

**EVALUATION OF ANTIMALARIAL DRUG USE PRACTICES OF
HEALTH EXTENSION WORKERS AND PATIENT ADHERENCE IN
SOUTHERN ETHIOPIA/WOLYTA ZONE**

by

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DECLARATION

I declare that **EVALUATION OF ANTIMALARIAL DRUG USE PRACTICES OF HEALTH EXTENSION WORKERS AND PATIENT ADHERENCE IN SOUTHERN ETHIOPIA/WOLYTA ZONE** is my own work and that all sources that I have used or quoted have been indicated and acknowledged by means of complete references and that this work is not being submitted before for any other degree at any institution.

A handwritten signature in blue ink, appearing to read 'Kassa Daka Gidebo', is written over a horizontal dotted line. Below the signature is a solid black horizontal line.

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EVALUATION OF ANTIMALARIAL DRUG USE PRACTICES OF HEALTH EXTENSION WORKERS AND PATIENT ADHERENCE IN SOUTHERN ETHIOPIA/WOLYTA ZONE

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Abstract

Early diagnosis and prompt treatment is one of the malaria control strategies used to minimize malaria morbidity and mortality. One of the mechanisms to implement early diagnosis and prompt treatment is community access to diagnostic services and effective antimalarial drugs. However, in Ethiopia the health system is underdeveloped and much of the rural population has limited access to modern health services. Therefore, the Ethiopian government introduced the Health Extension Programme (HEP) which is a community-based health care delivery system aimed at accessing essential health services through its health extension workers (HEWs). Involvement of the HEWs in prescribing and dispensing antimalarial drugs is shown to have improved community access to antimalarial drugs. However, there is insufficient knowledge of HEWs compliance to malaria treatment guidelines and patient adherence of patients treated by HEWs.

The objectives of this study has been to describe the HEWs practice in malaria treatment, to evaluate adherence of patients to antimalarial drugs, to explore the factors influencing the HEWs malaria treatment practice and patient adherence, and to develop the guidelines to support the HEWs in malaria treatment practice.

A qualitative study design was used to study the HEWs practice in malaria treatment along with patient adherence. Data were collected using in-depth face-to-face interviews, focus group discussion and patient medical record review and were analysed according to Tesch's steps.

The study revealed that the HEWs adequately comply with malaria treatment guidelines during diagnosis of malaria, as well as during the prescribing and dispensing of antimalarial drugs. However, there are some factors influencing the performance of

HEWs. These are: shortage of diagnostic kit/RDT, shortage of antimalarial drugs, patient pressure to obtain coartem, work load, and community beliefs with regard to antimalarial drugs effectiveness.

This study also revealed that the HEWs follow up after treatment of patients and good community support systems improved patient adherence to antimalarial drug use. Factors negatively influencing patient adherence were identified to include: forgetfulness, fear of shortage of drugs, adverse drug effects, duration of treatment, rapid relief of malaria symptoms and inadequate awareness of the consequence of incomplete dosage.

Guidelines were developed to support the HEWs in malaria treatment practice with the aim to improve patient adherence to antimalarial drugs.

Key words:

Malaria; Health Extension Workers; Compliance; Adherence; Antimalarial drugs; Community health workers; Community support; Health Extension Programme; Guidelines; Ethiopia.

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This thesis is dedicated

to my late parents, Getare Bala Bade and Daka Gidebo Jalo;

to my late brother, Demissie Daka Gidebo;

to my brother, Abera Daka Gidebo;

to my late friend, Tessema Dola Dutebo

and to my late primary school teacher, Kassu Anjulo.

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List of abbreviations

| | |
|----------|--|
| ACIPH | Addis Continental Institute of Public Health |
| ACT | Artemisinin Combination Therapy |
| AL | Artemether-Lumefantrine |
| CDC | Centres for Disease Control |
| CNHDE | Centre for Nutrition and Health Development of Ethiopia |
| DHS | Demographic Health Survey |
| FGD | Focus group discussion |
| EFMOH | Ethiopian Federal Ministry of Health |
| HBM | Health Belief Model |
| HEP | Health Extension Program |
| HEW | Health Extension Worker |
| HIV | Human Immunodeficiency Virus |
| EMoFED | Ethiopian Ministry of Finance and Economic Development |
| MSH | Management Science for Health |
| ORT | Oral Rehydration Therapy |
| PHC | Primary Health Care |
| PMI-MOPE | President Malaria Initiative- Malaria Operational Plan of Ethiopia |
| RBM | Roll Back Malaria |
| RDT | Rapid Diagnostic Test |
| SIGN | Scottish Intercollegiate Guidelines Network |
| SP | Sulfadoxine-pyrimethamine |
| TB | Tuberculosis |
| VMWs | Voluntary Malaria Workers |
| WHO | World Health Organization |

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Annexure 1

Ethical clearance from UNISA

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CHAPTER 1

OVERVIEW OF THE STUDY

1.1 INTRODUCTION

Making efficacious antimalarial drugs accessible to the community is vital to reducing malaria mortality. But simply making antimalarial drugs accessible is not enough to treat malaria effectively. The treatment must also be used appropriately by healthcare providers and be fully adhered to by patients in order to ensure high cure rates and to reduce resistance of the malaria parasites to antimalarial drugs (WHO 2010a:6; WHO 2006a:12).

To improve health service access to the community and to promote the appropriate use, the Ethiopian government introduced Health Extension Programme (HEP) into the health care system (CNHDE 2005:2; Argaw 2007:7). According to CNHDE (2005:2), the Health Extension Program is an innovative health service delivery programme that aims at universal coverage of primary health care. The programme gives priority to the prevention and control of communicable diseases with active community participation, with the goal of providing equitable access to health services. The programme is based on expanding physical health infrastructure and developing a cadre of health extension workers (HEWs), who will provide basic preventive and curative health services in every rural community.

The assessment of the HEWs activities in Ethiopia has observed accessibility to essential health services such as malaria prevention and treatment (antimalarial drugs) at a community level (EFMOH 2007:23; Barnabas 2009:3-11). But the quality of drug use practices and the HEWs role in increasing patient adherence to antimalarial drugs use has never been evaluated. Therefore, the aim of this study has been to evaluate the HEWs compliance to malaria treatment guidelines, and to evaluate patient adherence to antimalarial drugs dispensed by HEWs in order to improve the HEWs practice in malaria treatment in Ethiopia.

1.2 BACKGROUND TO THE PROBLEM

Malaria is a health problem of more than 107 countries in the world. In addition to a big health problem, it affects the economic status of many countries in malaria endemic areas. Africa, especially Sub-Saharan parts of Africa (SSA), is the part of the world most affected by the disease. The malaria control programmes have a long history in different malaria endemic countries in the Sub-Saharan Africa. But malaria is still a big health problem in most countries in the region due to weak malaria control systems, resource constraints (shortage of antimalarial drugs and diagnostic materials) and inadequate health structures, low community awareness and malaria parasite resistance to antimalarial drugs as a result of the inappropriate use of antimalarial drugs (WHO 2004a; WHO 2008a:1).

1.2.1 Malaria control

Malaria is a life-threatening disease that around the world results in 350-500 million cases and more than 1 million deaths annually. Studies indicate that about 40% of world's population is at risk of malaria (CDC 2001, WHO 2005: xi). Sub-Saharan countries are the most affected areas of malaria. About 80% of deaths and 90% of cases are found in SSA. The disease burden in this region causes economic loss of up to 6% of the gross national product (GNP) of affected countries due to loss of productivity and health service costs (CDC 2001; WHO 2003a:46).

As such, malaria is a significant impediment to social and economic development in Ethiopia. About 75% of land mass is malarious and 67 to 68 percent of the population are at risk of malaria in Ethiopia (EFMOH 2002:5-8). The disease is a leading cause of morbidity, mortality and hospital admission. It was reported that about 15.5% of outpatient, 20.4% hospital admissions and 27% of deaths are due to malaria. To give a sense of the extent of the problem, it is reported that malaria causes approximately 70,000 deaths each year (EFMOH 2004:1).

For malaria prevention and control programmes, a three-pronged approach has been implemented, consisting of early diagnosis and effective treatment, selective vector control and epidemic prevention and control. Evidence suggests that the large scale expansion of prevention programmes and improved access to more effective

antimalarial drugs are vital for malaria control, and can substantially reduce malaria cases and deaths (EFMOH 2009a:15). Effective malaria control also requires rational use (appropriate prescribing and dispensing) and patient adherence to antimalarial drugs (EFMOH 2004:6).

Artemisinin Combination Therapy (ACT) and chloroquine are used as first line treatment for the management of uncomplicated malaria, caused by *Plasmodium falciparum* and *Plasmodium vivax*, respectively (EFMOH 2004:9; WHO 2009:ix). ACT for malaria treatment started in Ethiopia in 2004, with almost all available drugs resisted by *Plasmodium falciparum*. Currently, ACT is provided through all government health facilities, which include hospitals, health centres and health posts. Health Extension Workers (community health workers with one year's training) at health posts are dispensing ACT/artemether-lumefantrine in cases of *Plasmodium falciparum* and chloroquine in cases of *Plasmodium vivax*, in order to treat uncomplicated malaria cases (EFMOH 2004:8).

Participation of health extension workers in malaria prevention and control increased community accessibility to prevention and control methods. Prevention methods such as household insecticide treated net (ITN) and accessibility to antimalarial drugs improved significantly. Malaria morbidity and mortality has subsequently decreased in Ethiopia in the past few years (Teklehaymanot, Kitaw, GebreYohannes, Girma, Seyoum, Desta & Ye-Ebiyo 2007:253; Barnabas 2009:3-11). However, the wider accessibility to antimalarial drugs should be balanced with appropriate use in order to minimise the problem of resistance and treatment failure (Bloland, Kachur, Williams 2003:3761-3769). Appropriate use by those prescribing medication, patient adherence and the quality of antimalarial drugs are important factors affecting effectiveness of malaria treatment (Amin, Hughes, Marsh, Abuya, Kokwaro, Winstanely, Ocholo & Snow 2004). Low adherence to medication causes low cure rates and exposing the parasite to under dose causing resistance to antimalarial drugs (WHO 2010a:6).

The WHO (2010a:6) states that “resistance to antimalarial medicines has been documented in all classes of antimalarials, including the artemisinin derivatives, and it is a major threat to malaria control. Resistance can be prevented, or its onset slowed considerably, by combining antimalarials with different mechanisms of action and ensuring very high cure rates through full adherence to correct dose regimens”.

However, the transition from single dose sulfadoxine-pyrimethamine (SP) to three days six dose artemisinin-based combination therapy (ACT) as first line treatment for uncomplicated *plasmodium falciparum* malaria, has posed a challenge ensuring full adherence by the patient (EFMOH 2008:34).

1.2.2 Health extension programme

One of the factors which aggravated the problem of controlling malaria in Africa is inadequate health structures (WHO 2004b). According to the EFMOH (2004:1) report, in Ethiopia an estimated 60-80 percent of health problems are due to communicable diseases (including malaria) and nutritional deficiencies. But health service coverage and the ratio of health personnel to population remain low. The health system is also under-developed and able to provide healthcare to only about half of the population, and much of the rural population have no access to modern forms of healthcare.

To increase the accessibility of modern health care to the community, the Health Extension Program (HEP) in Ethiopia was initiated in 2003 with the main objectives of prevention and control of malaria; prevention of HIV/AIDS and Tuberculosis; provision of oral contraceptives; and follow up of high risk pregnant mothers. Prevention and control of malaria extension package includes: increasing awareness, knowledge and skills of the communities on the transmission, prevention, and control of malaria; promoting participation of the communities in the prevention and control of the disease; and reducing the number of cases and deaths due to malaria (EFMOH 2004:2; Argaw 2007:7).

