took child to chemist / PMS (Ask Q442- Q451)

5. Took child to the health centre /dispensary (Ask Q452 - Q457)

Interviewers Pick the Questionnaire on Treatment Options (OPTIONS 1-5 questionnaires) and administer the Applicable One to the Option Mentioned. Thereafter, continue with the questions below.

Q458. When you want to buy drug for achild with febrile illness, which of these is most important? (Only one response)

1. ACT 2. Antimalarial (CQ, Fansidar etc) 3. Haematinics/vitamins

4. Butazolidine/phensic 5. Antibiotic 6. Paracetamol

Q459. Why did you think the drug you mentioned is the most important in treating malaria? _____ _____ _____

SECTION 4: Treatment Option 1: Caregiver treated child at home using traditional medicine

Q410. How many hours after noticing fever did you commence the traditional medicine for.....? _____

Q411. Where did you get the medicine from?

1. Prepared at own by yourself

2. Got it from a traditional healer (Go to Q 414)

Q412. How did you know how to prepare the medicine?

1. Inherited it from fore fathers

2. Taught by a traditional healer

3. Learned it from relations and/or friends

88. Others_____

Q413. Name the herbs used to prepare the medicine.

1. _____

2. _____

3. _____

Q414. How many times in a day did you administer the medicine?

_____

Q415. What is the measure of medicine given to a child under five years?

_____teaspoon/day (quantify in mls)

Q416. What is the measure of medicine given to a child < or = 5 years?

_____teaspoon (mls) /day

Q417. For how many days did you give the medicine? _____

Q418. Did you at anytime had to use other drugs with the herbal medicine?

1. Yes 2. No 77. Don't know

Q419. If yes to Q418, state the other drugs used? _____

Q420. Why did you have to use other drugs in addition to the herbal medicine?

_____

Q421. What was the outcome of the treatment you gave.....?

1. Got well

2. Got a little better

3. There was no improvement in child's condition

4. Sickness got worse

Q422. Did you have to take ..... to a health facility, dispensary or chemist after treatment at home with herbal medicine? 1. Yes 2. No

Q423. If Yes to Q417, why?

1. Sickness persisted 2. To be sure child is cured

3. Sickness getting worse 4. Herbal medicine not effective

88. Others_____

Q424. How many hours after noticing fever in ..... did you take him/her to health facility? _____hours

Treatment Option 2: Child taking to a traditional healer/herbalist

Q425. How many hours after noticing fever did you commence the traditional medicine for .....? _____

Q426. For how many days did you give the medicine?

a. < 3 b. 3 c. >3

Q427. If yes to Q418, state the other drugs used? _____

Q428. Why did you have to use other drugs in addition to the herbal medicine?

Q429. What was the outcome of the treatment you gave.....?

1. Got well

2. Got a little better

3. There was no improvement in child's condition

4. Sickness got worse

Q430. Did you have to take ..... to a health facility, dispensary or chemist after treatment at home with herbal medicine? 1. Yes 2. No

Q431. Did you at anytime had to use other drugs with the herbal medicine?

1. Yes 2. No 77. Don't know

Q432. If Yes to Q417, why?

1. Sickness persisted 2. To be sure child is cured

3. Sickness getting worse 4. Herbal medicine not effective

88. Others_____

Q433. How many hours after noticing fever in ..... did you take him/her to health facility? _____hours

Treatment Option 3: Treated child at home using drugs bought from chemist, patent medicine sellers (pms) or drug hawkers.

Q434. How many hours after noticing fever did you commence the traditional medicine for.....? _____

Q435. What drug (s) did you buy to treat ....? (Do not prompt)

1. Nivaquine/Chloroquine |_| 2. Paracetamol |_|

3. Aspirin |_| 4. Antibiotics (ogun kokoro) |_|

5. Phenergan/piriton |_| 6. Vitamin/blood tonic |_|

7. ACT |_|

88. Others_____ 77. Don't know

Q436. Which of the following drug sellers did you buy drugs from?

1. Chemist/PMS 2. Drug hawkers 3. Dispensary / health centre

Q437. How did you use the drugs?

Name of drug	Formulation 1. Syrup 2. Tablet 3. Injection	Dose	How many times a day	Duration	How may hours after noticing fever did you commence drug

Q467**.** For investigator - correctness of use of antimalaria. 1. Yes 2.No

Q438. How satisfied were you with the drug(s) you brought to treat.....?