The HEP was implemented at health post/community level, which is the lower level of Ethiopian health tier system. The health tier system of Ethiopia has three levels and includes primary level, secondary level and tertiary level (table 1.1). Health posts are equipped with family planning and health education materials, medical supplies and equipment, diagnostic materials (RDTs), curative drugs such as antimalarial drugs and two HEWs expected to serve about 3000-5000 people (500-1000 households) (EFMOH 2003:8).

Table 1.1 Ethiopian Health Care Tier System

| Level of health care/health tier | Types of health facility | Population served |
|----------------------------------|--------------------------|-------------------|
| Primary level | Health post | 3000-5000 |
| | Rural Health Centre | 15000-25000 |
| | Urban Health Centre | 40000 |
| | Primary Hospital | 600000-100000 |
| Secondary level | General Hospital | 1.0-1.5 million |
| Tertiary level | Specialised hospital | 3.5-5.0 million |

The HEP is an innovative community-based strategy in place to deliver preventive and promotive health services and selected high-impact curative interventions such as treatment of uncomplicated malaria with ACTs and chloroquine, at community level. It brings about community participation through the creation of awareness, behavioural change, and community organisation and mobilisation. It also improves the utilisation of health services by bridging the gap between the community and health facilities, through the deployment of the HEWs. One of the priority areas of the HEP is maternal and child health service. It was expected that females have better attention to mothers and child health services. Therefore, in this programme, two female HEWs are assigned to a health post in each Kebele, conducting outreach activities with 500-1000 households (EFMOH: 2007b:5). The main objective is to improve access to essential health services provided at the village and household levels (EFMOH 2007b:6).

In addition to dispensing antimalarial drugs based on the malaria treatment guidelines to patients with malaria (EFMOH 2003:4), HEWs are expected to educate and follow up patients at their residence through outreach activities about antimalarial drugs and to promote early care seeking, adherence and an increase treatment success rate (Argaw 2007:8-11; EFMOH 2008:7). Saharty, Kebede, Dubusho and Sidat (2009:33) have also indicated that: "HEWs, in addition to frontline health workers, have been instrumental in promoting early care seeking behaviour and adherence" to antimalarial drugs. Ye-Ebiyo, Kitaw, Gebre-Yohannes, Girma, Desta, Seyoum and Teklehaymanot (2007:242), reported in their study that to implement the malaria treatment effectively, adequate training and continuing education about malaria treatment and prevention methods was provided to the HEWs.

1.2.3 Adherence to medications

Adherence to a medication regimen is generally defined as “the extent to which patients take medications as prescribed by their healthcare providers” (Osterberg & Blaschke 2005:487). According to Yeung and White (2005:123), “adherence meant that the antimalarial was taken at a dose and duration that was considered to be within a range that would result in the same efficacy as the recommended regime”. The adherence level of patients determines the effectiveness of drugs taken by the patient. Non-adherence to medication such as anti-infective drugs causes both treatment failure and drug resistant parasites (Yeung & White 2005:123).

Adherence is one of the components of rational drug use, and it is used to minimise the development of drug resistance (Steel, Nwokike & Joshi 2007:1). Patient adherence is also the main element of the drug use cycle, illustrated in figure 1.1 below as proposed by MSH and WHO (1997:423).

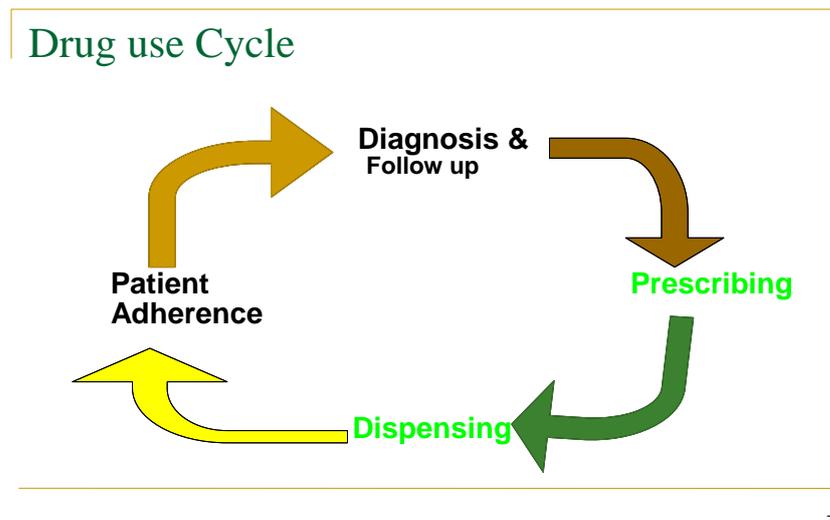


Figure 1.1 The drug use process
(MSH & WHO 1997:423)

Figure 1.1 indicates that the overall efforts made during availing drugs and medical supplies, diagnosis process, prescription and dispensing process and overall expenses of patients during the treatment process, will be useless if the patient does not adhere to the treatment schedule (MSH & WHO 1997:423; Rigby 2007:32).

Therefore, patient adherence to appropriate drug administration, which includes an appropriate dose of drugs, time/interval of drug taking and duration of full treatment, directly affects the response to antimalarial drugs (Amin et al 2004). Poor adherence to medication regimens contributes to a worsening of diseases, and death due to inadequate dose regimen. Poor adherence to medication also contributes to increased healthcare costs, by promoting resistance to available low cost drugs. Furthermore, some studies indicate that about half of those patients for whom medicines are prescribed, do not take them correctly (WHO 2003c:48).

Patient adherence to medication is influenced by many factors. According to British National Formulary (2010), “inadequate follow up, poor provider patient relationship, unclear instructions for administration and patient lack of belief in benefit of treatment are major predictors of adherence to medication”. The type of drug packages also affects the adherence of patients. Easy to handle and use packages such as “blister packs” encourage completion of the treatment course and correct dosing (WHO 2010a:24).

Duration in terms of the number of days and doses of the drug administered to the patient also affect the patient adherence. Amin et al (2004:970) indicate that a single dose of sulphadoxine–pyrimethamine (SP) was found to be “adequately adhered” by 66.7% of patients, but that a three day dose of amodiaquine (AQ) was adhered to by only 13.8% of patients. Souares, Lalou, Sene, Sow and Hesran (2009), citing Deccache (1995) and Morin (2001), indicated that the patient's treatment adherence is also determined by factors such as perceptions of the disease and perceptions of treatment (such as taste, cost, complexity of the schedule and side effects).

The adequacy of information or explanation given during prescribing or dispensing to patients or caregivers also determines the adherence level of patients. Prescribers and dispensers should, therefore, give a clear and comprehensible explanation of how to use the medicines (WHO 2010a:24; WHO 2006b:30). Checchi, Piola, Fogg, Bajunirwe, Biraro, Grandesso, Ruzagira, Babigumira, Kigozi, Kiguli, Kyomuhendo, Ferradini, Taylor and Guthmann (2006:59) indicate that providing adequate information by health workers about malaria and antimalarial drugs during prescription and dispensing is important to promoting adherence and increasing cure rates. A study done in Thailand shows that about 76.2% of patients diagnosed with *P.Vivax* did not adhere to chloroquine

medication for two reasons: low knowledge score about malaria and lack of access to adequate information on antimalarial medications (Khantikul, Butraporn, Kim, Leemingsawat, Tempongko & Suwonkerd 2009:4).

“The clarity as well as the quality and inter-activeness of client-prescriber and client-dispenser communication and a more detailed explanation of biomedical paradigms in providing counselling on prescribed treatment may be needed to improve adherence” (Agyepong, Ansah, Gyapong, Adjei, Barnish & Evans 2002:2215). A study done by Soares et al (2009:118) also indicate that information given to the patients at the time of prescribing and dispensing consultation is important to improving adherence and to preventing the emergence of rapid drug resistance.

Adherence is also influenced by health workers’ ability to convince patients of the value of treatment and patient perceptions towards health workers capability. MSH and WHO (1997:428) indicate that

“Adherence depends not only on acceptance of information about the health threat itself but also on the practitioner’s ability to persuade the patient that the treatment is worthwhile and on the patient’s perception of the practitioner’s credibility, empathy, interest, and concern”.

1.2.4 Antimalarial drug use

Those patients who use antimalarial drugs in rural parts of most developing countries are not followed up by health workers (Baird 2005:1566) and self-treatment, either treating with traditional medicine or drugs purchased from open markets without consulting health professionals, is common. A study conducted in Burkina Faso suggested that among febrile patients with malaria, 69 percent were self-treated (Muller, Traore, Becher & Kouyate 2003:290). A study conducted among 630 febrile patients with malaria in Ethiopia also indicates that 67% were self-treated (Deressa, Ali & Enqusellassi 2003:261-268).

To increase patient access to antimalarial drugs and supervision during treatment by trained health workers, so-called ‘Close-to-Home Treatment’, is one of the strategies that were proposed at the Abuja Summit in April 2000. African heads of state at Abuja

Summit agreed that, “by 2005, 60 percent of malaria sufferers should have prompt access to affordable, appropriate treatment within 24 hours of the onset of symptoms ” (WHO 2000). The general aim of “home-based malaria treatment” is to greatly improve access to efficacious medicines such as ACT at the most peripheral levels, and to increase community members’ knowledge about how to use antimalarial medicines properly (Bloland et al 2003:3761-3769).

Even though it is recommended that the wide accessibility of antimalarials such as ACT is very important at community level to treat malaria, availability should be balanced with appropriate use (Bloland et al 2003:3761-3769). Arrow, Panosian and Gelband (2004:314) emphasise that “an unprecedented investment in highly efficacious ACTs must be accompanied by investments aimed at improving the environments in which they will be used in order to maximise their benefits and minimise the potential for harm resulting from misuse.” Arrow et al (2004:314) also emphasise that “infusing ACTs in the same environment, in which chloroquine, sulfadoxine-pyrimethamine, and other drugs have failed, could even be counterproductive”– resulting in resistant malaria parasites and decreasing cure rates.

According to the WHO (2009:3) in their malaria report of 2009, “prompt parasitological confirmation by microscopy or alternatively rapid diagnostic tests (RDTs) is recommended in all patients suspected of malaria before treatment is started using ACT”. But Bloland, Ettlign and Meek (2000:1378) argue that in settings with limited health facility access, diagnosis and treatment should be provided at community level, through a programme of community case management (home-based management) of malaria.

1.3 GUIDELINES FOR DIAGNOSIS AND TREATMENT OF MALARIA

Malaria diagnosis and treatment are an essential parts of malaria control strategies. Early diagnosis and prompt treatment with effective antimalarial drugs promotes rapid recovery in case of uncomplicated malaria, prevents development of severe malaria and reduces death due to malaria. According to the WHO, malaria treatment guidelines and malaria case management requires appropriate early diagnosis and treatment with effective antimalarial drugs (WHO 2010a:ix-6).

The WHO guidelines for treatment of malaria give emphasis to appropriate diagnosis of malaria and to the rational prescribing and dispensing of antimalarial drugs. The WHO also strongly recommends laboratory confirmation, using “microscopy or Rapid Diagnostic Test (RDT)” before onset of treatment, in order to minimise overuse of antimalarial drugs and drug resistance (WHO 2010a:xi).

1.3.1 Malaria diagnosis

Appropriate diagnosis of health problems such as malaria is one of essential elements of rational drug use cycle (MSH & WHO 1997:423). With regard to diagnosis, there are two main methods of malaria diagnosis: diagnosis of malaria according to clinical signs and symptoms, and detection of parasites in the blood (laboratory testing). Laboratory testing using light microscopy or RDT to confirm presence of malaria parasite in blood is the preferred method of diagnosis, and is strongly recommended by the WHO, especially in areas of low to moderate malaria transmission (WHO 2010a:11).

At high malaria prevalent areas such as the SSA, it is also highly recommended that presence of malaria be confirmed using microscopic blood testing. However, it is also acceptable to use RDT at places where microscopy is not available, or cannot be used, due to lack of adequately trained professionals as well as other resources, such as electricity. But antimalarial treatment based on clinical signs and symptoms can also be done in conditions where parasitological diagnosis, is not accessible particularly in vulnerable populations such as amongst children under five and pregnant women in whom the disease can rapidly become fatal. In the case of epidemic and complex emergency conditions, it is also not possible to conduct a laboratory test to check the presence of malaria in all patients. In this situation, treatment may be done based on clinical signs and symptoms (WHO 2010a:12).

The WHO recommendations for clinical diagnosis of uncomplicated malaria in different epidemiological settings are as follows:

In settings where the risk of malaria is low, clinical diagnosis of uncomplicated malaria should be based on the possibility of exposure to malaria and history of fever in the previous three days with no features of other severe diseases; In settings where the risk of malaria is high,

clinical diagnosis should be based on a history of fever in the previous 24 h[ours] and/or the presence of anaemia, for which pallor of the palms appears to be the most reliable sign in young children (WHO 2010a:9).

1.3.2 Malaria treatment

Immediate treatment with efficacious antimalarial medicines at an early stage of malaria infections creates rapid full recovery. Access to effective antimalarial medicines and prompt treatment also minimises the chance of severe malaria and death. Ineffective medicine and delayed treatment particularly in *Plasmodium falciparum* creates a chance to increase parasite load in the patient's blood and increases the probability of development of severe malaria (WHO 2010a:4).

Hence, appropriate treatment (adequate dose, duration and counselling) with effective medication against malaria parasites, minimises the development of severe malaria and death (WHO, 2010a:5). According to the WHO treatment guideline (WHO 2010a:49):

Chloroquine 25 mg base/kg body weight divided over 3 days is the drug of choice for chloroquine sensitive infections. Chloroquine also combined with Primaquine 0.25 mg base/kg body weight once daily for 14 days to treat systemic infection of *Plasmodium vivax* malaria. For chloroquine resistant *plasmodium vivax* malaria ACT combined with Primaquine can be used for radical cure (WHO 2010a:x).

The WHO also recommends that for uncomplicated *plasmodium falciparum* malaria treatment, artemether plus lumefantrine, with therapeutic dose of “6 dose regimen over a 3 day period and the dosing is based on the number of tablets per dose per weight (5–14 kg: 1 tablet; 15–24 kg: 2 tablets; 25–34 kg: 3 tablets; and > 34 kg: 4 tablets), given twice a day for 3 days” (WHO 2010a:20). The WHO indicates that parasitological diagnosis of positive results is for the treatment of malaria with antimalarial drugs but in the case of severe malaria, which is justified by clinical symptoms treated with antimalarial drugs for negative cases is also possible (WHO 2010a:10).

When parasitological diagnosis is possible, the findings of a diagnosis should be available within no more than two hours. In cases of delay of parasitological diagnosis,

patients with suspected groups should be treated immediately on clinical grounds. In addition to prescribing and dispensing an appropriate drug in appropriate doses to patients, the WHO also strongly recommends that adequate explanation/instruction should be provided to patients/caregivers to promote patient adherence to antimalarial drugs (WHO 2010a:10, 24).

1.4 PROBLEM STATEMENT

Malaria is a leading cause of morbidity and mortality in Ethiopia (EFMOH 2004a:1). Even though malaria case management remains a vital component of the malaria control strategies, low health service coverage and poor accessibility to antimalarial drugs have affected malaria control in Ethiopia. The Ethiopian government expanded its healthcare system to village level through involvement of HEWs in order to increase accessibility of malaria treatment to the community, along with other essential curative and preventive health services. This effort increased health service coverage in the country.

The HEWs played an important role in making antimalarial drugs accessible to the community (Barnabas 2009:3-11). However, there is no study conducted to explore the HEWs compliance to malaria treatment guidelines and the patient adherence. Therefore, the aim of this study was to evaluate the HEWs compliance to national and WHO malaria treatment guidelines, to evaluate patient adherence, identify factors affecting HEWs compliance to malaria treatment guidelines and patient adherence in order to develop support guidelines for HEWs in malaria treatment practice based on findings or factors identified.

1.5 RESEARCH QUESTIONS

Based on the above background information and problem statement, the aim of this study is to evaluate the practice and use of antimalarial drugs by HEWs and patients in Southern Ethiopia, by answering the following research questions:

- How well do HEWs manage antimalarial drugs?

- What factors influence HEWs compliance to malaria treatment guidelines with respect to antimalarial drug use?
- What is the level of patient adherence to antimalarial drugs dispensed by health extension workers?
- What factors influence patient adherence to antimalarial drugs dispensed by health extension workers?

1.6 PURPOSE AND OBJECTIVES OF THE STUDY

The purpose of this study is to evaluate the malaria treatment practice of HEWs in Damot Gale district (Southern Ethiopia), based on national and WHO malaria treatment guidelines, as well as to evaluate the patient adherence to antimalarial drugs.

Research objectives

- To describe the HEWs compliance with national and WHO malaria treatment guidelines.
- To evaluate adherence of patients treated by health extension workers in Ethiopia.
- To explore factors affecting HEWs compliance to malaria treatment guidelines and patient adherence.
- To develop guidelines for support of HEWs in malaria treatment practice.

1.7 DEFINITIONS OF KEY CONCEPTS

The study uses the following definitions of key concepts throughout the thesis:

Health Extension Program (HEP): HEP is an innovative community-based strategy to deliver preventive and promotive health services and selected high-impact curative interventions at community level (EFMOH 2004:2).

Health Extension Workers (HEWs): A community level health workers trained for one year at an undergraduate level to deliver preventive, promotive and curative health services, such as treatment of uncomplicated malaria (EFMOH 2003:28).

Adherence: *Collins English Dictionary* (1991:18) defines adherence as “to follow closely or exactly adhere to the rules”. Adherence is the practice of following the rules closely. MSH and WHO (1997:428) also defines adherence as: “the degree to which patients adhere to medical advice and take medication as directed”. In this study, adherence refers to the extent to which patients take antimalarial medications as prescribed by Health Extension Workers.

Antimalarial drugs: According to pharmacological definition of *Microsoft Encarta* (2009), “drugs are substances used to treat illness”. Therefore, antimalarial drugs are substances used to treat malaria infection. In this research, antimalarial drugs refer to drugs used for treatment of uncomplicated malaria (*Plasmodium falciparum* and *Plasmodium Vivax*) infection including Artemether-lumefantrine (Coartem) and chloroquine.

Compliance: “The state or act of conforming with or agreeing to do something” (*Microsoft Encarta* 2009). In this research, compliance refers to the extent to which Health Workers adhere to malaria treatment guidelines during prescribing, dispensing and educating patients about antimalarial drugs.

Kebele: The lowest administration unit of the government, which includes villages and population from 5000–10000.

Village team: A team consist of 5 households which are very close neighbours and most of times they farm together, eat together, and they conduct coffee ceremony together.

Village team leader: one of the village team members selected as a team leader to coordinate the team activities, such as malaria prevention and treatment and who report to the HEWs and other Kebele administration staffs.

Uncomplicated malaria: The WHO (2010a:13) defines uncomplicated malaria as “symptomatic malaria without signs of severity or evidence (clinical or laboratory) of vital organ dysfunction. The signs and symptoms of uncomplicated malaria are non-specific.

Malaria is, therefore, suspected clinically mostly on the basis of fever or a history of fever”.

Guidelines: The WHO (2003b:2) defined guidelines as “systematically developed evidence based statements which assist providers, recipients and other stakeholders to make informed decisions about appropriate health interventions”. The WHO also states: “Guidelines are formal advisory statements which should be robust enough to meet circumstances and constraints of the specific situation to which they are being applied”. Field and Lohr (1990), as cited in SIGN (2011:2), also defined guidelines as “systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances”. In this study, the guidelines refer to the guidelines developed to support the performance of HEWs in malaria treatment and to improve patient adherence to antimalarial drugs.

1.8 PARADIGMATIC PERSPECTIVE OF RESEARCH

Patton (2002:69) describes a paradigm as “a worldview - a way of thinking about and making a sense of the complexities of the real world. As such, paradigms are deeply embedded in socialisation of adherents and practitioners. Paradigm tells us what is important, legitimate and reasonable”. According to Kuhn (1970), paradigm is “the set of practices that define a scientific discipline at any particular period of time”.

According to Guba (1990), paradigm is “a set of beliefs and feelings about the world and how it should be understood and studied”. Kuhn (1970:210) also describes a paradigm as “underlying assumptions and intellectual structures upon which research and development in a field of inquiry are based”. The following sub-sections present assumptions of the researcher with regard to this study.

1.8.1 *Ontological assumptions*

Ontological assumptions deal with the question “what is the form and nature of reality and therefore, what is there that can be known about it”. Ontological assumptions deal with the question of reality (Patton 2002:134). Ontological assumptions are statements about human nature, society, the nature of history and material phenomena, causality and intentionality (Mouton 1996:46). According to Guba and Lincoln (1994:111),

ontological assumptions deal with “assuming an objective external reality upon which inquiry can converge”. The following ontological assumptions were used in this study to understand the practice of the HEWs in malaria treatment, patient adherence as well as factors influencing malaria treatment practice in southern Ethiopia.

- The malaria patients visiting health posts understand the importance and outcomes of malaria treatment.
- Adequate availability of essential resources in the health post and the HEWs compliance to malaria treatment guidelines during malaria treatment are essential for effectiveness of malaria treatment.

1.8.2 Epistemological assumptions

Epistemological assumptions deal with the question of “how we know what we know” (Patton 2002:134). They also deal with the assumptions about the nature of knowledge or the content of truth and related ideas (Mouton 1996:123). According to Guba and Lincoln (1994:111), epistemological assumptions deal with “assumptions that enable the investigator to determine how things really are and how things really work”. This study deals with the evaluation of the treatment of malaria patients by the HEWs and how malaria patients use antimalarial drugs.

The conceptual framework that follows is adapted from the systems model and result based logic model of PHC (Watson, Broemeling, Reid & Black 2004:6) and indicates that close supervision given to patients at their residence/home through daily outreach activities of health extension workers, as well as patient education through clear use of the local language can promote patient adherence to antimalarial drugs. Patient adherence contributes to reducing resistance and promoting cure rates and can ultimately decrease morbidity and mortality (MSH & WHO 1997:426).

The basic systems model and result based logic model of primary healthcare (Watson et al 2004:6) are also used as a basis for interpretation of findings in this study (see chapter 4, section 4.5 for more details).