1. Very satisfied 2. Satisfied 3. 50/50

4. Not satisfied 5. Not satisfied at all

Q439. Did you have to take ..... to a health facility, dispensary or chemist after treatment at home with orthodox drugs? 1. Yes 2. No

Q440. If Yes to Q418, why?

1. Sickness persisted 2. To be sure child is cured

3. Sickness getting worse 4. Herbal medicine not effective

88. Others_____

Q441. How many hours after noticing fever in ..... did you take him/her to health facility? _____hours

Treatment option 4: Took child to a chemist

Q442. How many hours after noticing fever did you take child to a chemist? _____

Q443. How did the chemist attendant know the type of illness your child had?

1. Ask for what I noticed in child 2. Examined the child

3. Did a laboratory test (blood and urine test e.t.c)

4. Checked the temperature of the child

88. Others _____

Q444. What drugs did the attendant prescribed?

1._____

2. _____

3. _____

Q445. Did the attendant tell you how to use the drug(s)? 1. Yes 2. No

Q446. If no to Q445, how did you know how the dose to give to your child?

1. Read the literature in the drug pack

2. Ask from a friend/neighbour

3. Used it as I did in the past

88. Others_____

Q447. How did you use the drug (s)?

Name of drug	Formulation 1. Syrup 2. Tablet 3. Injection	How many time a day	Duration	How many hours after noticing fever did you use drug

Q467. For Investigator - Correctness of Use of Antimalarial 1. Yes 2. No

Q448. How satisfied were you with the drug(s) you brought to treat.....?

1. Very satisfied 2. Satisfied 3. 50/50

4. Not satisfied 5. Not satisfied at all

Q449. Did you have to take ..... to a health facility, dispensary or chemist after treatment at home with orthodox drugs? Yes 2. No

Q450. If Yes to Q418, why?

1. Sickness persisted 2. To be sure child is cured

3. Sickness getting worse 4. Herbal medicine not effective

88. Others_____

Q451. How many hours after noticing fever in ..... did you take him/her to health facility? _____hours

Treatment option 5: Took child to health centre.

Q452. How many hours after noticing fever did you take child to a health centre? _____

Q453. What drugs did the attendant prescribed?

1._____

2. _____

3. _____

Q454. Did the health worker tell you how to use the drug(s)? 1. Yes 2. No

Q455. If no to Q.454 , how did you know how the dose to give to your child?

1. Read the literature in the drug pack

2. Ask from a friend/neighbour

3. Used it as I did in the past

88. Others_____

Q456. How did you use the drug (s)?

Name of drug	Formulation 1. Syrup 2. Tablet 3. Injection	Duration	Cost of drug	How many hours after noticing fever did you use drug

Q467. For Investigator - Correctness of Use of Antimalarial 1. Yes 2. No

Q457. How satisfied were you with the drug(s) you received at the health centre.....?

1. Very satisfied 2. Satisfied 3. 50/50

4. Not satisfied 5. Not satisfied at all

APPENDIX II

GUNDUMA HEALTH SYSTEM COUNCIL HADEJIA

Behind Old Motor Park, Hadejia, Jigawa State-Nigeria

GHSC/HJ/GEN/352

1st July 2011

The chairman

Hospital Management Committee

Hadejia General Hospital

INTRODUCTION OF DR. UMAR AHMED AND CONSENT TO UNDERTAKE SURVEY ON MALARIA

I write to introduce the bearer who is undertaking a survey on knowledge and practice of home management of malaria fever in under fives among mothers attending your hospital.

In view of the above, the council had approved the conduct of the survey and it is expected the findings will be disseminated for utilization by the hospital and the council.

Your support is solicited towards the gesture to enable a successful conduct of the survey.

Best regards.

Adamu abdullahi

Director.

...Promoting health, improving care.

APPENDIX III

HADEJIA LOCAL GOVERNMENT

LGA Secretariat-Nguru Road
Hadejia

P.M.B. 1301
Tel: 721923
Jigawa State

Our Ref:

Your Ref: *Date:* 30th June 2011

Director PHC Department

To Incharge
Hadejia General Hospital

LETTER OF INTRODUCTION

I wish to introduce Umar Ahmed a Post Graduate Student in Ahmadu Bello University, Zaria, He is to conduct a research under your facility.

Please give him the necessary assistant required.

Yours faithfully,

30/6/2011

DPHC-Hadejia LGA