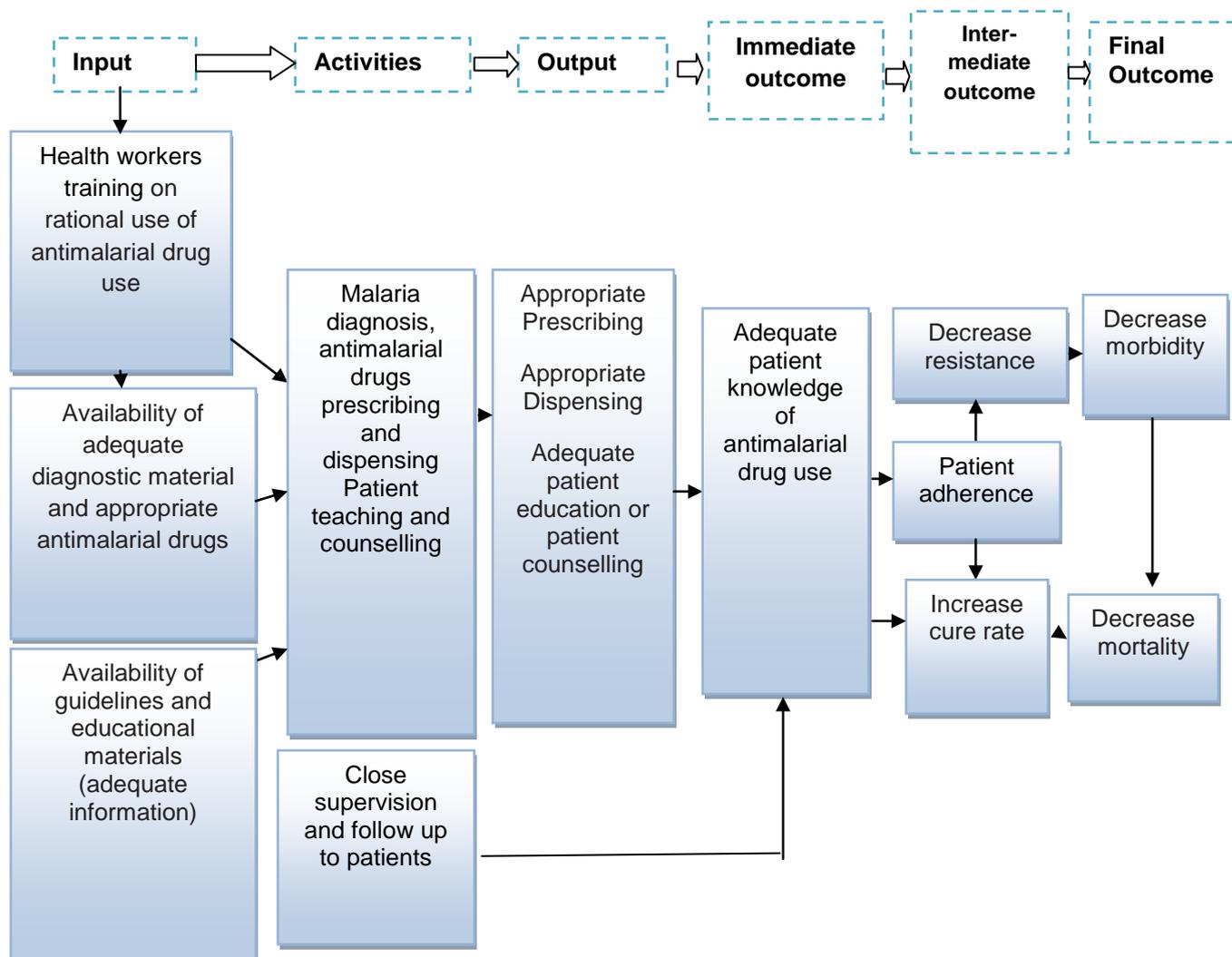


Figure 1.2 Conceptual framework adapted from the basic systems model and result based logic model of PHC

(Watson et al 2004:6)

Training on antimalarial drug use is one of the factors that promote health workers' compliance to malaria treatment guidelines. Availability of effective antimalarial drugs and treatment guidelines are also important factors contributing to health workers' compliance to treatment schedules. The close supervision of health workers at their work places/health facilities contributes to promoting health workers' compliance to treatment guidelines (MSH & WHO 1997:426). The health workers' compliance to treatment guidelines during prescribing, dispensing and patient counselling is very important for patient adherence to antimalarial drug use. Adequate counselling during drug prescribing and dispensing, as well as follow up of patients after treatment, also promotes patients' adherence to treatment and improved cure rates (MSH & WHO

1997:426). Generally, patient adherence is the result of a process involving successive institutional and individual responsibilities. Health providers follow up with patients at home after prescribing antimalarial drugs is a “powerful incentive” to promote patient adherence to antimalarial treatment (Castro et al 2009:2076).

1.8.3 Methodological assumptions

Methodological assumptions deal with the question of “how can the inquirer go about finding out whatever he or she believes can be known”. Methodological assumptions also deal with the nature of research processes and with choosing those methods suitable for exploring the phenomena of interest to the researcher (Mouton 1996:124). In this study, the researcher used the qualitative research method to investigate the HEWs malaria treatment practice and to evaluate patient use of antimalarial drugs. The descriptive and explorative qualitative methods were assumed to be appropriate for investigating and describing the malaria treatment practice of the HEWs and patients’ use of antimalarial drugs. Qualitative research methods are helpful with investigating in detail the HEWs diagnosed malaria patients, and with prescribing antimalarial drugs to ‘malaria positive’ patients. The study used in-depth interviews with the HEWs to provide a description of the malaria treatment practice of HEWs and focus group discussion with the treated malaria patients, in order to explore how the patients used antimalarial drugs. The study assumes that investigating the patient’s medical record is also helpful to evaluate how the HEWs treated malaria patients.

1.9 RESEARCH DESIGN AND METHODOLOGY

A brief overview of the research design; research setting; the population of the study; sample and sampling techniques; introduction to data collection methods and data analysis; introduction to development of guidelines; validity and reliability; trustworthiness and ethical considerations included in research design; and methodology are presented in this section. A detailed description of the research design is discussed in chapter 3.

1.9.1 Research design

Creswell (1998:2) defines the research design as “the whole process of conducting research from conceptualisation to narration”. Creswell (2009:3) also states that the research designs are plans and procedures that include the different types of assumptions and methods used for data collection and analysis in a study.

The status of drug use can be evaluated using both quantitative and qualitative methods. Quantitative methods are preferred in order to collect and analyse data about the process and level of drug use. The qualitative approach is also the best method to study how patients and health workers use drugs and treat health problems (MSH & WHO 1997:431-439). Qualitative design is also useful in understanding the detailed issue of drug use in the facilities and in the community. According to Creswell (1994:15):

a qualitative study is an inquiry process of understanding a social or human problem, based on building a complex, holistic picture, formed with words, reporting detailed views of informants, and conducted in a natural setting. Alternatively a quantitative study, consistent with the quantitative paradigm, is an inquiry into a social or human problem, based on testing a theory composed of variables, measured with numbers, and analysed with statistical procedures, in order to determine whether the predictive generalisations of the theory hold true.

A qualitative approach is also important in order to identify the reasons related to an inappropriate use of drugs (EFMOH 2008a:34). According to Agyepong et al (2002:2215), a qualitative method is preferred to investigate the factors that affect patient adherence to medications. Wasunna, Zurovac, Goodman and Snow (2008:29) used qualitative methods to study factors affecting the prescription of drugs.

The research design used for this study was a qualitative research design. The full description of the research design will be presented in chapter 3.

1.9.2 Research setting

Wolaita Zone is one of 13 administrative zones of the southern Ethiopia Regional State (SNNPR) and has population of approximately 1.7 million. It is about 380kms south of Addis Ababa, capital city of the country. Wolaita zone has 12 rural Woreda or districts and 3 city administrations; 314 rural Kebele or lowest administrative units; 354,796 households; 313 health posts; and 686 Health Extension Workers (Wolaita Zone Health Department 2011).

Damot Gale district is one of the 12 districts of Wolaita zone. It is located 18 kms north of the capital city of Wolaita zone or Sodo and 362km south of Addis Ababa. Damot Gale district has 31 kebele and a population of about 146,429. Damot Gale district has 6 health centres, 31 health posts, 3 NGOs and private clinics, and 1 private rural drug vendor.

Damot Gale district is one of highest malaria incidence areas in the region. Both types of malaria (*Plasmodium falciparum* and *plasmodium vivax*) were the leading cause of morbidity and mortality in Damot Gale district. The morbidity data indicates that among the ten top diseases in the area, malaria is the most incidence in both 2010 and 2011. In 2010, among the total (3956) under-five children visited health facilities about 33.5% (1328) of children were diagnosed and treated for malaria with antimalarial drugs in Damot Gale district (see table 1.2) (Damot Gale District Health Office 2011). The Damot Gale District Health Office Report of 2011 also indicates that of the total number of out-patients treated in the health facilities (15816), about 44.5% (7039) were treated for malaria (table 1.3).

The researcher selected Damot Gale district, due to accessibility in collecting data.

Table 1.2 Five top diseases of under-five children in Damot Gale district in 2011

| Ser number | Cases | Number of cases | Percent |
|-------------------|---------------------|------------------------|----------------|
| 1 | Malaria | 1328 | 33.5 |
| 2 | Pneumonia | 816 | 20.6 |
| 3 | Diarrhea | 471 | 11.9 |
| 4 | Intestinal parasite | 207 | 5.4 |
| 5 | Skin infection | 168 | 4.2 |
| | All other cases | 966 | 24.4 |
| | Total | 3956 | 100.0 |

Table 1.3 Ten top diseases in Damot Gale district in 2011

| Ser number | Types of diseases or cases | Number of cases | Percent |
|-------------------|-----------------------------------|------------------------|----------------|
| 1 | Malaria | 7039 | 44.5 |
| 2 | Pneumonia | 2784 | 17.6 |
| 3 | Intestinal parasite | 1486 | 9.4 |
| 4 | Diarrhea | 1097 | 6.94 |
| 5 | Skin infection | 620 | 3.92 |
| 6 | Eye infection | 438 | 2.77 |
| 7 | Arthritis | 402 | 2.54 |
| 8 | Gastritis | 394 | 2.49 |
| 9 | Tonsillitis | 305 | 1.93 |
| 10 | Injury | 101 | 0.64 |
| | All other cases | 1150 | 7.27 |
| | Total | 15816 | 100.00 |

The following maps indicate the location of Ethiopia in Africa and the location of study area (Wolaita Zone and Damot GALE District) in southern Ethiopia.

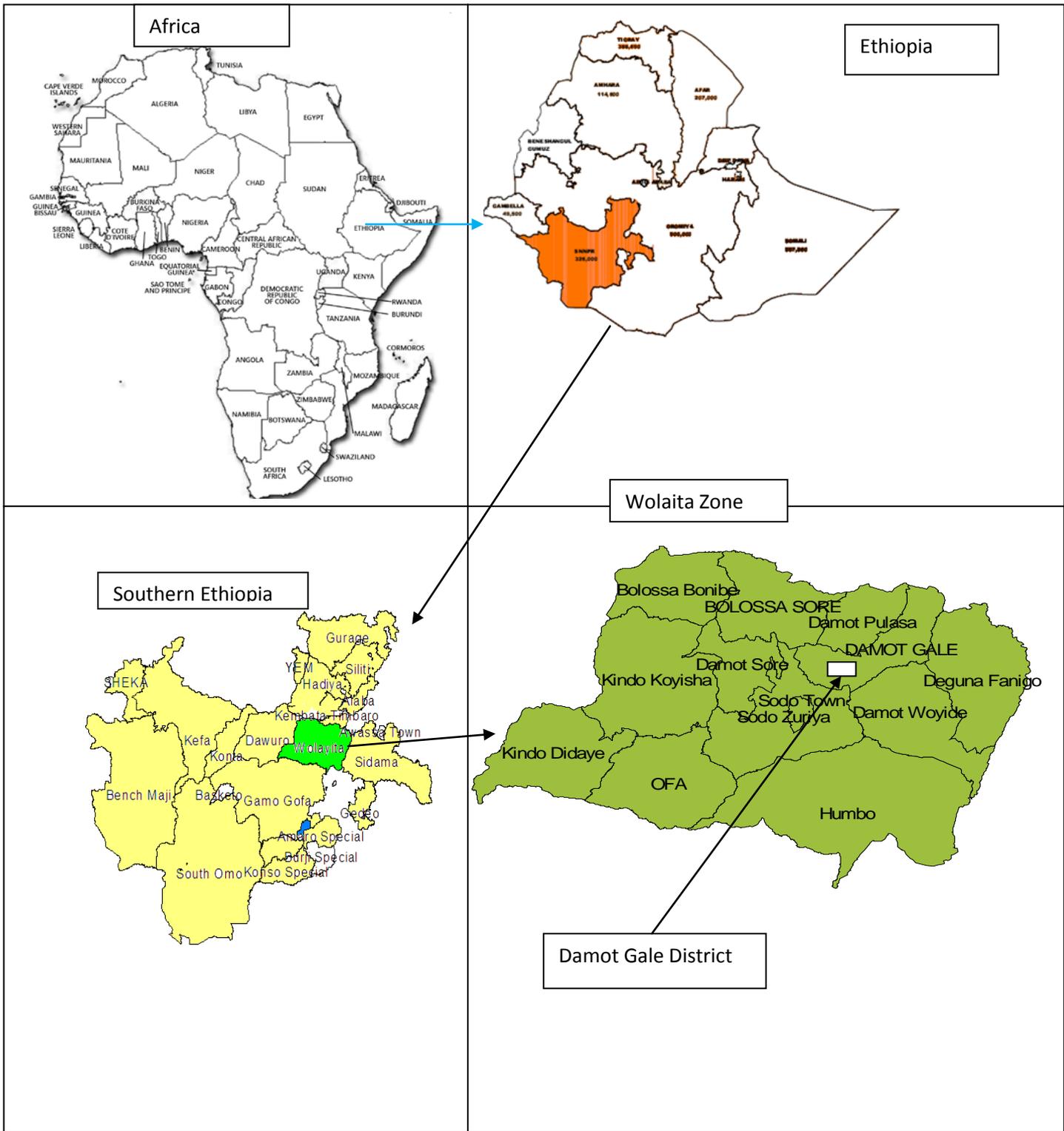


Figure 1.3 Maps of Africa, Ethiopia, SNNPR, Wolaita Zone and Damot Gale district
(Regional Health Bureau 2010)

1.9.3 Population of the study

The research population refers to the total number of units from which the study groups are selected for the research purpose. Punch (2005:101) defines population as “total target group who would, in the ideal world be the subject of the research, and about whom one is trying to say something”. According to Babbie (2010:199), “a study population is that aggregation of elements from which the sample is actually selected”.

In this study, the research population are those HEWs working in Damot Gale district and malaria patients treated by HEWs in the district.

1.9.4 Sample size and sampling techniques

Burns and Grove (2005:750) described a sample as part of the study population selected by a researcher for a particular study. The sampling technique basically considers the type of study approach or design, research purpose and research questions. The important points to be addressed in the sampling strategy are the sample selection methods and the size of samples included in the study (Punch 2005:101).

In this study, a purposive sampling method was used in order to select a study district or Woreda from 12 rural districts in Wolaita zone. The selected district or Damot Gale district has a total of 31 health posts. From these 20 health posts in 20 kebele (village) were included in the study.

The detailed description of sampling and sample size are discussed in chapter 3.

1.9.5 Data collection

In this research, data collection guides were developed based on research objectives and research questions. Pilot testing of data collection guides was undertaken at one district outside the study area. Data collection guides were revised after pilot testing, and data were collected using the following methods: patient medical record review; the HEWs in-depth interview; and treated malaria patients' focus group discussion (FGD). The data collection matrix on the next page indicates the phases of the study,

objectives/research questions, sources of data, sample sizes and data collection methods. A detailed description of data collection will be presented in chapter 3.

Table 1.4 Data collection information matrix

| Phase | Objective/research questions | Source of data | Sample size | Data collection method |
|---|--|---------------------------------|---|--|
| Phase 1: The exploration of the management of antimalarial drugs by HEWs | To identify HEWs compliance to malaria treatment guidelines during diagnosis | HEWs interview | 20 | In-depth interview |
| | To identify HEWs compliance to malaria treatment guidelines during prescription | Patient medical record | 20 patients prescription data in each health post | Patient medical record review |
| | To identify HEWs compliance to Dispensing and communication with patient | HEWs interview | 20 | In-depth interview |
| | to explore factors influencing HEWs compliance to treatment guidelines | | | |
| Phase 2: The exploration of patient adherence to antimalarial drugs dispensed by HEW's | To evaluate malaria treatment adherence by patients treated by HEWs | Patients | 7 FGD (59 malaria treated patients) | Focus group discussion with malaria treated patients |
| | To identify factors which contribute to non-compliance to antimalaria treatment guidelines by HEWs | | | |
| Phase 3: Development of guidelines | To develop guidelines to promote HEWs compliance to antimalaria treatment guidelines and the adherence of patient to antimalarial drug use | Findings and literature control | | Presentation of findings and discussion with selected groups based on findings, gathering comments on developed guidelines |

1.9.6 Data analysis

Data analysis in qualitative research starts at the beginning of data collection (Fitzpatrick, Sanders & Worthen 2004:362; Marshall & Rossman 2011:208; Royse, Thyer, Padget, Logan 2006:102). Creswell (2009:184) also indicated that data analysis in a qualitative study is undertaken together with data collection, data interpreting and report writing.

According to Creswell (2009:184), preparing data for analysis, coding, categorising and identifying themes in the qualitative data are the primary concerns of data analysis. Creswell also indicates that data analysis in a qualitative study starts with organising data into manageable size.

The data analysis in this study was conducted according to Tesch's steps. Tesch (1990), as cited by Creswell (2009:186), indicated eight data analysis steps in qualitative study.

A detailed description of the data analysis process will be provided in chapter 3.

1.10 TRUSTWORTHINESS

Trustworthiness refers to "the credibility of the findings in a piece of qualitative research and the extent to which readers can have trust in the research and its findings" (Holloway 2005:296). Lincoln and Guba (1985), in Baily (2007:180-181), describe trustworthiness as the degree to which the findings of a research are believable and are worthy of attention. Lincoln and Guba (1985:293) identified four criteria in order to detect the trustworthiness of the qualitative study. These are: credibility, transferability, dependability and confirmability. Therefore, the trustworthiness of this study was ensured by using these four criteria.

A detailed description of issues in trustworthiness, including the four criteria of trustworthiness, is discussed in chapter 3.

1.11 ETHICAL CONSIDERATIONS

Ethical clearance: Ethical clearance was obtained from ethical and research committee of the Department of Health Studies, University of South Africa. A supporting letter to Wolaita zone and Damot Gale district was also obtained from Southern Nation Nationalities and Peoples (SNNPR) regional health bureau (see annexures 1 and 2).

Informed consent: Malaria patients and the HEWs approached to get written and verbal informed consent. The HEWs and malaria patients were informed about the purpose and benefits before interview and FGD and requested for informed consent (see annexures 3 and 4). All patients and the HEWs approached for interviews agreed to participate in the study.

Confidentiality: No interviewee or participant was identified by name, and no information was disclosed indicating individual patient, respondent and health institution.

The detailed descriptions of ethical considerations are discussed in chapter 3.

1.12 DEVELOPMENT OF THE GUIDELINES

Developing guidelines that promote appropriate prescribing and dispensing of antimalarial drugs is among those tools suggested by Souares (2009:118). The WHO (2010a:24) also indicates that to create adequate awareness amongst patients about drugs prescribed for malaria treatment, clear guidelines in the language understood by the local users should be provided.

One of the objectives of this research is to develop guidelines to promote the compliance level of HEWs to malaria treatment guidelines during diagnosis, prescribing and dispensing of antimalarial drugs and to promote patient adherence. Therefore, the researcher developed guidelines based on findings of this study as well as other literature.

The developed guidelines are presented in chapter 5.

1.13 SCOPE OF THE STUDY

The study was conducted in health posts at Damot Gale district, Wolaita zone, southern Ethiopia. Therefore, this study includes the HEWs who are working at health posts in Damot Gale district, and only those patients treated by health extension workers in this district. The study focuses on: assessing the compliance level of health extension workers at health posts, adherence level of patients treated by health extension workers, factors affecting patient adherence and compliance of health extension workers to malaria treatment guidelines at the study area, in order to develop the guidelines to support the HEWs in malaria treatment practice.

1.14 OUTLINE OF THE STUDY

- Chapter 1** Overview of the study
- Chapter 2** Literature review
- Chapter 3** Research design and methodology
- Chapter 4** Findings and discussions
- Chapter 5** Guidelines for support of HEWs in malaria treatment practice/performance
- Chapter 6** Conclusion, limitations and recommendations

1.15 CONCLUSION

This chapter presented and discussed the general overview of the study. The background problem, malaria control issues, Health Extension Programme, adherence to medications and antimalarial drug use were presented and the WHO malaria treatment guideline introduced. The significance of the study and the research problem, the purpose of research, the objectives and the research question for this study were also discussed. The research design and methods, including the data collection, data analysis, study setting, the ethical consideration and trustworthiness, were also introduced.

The next chapter (chapter 2) will present a summative literature review.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Chapter 1 introduced the research problem regarding malaria control, health extension program, adherence to medication, the WHO malaria treatment guidelines, antimalarial drug use, research purpose, research objectives, research questions, significance of the study, foundation of the study, research design and the research methods. The literature referred to in outlining the study was mainly concerned with background problems of malaria treatment, adherence, antimalarial use problems, and health extension workers importance in malaria treatment.

This chapter discusses the literature review conducted on the malaria situation of the world more broadly as well as in Ethiopia, causes and types of malaria, management of malaria, patient adherence to antimalarial drugs including factors affecting patient adherence, health workers compliance to malaria treatment guidelines, factors influencing the health workers compliance.

2.2 MALARIA A MAJOR PUBLIC HEALTH PROBLEM

2.2.1 The world and Sub-Saharan situation

Malaria is one of the biggest public health problems worldwide. About half of the world's population is at risk of malaria infection. It is prevalent in 109 countries and causes about half a billion incidence and more than 1 million deaths each year (WHO & UNICEF 2005:8; WHO 2008a:vii).

Besides health problems, malaria is one of the most important factors that affect the social and economic status of the people of the world. Studies indicate that economic growth of most of countries with a high burden of malaria is lower than those countries with no burden, or a low burden of malaria. Analysis of the relationship between malaria

burden and socio-economic factors done by Sachs and Malaney (2002:683) has indicated that there is correlation between malaria burden and per capita domestic product (GDP). The analysis done by Sachs and Malaney (2002) also revealed that there is a lower economic growth rate in malaria endemic countries when compared to non-malaria areas in the world. Hence, it is important that malaria prevention and control strategies be implemented effectively to tackle the malaria burden in malaria endemic countries.

To control malaria burden and strengthen preventive and curative services, the malaria control partners developed the targets for 2010. The global target for malaria prevention and control developed by Roll Back Malaria or RBM (RBM 2005:2; RBM 2008:14) partnership for 2010 were:

1. 80% of people at risk from malaria are using locally appropriate vector control methods such as long-lasting insecticidal nets (LLINs), indoor residual spraying (IRS) and, in some settings, other environmental and biological measures.
2. 80% of malaria patients are diagnosed and treated with effective antimalarial treatments.
3. In areas of high transmission, 100% of pregnant women receive intermittent preventive treatment (IPT).
4. The global malaria burden is reduced by 50% from 2000 levels to less than a million cases and 500,000 deaths annually.

Amongst the countries of the world, countries in Sub-Saharan Africa are the most affected that share 90% of cases and deaths. From a total of new yearly infections (300 to 500 million), about 85% of malaria infection occurs in Sub-Saharan Africa (WHO 2005:8). Another study also asserts that malaria is the main reason for about one third of all outpatient clinic cases across Africa (WHO & UNICEF 2003:9). Africa malaria report (WHO & UNICEF 2003:9) also states that deaths due to malaria because of normal transmission and epidemics are common in Sub-Saharan Africa. About 20% of the total child deaths in Africa are due to malaria each year. Malaria epidemics also cause annually more than 12 million malaria episodes and up to 310,000 deaths.

As a result, Sub-Saharan Africa contributes the highest number of malaria deaths in the world. Among 35 countries that contribute the greatest number of malaria deaths in the

world, more than 27 countries are located in Sub-Saharan Africa. Among these countries, five countries (Nigeria, Democratic Republic of Congo, Uganda, Ethiopia and Tanzania) contribute about 50% and 47% of global deaths and cases, respectively. Many of these countries have high transmission of *P. falciparum* malaria (WHO 2008a: viii). The following figure (figure 2.1) indicates the distribution of the malaria burden amongst countries in Africa and the world.

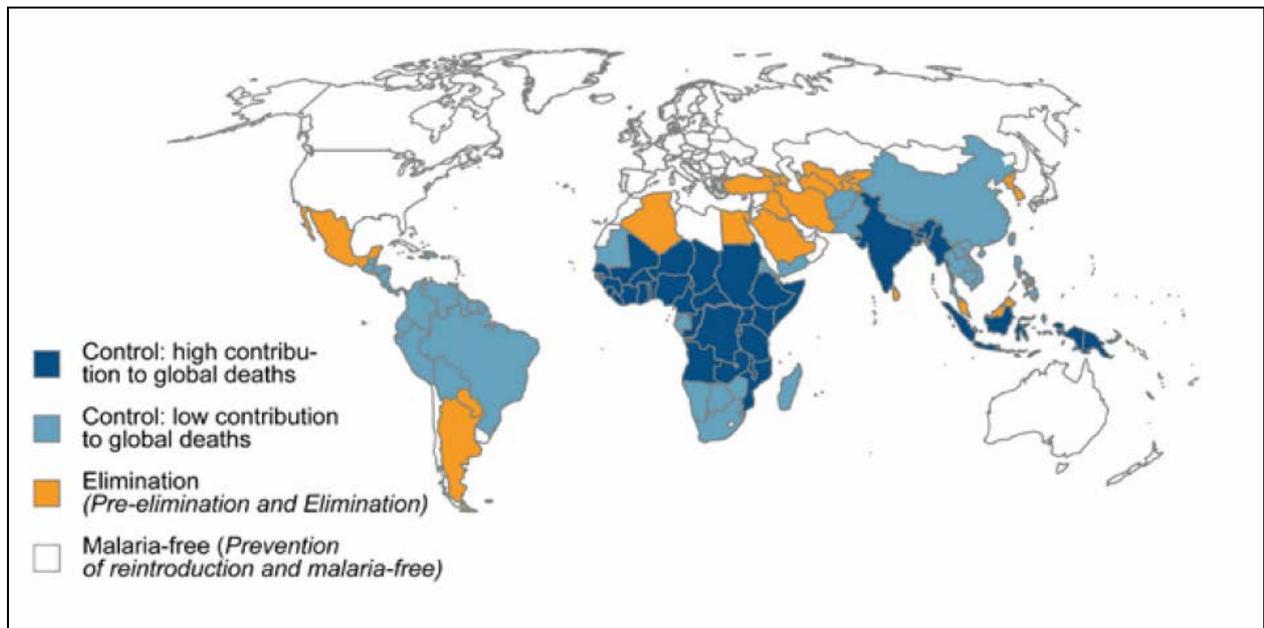


Figure 2.1 Country categorisation by malaria status and burden

(RBM 2008:46)

2.2.2 Ethiopia's situation

Ethiopia is geographically located in a tropical area between 8°00 N and 38°00 E (http://www.mapsofworld.com/lat_long/ethiopia-lat-long.html), which is within the most favourable of areas for malaria breeding and transmission. As one of Sub-Saharan countries in a favourable geographical situation for malaria transmission, malaria is the leading cause of morbidity and mortality in Ethiopia (WHO 2008b:viii).

Malaria is among the top four diseases that contribute to 93% of child deaths in Ethiopia. Among other cases of child death, malaria, pneumonia, diarrheal diseases and newborn conditions are the major causes. These four health problems contribute

about 93% (malaria 20%, pneumonia 28%, diarrheal diseases 20% and newborn conditions 25%) of child death in Ethiopia.

About 75% of the land mass of Ethiopia is malarious, and two thirds of the Ethiopian population is at risk of malaria. However, malaria transmission in Ethiopia is seasonal. The two seasons, September to December and April to May, are the main seasons for malaria transmission in Ethiopia (EFMOH 2004:5; Jima 2011).

As indicated by Jima, Getachew, Bilack, Steketee, Emerson, Graves, Gebre, Reithinger and Hwang (2010:8), the main contributing factors for malaria's high prevalence in Ethiopia are:

1. Geographical situation (tropical) which is favourable for malaria transmission
2. Low health service coverage for prevention and control of malaria
3. Inadequate resources (both professionals and others resources) for malaria treatment and control
4. Inadequate community awareness of malaria prevention and control

The World Bank (2004:16) report also indicated that malaria was among the first from ten top diseases of outpatient visits in Ethiopia. The report of Save the Children, USA also indicates that malaria is among the four main causes of child death (Save the Children, 2009). According to the WHO report, malaria was the leading cause of morbidity and mortality in the Ethiopia in 2005 (WHO 2010b:43).

However, due to various interventions undertaken, such as the introduction of artemisinin combination therapy (ACT) in Ethiopia starting from 2005, and since implementation of the HEP, the significant decline in malaria morbidity and mortality have been reported (figure 2.2) (EFMOH 2010:6; Jima et al 2010; WHO 2009; WHO 2010c:43, O'Meara, Mangeni, Steketee & Greenwood 2010:551). Three intervention strategies, namely early diagnosis and prompt treatment, vector control and epidemic prevention and control, are implemented to tackle the high mortality and morbidity rate in Ethiopia and to achieve the Millennium Development Goal for malaria (EFMOH 2010:5).

Among other activities, the following activities were mainly implemented to accomplish the three strategies:

1. Training of adequate human resources, including health extension workers for malaria treatment and prevention.
2. Policy change to malaria treatment from SP to ACT to treat *Plasmodium falciparum*, which is resistant to SP.
3. Procuring ACT/AL and distributing to all government public health facilities.
4. Distributing ITN to all households using HEWs.
5. Strengthening community participation to enhance prevention measures such as controlling malaria breeding areas.
6. Expanding malaria diagnosis and treatment to community level/health post level/ through health extension workers.
7. Creating community awareness and participation in malaria prevention and treatment.

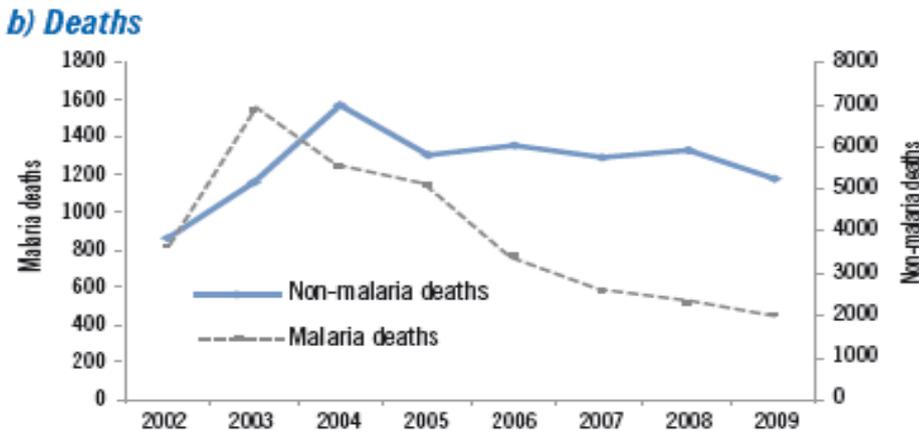
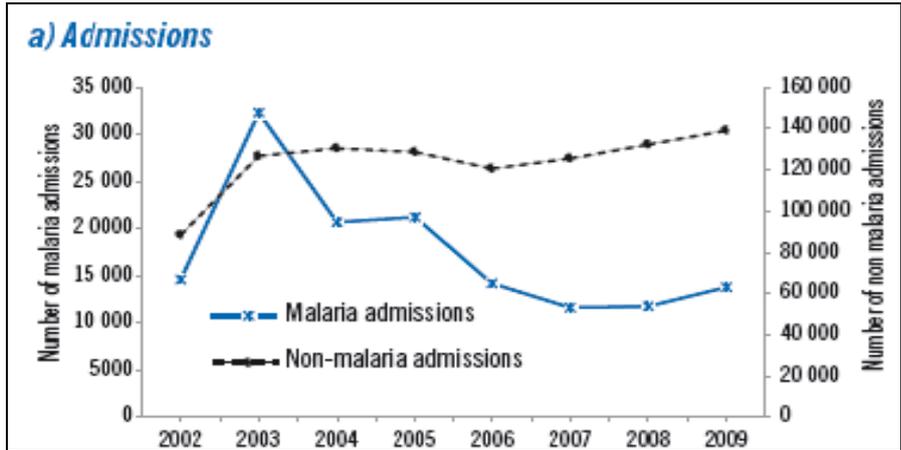


Figure 2.2 Malaria and non-malaria admissions and deaths in Ethiopia, 2002–2009
(WHO 2010c:43)

The other important intervention implemented in Ethiopia is increasing health service coverage. The health service coverage in Ethiopia has increased from 60% in 2005 to 89.6% in 2010, by implementing health extension programmes and rapidly expanding health facilities. The assessment of the implementation of the five year plan (2005-2010) indicates that the household level Insecticide Treated Net (ITN) coverage rate in malaria-prone areas increased from 3.5% in 2005 to 100% in 2010, and the facility-based data that morbidity due to malaria declined by 48%, hospital admissions by 54% and mortality by 55% (EMoFED 2010:9-23).

This indicates that there is significant change in malaria morbidity and mortality after implementation of health extension programme (EMoFED 2010:90). The WHO report also indicates that about 100% of malaria diagnosed cases have access to ACT in Ethiopia (WHO 2009:21).

However, the nature of malaria transmission in Ethiopia challenges the malaria control interventions. Malaria transmission in Ethiopia is characterised by frequent and often large-scale epidemics, occurring every five to eight years (EFMOH 2010:12). Except for some malaria-free highlands, most of the land mass of Ethiopia is malarious and prone to epidemic (figure 2.3). In general, malaria areas in Ethiopia are classified into four major geographical areas. These areas include highlands, arid lowlands, highland fringe areas, and malarious lowlands (EFMOH 2010:12; EFMOH & WHO 2007).

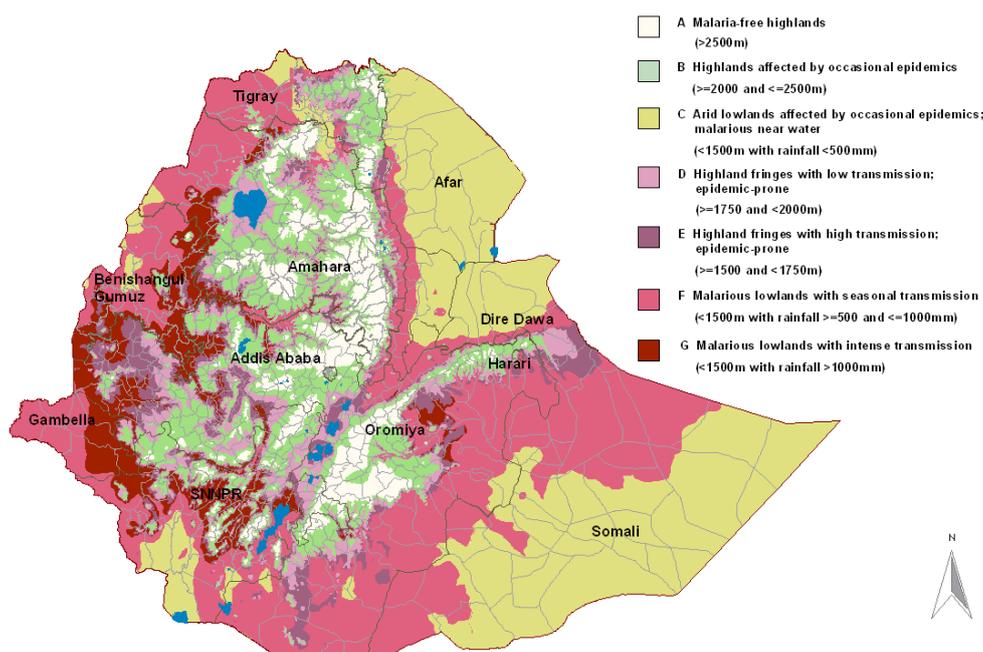


Figure 2.3 Malaria transmissions in Ethiopia

(EFMOH 2007)

2.3 CAUSES, TYPES AND MANAGEMENT OF MALARIA

2.3.1 Causes and types of malaria

Malaria is caused by the infection of red blood cells with protozoan parasites of the genus *Plasmodium*. The parasites are inoculated into the human host by a feeding female anopheline mosquito. The four *Plasmodium* species that infect humans are *P. falciparum*, *P. vivax*, *P. ovale* and *P. malariae* (WHO 2010a:48). *P. falciparum* and *P. Vivax* are common species in Ethiopia (EFMOH 2004:3).

The first symptoms of malaria are non-specific and similar to the symptoms of a minor systemic viral illness. They comprise of headaches, lassitude, fatigue, abdominal discomfort and muscle and joint aches, followed by fever, chills, perspiration, anorexia, vomiting and worsening malaise. This provides a typical picture of uncomplicated malaria. Residents of endemic areas are often familiar with this combination of symptoms, and frequently self-diagnose (EFMOH 2004:3).

Malaria is therefore frequently over-diagnosed on the basis of symptoms alone. Infection with *P. vivax* and *P. ovale*, more than with other species, can be associated with well-defined malaria paroxysms, in which fever spikes, chills and rigors occur at regular intervals. At this stage, with no evidence of vital organ dysfunction, the case-fatality rate is low (circa 0.1% for *P. Falciparum* infections), while the other human malarias are rarely fatal provided prompt and effective treatment is given (EFMOH 2004:5).

But if ineffective drugs are given or treatment is delayed in falciparum malaria, the parasite burden continues to increase and severe malaria may develop. A patient may progress from having minor symptoms to having severe disease within a few hours. This usually manifests with one or more of the following symptoms: coma (cerebral malaria), metabolic acidosis, severe anaemia and hypoglycaemia. In adults, acute renal failure or acute pulmonary oedema also can develop. By this stage, mortality in people receiving treatment has risen to between 15-20 percent. If untreated, severe malaria is almost always fatal (WHO 2010a:6).

In Ethiopia, *Plasmodium falciparum* is a significant cause of morbidity and mortality due to malaria. *Plasmodium falciparum* accounts for 60% of infection in all malaria endemic areas of the country. *Plasmodium vivax* is also significant cause of morbidity due to malaria in Ethiopia and accounts for about 40% of malaria infection (EFMOH 2004:3; EFMOH 2010:9).

2.3.2 Management of malaria

Case management is one of the cornerstones of malaria control in this part of the world with the goal to reducing morbidity and mortality through prompt diagnosis and effective management of acute clinical episodes with antimalarial drugs (WHO 2010a:58). Early diagnosis and prompt treatment are life-saving activities in malaria endemic areas of the world.

2.3.2.1 Early diagnosis and treatment

According to EFMOH (2010:31), for the treatment of malaria, effective diagnosis without delay and adequate treatment with effective antimalarial drugs are a crucial part of malaria management, and they state that:

Effective case management of malaria depends on early, accurate diagnosis with microscopy or rapid diagnostic tests (RDTs) and prompt treatment with an effective drug. Microscopic malaria parasitic identification is a gold standard for diagnosis, and using RDT, is better than diagnosing using clinical signs and symptoms only. Artemisinin-based combination therapies (ACTs) are the recommended first-line treatment for uncomplicated *Plasmodium falciparum* malaria in most malaria-affected regions of Africa, and are extremely effective against malaria parasites; they have few or no side effects (EFMOH 2010:31).

2.3.2.1.1 Diagnosis of malaria

According to the WHO (2010a:9-10), diagnosis of malaria can be performed using one of three methods. The most common method used to identify the presence of malaria in human blood cells and to differentiate the type of malaria, is microscopy. The other method is diagnosing malaria based on clinical symptoms, which are presented by the

patient on physical examination. The recently-initiated method, which is more appropriate for peripheral areas, is Rapid Diagnostic Test Kit (RDT).

In Ethiopia, since 2005, there has been a major shift from clinical diagnosis to confirmatory diagnosis, following the wide-scale use of RDTs in peripheral health facilities. To improve the quality of malaria diagnosis and treatment at peripheral health facilities (health posts), pan-specific RDTs are now being introduced. HEWs were trained on the use of multi-species RDTs in the integrated refresher training (IRT). The Ethiopia National Strategic Plan for malaria diagnosis and treatment (2010–2015) indicates that all (100%) suspected malaria cases should be diagnosed using RDTs and/or microscopy within 24 hours of fever on set (EFMOH 2009c:viii).

The WHO (2010a:9-10) as well as the National Malaria Treatment Guidelines of Ethiopia (EFMOH 2004:3) also strongly recommend that the diagnosis of malaria should be based on parasitological diagnosis with RDTs or Microscopy. But the facilities in peripheral areas are not adequately equipped with RDTs or Microscopy. Even those health facilities at peripheral areas with microscopy cannot perform microscopic tests, due to insufficient electric power or qualified professionals (WHO 2010a:11).

According to the EFMOH (2009c: iii), microscopy remains the gold standard for the diagnosis of malaria, and is used in health centres and hospitals, covering around 30% of all fever cases. Rapid diagnostic tests (RDTs) are being used in the health posts at community level, covering an estimated 70% of fever cases (EFMOH 2009c: viii). But the sensitivity and specificity of RDTs are influenced by high temperature and humidity (WHO 2010a:11)

2.3.2.1.2 Treatment of malaria

Treatment of malaria depends on two major issues: (1) the types of malaria diagnosed (using clinical symptoms or parasitological confirmation methods) and (2) the level of health facility that the patient approached for treatment. Availability of antimalarial drugs and professionals are also major factors affecting the treatment of malaria.

According to the EFMOH (2004a:8-19), the major types of malaria are categorised in two: uncomplicated and severe malaria. Uncomplicated malaria has mild symptoms

compared to those of severe malaria. The typical picture of uncomplicated malaria includes headaches, lassitude, fatigue, abdominal discomfort and muscle and joint aches, followed by fever, chills, perspiration, anorexia, vomiting and worsening malaise. During uncomplicated malaria, the initial symptoms are non-specific and similar to the symptoms of a minor systemic viral illness (EFMOH 2004:8).

Adequate treatment of uncomplicated malaria with effective antimalarial drugs not only minimises suffering of the patient but also prevents the development of severe malaria (WHO 2010a:5). The first line drugs recommended for treatment of uncomplicated malaria are Chloroquine and ACT (Artemether-lumefantrine) (EFMOH 2004:9). The HEWs in health posts in Ethiopia are expected to treat uncomplicated malaria using chloroquine and artemether-lumefantrine. The following sections discuss the treatment of uncomplicated malaria, using chloroquine and artemether-lumefantrine.

Chloroquine

In the history of malaria prevention and control, chloroquine is the most widely used drug in the world. It was effective for all types of malaria species at the beginning of its use but now due to resistance, chloroquine is ineffective for treatment of *Plasmodium falciparum* in most parts of the world. A nationwide study conducted in Ethiopia in 1998 indicated that there was high treatment failure rate of chloroquine for treatment of *Plasmodium falciparum* (EFMOH 2004:1).

However, the WHO states that chloroquine is still effective for the treatment of malaria species other than *Plasmodium falciparum*. This is the case even though:

Widespread resistance has now rendered it virtually useless against *Plasmodium falciparum* infections in most parts of the world, it still maintains considerable efficacy for the treatment of *P. vivax*, *P. ovale* and *P. malariae* infections. As with other 4-aminoquinolines, it does not produce radical cure (WHO 2010a:73).

The national and WHO malaria treatment guidelines (EFMOH 2004:50; WHO 2010a: x) that a total dose of chloroquine for treatment of *plasmodium vivax* malaria is 25 mg

base per kilogram weight. The guidelines also emphasise that the duration of treatment should be three days (see table 2.1).

Table 2.1 Dose of chloroquine per patient weight and age (EFMOH 2004a:50)

| Weight (kg) | Age (years) | Day 1 | Day 2 | Day 3 |
|-------------|-------------|---------------------------|---------------------------|-------------------------|
| 5-6 | <4 months | 5 ml syrup | 5 ml syrup | 2.5 ml syrup |
| 7-10 | 4-11 months | 7.5 ml syrup | 7.5 ml syrup | 5 ml syrup |
| 11-14 | 1-2 years | 12.5 ml syrup | 12.5 ml syrup | 7.5ml syrup |
| 15-18 | 3-4 years | 1 tablet or 15ml syrup | 1 tablet or 15 ml syrup | 1 tablet or 15 ml syrup |
| 19-24 | 5-7 years | 1 ½ tablet or 20 ml syrup | 1 ½ tablet or 20 ml syrup | 1 tablet or 15 ml syrup |
| 25-35 | 8-10 years | 2 ½ tablets | 2 ½ tablets | 1 tablete |
| 36-50 | 11-13 years | 3 tablets | 3 tablets | 2 tablets |
| 50+ | 14 years | 4 tablets | 4 tablets | 2 tablets |

One tablet contains 150 mg chloroquine and 5 ml syrup contains 50 mg chloroquine

Artemisinin-based Combination Therapy (ACT)

The treatment of malaria with an effective drug is a vital part of malaria prevention and control strategies. The WHO indicates that the challenging issue in malaria control is the decreasing efficacy of previously effective antimalarial drugs. The antimalarial drugs widely used for treatment of malaria such as chloroquine and sulphadoxin-premethamine, became in-effective in treating malaria parasites in most malaria-endemic areas in the world. Due to this, the WHO strongly recommended ACT for the treatment of all falciparum malaria in the countries that are malaria endemic (WHO 2006a:15).

ACT is a combination of artemisinin or one of its derivatives, with an antimalarial or antimalarials of a different class (WHO 2010a:v). The WHO recommends the use of artemisinins only in the combination. The recommended combinations are: artemether plus lumefantrine; artesunate plus amodiaquine; artesunate plus mefloquine; and artesunate plus sulfadoxine-pyrimethamine (WHO 2010a:ix).

Combining two or more drugs that are effective against parasites or bacteria, helps to minimise the probability of resistance and prolong the effectiveness and efficacy. ACTs are prepared in different combinations. These combinations are expected to prevent resistance and prolong the usefulness of antimalarial drugs in malaria treatment.

Therefore, the WHO strongly recommends only combined ACT, a mono therapy should not be used (WHO 2010a:ix).

The widely-available ACT in Ethiopia is artemisinin, combined with lumefantrine (coartem). The dose and duration of ACT (coartem), according to WHO treatment guidelines, should be given to a patient for at least three days to achieve the expected therapeutic result (WHO 2010a:x). Malaria diagnosis and treatment guideline of Ethiopia also recommends a 3 day dose, according to the following dosing schedule (Table 2.2) (EFMOH 2004:48).

Table 2.2 Dose and duration of artemether-lumefantrine

| Weight (kg) | Age | Number of tablets per dose twice daily for three days | | | | | |
|-------------|------------------|---|---------|---------|---------|---------|---------|
| | | Day 1 | | Day 2 | | Day 3 | |
| | | Morning | Evening | Morning | Evening | Morning | Evening |
| 5-14 | 3 months-2 years | 1 | 1 | 1 | 1 | 1 | 1 |
| 15-24 | 3-7years | 2 | 2 | 2 | 2 | 2 | 2 |
| 25-34 | 8-10 years | 3 | 3 | 3 | 3 | 3 | 3 |
| 35+ | >10years | 4 | 4 | 4 | 4 | 4 | 4 |

One tablet contains 20 mg artemether plus 120 mg lumefantrine (EFMOH 2004:48)

Compared with chloroquine and sulphadoxine-pyremethamine, which are administered in a single dose a day, coartem has a more complex two doses per day for three days. However, the age and weight category of a coartem dose is only grouped in to four, which is easier to remember than chloroquine, which has 8 categories (WHO 2010a:86).

The artemisinin combinations such as artemether-lumefantrine are found to be very effective and safe to treat chloroquine resistant malaria (WHO 2010a:27). But the WHO indicated that appropriate use both by health workers and patients is a crucial issue in maintaining the efficacy and hindering malaria parasite resistance. Some reports indicate that there is an indication of resistance to ACT in Cambodia and along the border of Thailand (WHO 2010a:27). Carrara, Zwang, Ashley, Price, Stepniewska, Barends, Brockman, Anderson, McGready, Phaiphun, Proux, Vugt, Hutagalung, Lwin, Phyo, Preechapornkul, Imwong, Pukrittayakamee, Singhasivanon, White and Nosten (2009), indicated that “the development of resistance to artemisinin and its derivatives

would be a global disaster for malaria control as current treatment regimens are dependant on this class of antimalarial drugs”.

The current challenges of ACT use in malaria treatment are cost and patient adherence. The cost of ACT is 5-10x times higher than the cost of chloroquine and Sulphadoxine–Pyremethamine (SP). The high cost of ACT may reduce the community access and affect the effectiveness of malaria treatment programme (WHO 2010a:1, Bloland et al 2003:3767).

Even though sustainability is uncertain, improving access and minimising cost, factors which may affect the patient adherence, free distribution of ACT in public health facilities in countries such as Ethiopia is a vital mechanism. Currently, all public health facilities in the country dispense ACT free of charge. However, a personal observation of the researcher indicates that in private drug retail outlets in Ethiopia, the price of full dose artemether- lumefantrine is about 10USD, which is not affordable by most Ethiopians.

This high price can cause two major problems, which can compromise appropriate use of ACT. The first problem is the high cost in private legal market, leading to the low price of illegal drugs, namely substandard/low quality drugs with low price. The second problem is that those legal sources may distribute below the ACT-prescribed dosage, decreasing the price for the patient, which is one of the reasons for burgeoning drug resistance. Under-dosage dispensing of drugs such as expensive antibiotics, chloroquine and SP was found to be common, and among the causes for drug resistance in many developing countries, including Ethiopia.

Kokwaro, Mwai and Nzila (2007:81) indicated that besides the cost of ACT, the duration and number of doses administered per day are also problems that can hinder the patient adherence and disturb the effective use of ACT. Those patients who take drugs for longer times adhere only to 50% of the drugs prescribed. When compared to the single dose of SP, adherence to ACT is much less. However, a study conducted in some areas has indicated that ACT adherence is very high, and that patients get adequate information on how to take drugs from health care providers (Kabanywany, Lengeler, Kasim, Kingengena, Schlienger, Mulure and Genton 2010).

Bloand et al (2000:1378-88) also indicated that there is widespread inappropriate use of drugs including antimalarial drugs both by health workers, patients and drug illegal traders in sub Saharan countries. Therefore, besides increasing ACT accessibility to the community and promoting adherence at public health facilities, the WHO and other agencies concerned with the rational use of drugs have to work to prevent illegal use of antimalarial drugs, including illegal drug movements from countries to countries and irrational use (in the form of under-dosage) at private drug retail outlets.

According to the WHO, it is very important to create a favourable condition to promote appropriate use of ACT in order to prevent resistance. Pongtavornpinyo, Yeung, Hastings, Dondorp, Day and White (2008:2) also state that

“Although providing easy access to very low cost ACT in the private sector, or free ACT in the public sector, may achieve this aim, it has to be balanced against the costs and risks of the widespread use of such combinations. In particular, if artemisinins are used on their own and not in co-formulation with an effective partner drug, then there is a much greater risk of drug resistance arising [for] this precious class of drugs”.

Bhattarai et al (2007:1785) also indicated that introducing ACT contributed significantly to decreasing morbidity and mortality caused by malaria in different countries. But introduction of ACT into clinical practice requires a greater effort in order to ensure adherence to diagnostic, prescription, drug dispensing and counselling recommendations, in order to prevent resistance and treatment failure. Appropriate and easily-understandable treatment guidelines play an important role in promoting appropriate use by health workers, as well as patient adherence. The treatment guidelines, therefore, should specify counselling and drug administration tasks that health workers should perform when prescribing AL, including counselling patients on the dosing schedule, the importance of a fatty diet, what to do in case of vomiting, and the administration of the first dose under the health worker's supervision, in order to prolong the effectiveness of coartem. Hence, patient adherence is an important part of malaria treatment, which should be given attention.

2.4 PATIENT ADHERENCE

2.4.1 Definitions of adherence

As cited by Kokwaro et al (2007:80), McGvock (1996) has defined adherence as “the extent to which a patient fulfils the intention of the prescriber in taking medication”. Osterberg and Blaschke (2005:487) also defined adherence as “the extent to which patients take medications as prescribed by their health care providers”.

2.4.2 Adherence to antimalarial drugs

Yeung and White (2005:123) defined the adherence to antimalarial drugs as ‘the consumption of antimalarial at a dose and duration that was considered to be within the range that would result in the same efficacy as the recommended regime’. The benefit of medicines to treat health problems not only depends on the effectiveness of medicines, but also on appropriate use i.e. patient adherence (Osterberg & Blaschke 2005:487). Particularly in treatment of life threatening disease such as malaria, patients’ appropriate compliance with health workers instruction and appropriate use of efficacious medicines not only minimises the incidence of drug resistance, but also prevents the development of severe malaria (WHO 2010a:24).

The WHO (2010a:124) indicated that “in most countries that have in the world previously effective drugs such as sulphadoxine-pyremethamine and chloroquine, which were used for long time to treat malaria, are now out of use due to resistance of malaria parasites”. Poor adherence by the patient is among the main reasons contributing to the resistance of malaria parasites to antimalarial drugs (WHO 2010a:124).

Hence, effective management of malaria requires not only appropriate diagnosis and prescription, but also appropriate patient use of antimalarial drugs. According to the WHO (2010a:24), the correct use of antimalarial drugs by patients is an important part of malaria treatment. The WHO (2010a:24) also emphasises that the effectiveness of antimalarial drugs against malaria is most significantly determined by patient adherence.

Most of the malaria endemic areas in the world including Sub-Saharan countries have now shifted malaria treatment policy to Artemisinin-combination therapy (ACT), which is effective and is not yet resisted by malaria parasites. But for effective use and prolonged efficacy, the issue of patient adherence must be given due attention (Bloland et al 2000), and those interventions which enhance patient adherence should be implemented during treatment.

2.4.3 Consequences of non-adherence

Non-adherence causes problems not only for individual patients, but also causes health problems, increases the workload of healthcare workers and prompts financial problems for both the community as well as health facilities. Reports indicate that 33 to 69% of hospital admission in the United States of America is due to poor medication adherence (McDonnell & Jacobs 2002:1331-1336). Inadequate adherence to medication can cause worsening of disease, death and increased cost of treatment and medical care for a patient (Osterberg & Blaschke 2005:488).

According to National Pharmaceuticals Council of USA (1993:11), about 22% of nursing admission is due to health problems related to medication non-adherence. The national pharmaceutical council also indicated that “125,000 deaths per year [are] associated with the inappropriate use of medications”. Senst et al (2001:1126-1132) also reported that about 100 billion USD in unnecessary hospital costs per year are due to non-adherence to medication treatment in the USA alone.

2.4.4 Types of non-adherence

Patient adherence problem can be categorised into: non-adherence to duration of medication; incorrect timing interval between doses; and amount of doses taken less than the required dose.

Non-adherence to duration

One of the major problems of inappropriate use of medications by patients (non-adherence) is not completing prescribed medicine in required duration of treatment. Beer et al (2009:769) indicates that “among 23% (40) of patients who didn’t adhere to

malaria treatment, 30% (12) [was] due to incomplete administration of prescribed drugs to adequate duration and [the fact that the patient] didn't complete the 3 day treatment".

A study done in Tanzania by Kachur et al (2004:720) in Rufiji District on Sulphadoxine-pyrimethamine and artesunate indicates that inappropriate duration of patient administration is a major problem. This study has shown that most patients finished drugs before the recommended duration and some patients keep drugs to beyond their prescriptions duration (three days).

Incorrect timing interval and low dose

The other problems of patient adherence are incorrect timing interval and taking lower dose than required. Sometimes patients skip doses between required time intervals and take doses at different intervals than required. A study by Kachur et al (2004:718) also revealed that a significant number of patients take fewer drugs (lower doses) than required in the malaria treatment guidelines.

2.4.5 Factors affecting patient adherence

In general, the factors affecting patient adherence can be classified into five categories. These include: healthcare providers-related factors; patient or caretaker-related factors; healthcare system-related factors; disease-related factor; and medication-related factors (Kokwaro et al 2007:81).

2.4.5.1 Healthcare provider factors

Patient adherence is the result of the efforts of patients and healthcare providers related as well as the healthcare system (Champion & Skinner, 2008:47; Castro et al 2009). Hence, adequate interaction and communication of health workers with patients play a great role in promoting the adherence level of a patient. Good communication between health workers and patients creates an understanding and knowledge of the seriousness of malaria as a disease, and the importance of medication on patients. The study done by Kachur et al (2004) indicated that those patients who communicated well with healthcare providers understood the disease problem, appropriate use of

medication, and the benefits of treatment. This awareness helps the patient to adhere to the malaria treatment schedule.

In their study Kachur et al (2004:719) also stated that those patients' dispensed antimalarial drugs with adequate information adhere more readily than those that did not receive adequate information. There was also a statistically significant association between adherence and knowledge of the correct doses. Those patients with adequate knowledge about the benefit and use of antimalarial drugs adhere more closely to antimalarial drug use, than those who do not have adequate knowledge.

Communication between health workers and patients also helps to prevent the development of resistance by promoting patient adherence. Lack of adequate information affects the adherence of patients to drugs and can cause malaria parasite resistance to antimalarial drugs (Souares et al 2009). Okonkwo, Akpala, Okafor, Mbah and Nwaiwu (2001:322) also emphasised that instruction on how to take antimalarial drugs increases the adherence level of patients to antimalarial drugs.

Communication between patients and healthcare providers is very important, but it should be clear and result in patient satisfaction. According to Souares et al (2009:119), adherence is not only associated with information received during consultation, but also patient satisfaction, on discussion with healthcare providers. The satisfaction of patients is also affected by healthcare providers' approach to them, by the degree of attention given to patients' health problems, and by the current condition of the patient (Souares et al 2009:118). Health care attitude; the way in which healthcare providers discuss with patients during diagnosis; and the prescription and dispensing of antimalarial drugs are all also related with patient adherence level.

Okonkwo et al (2001) also indicate clear instructions provided by healthcare workers on how to take antimalarial drugs increases the adherence level of patients to these drugs. Souares et al (2009) also emphasise the importance of clarity of information during the health worker-patient communication. These authors indicated that clear communication between a healthcare provider and patients, as well as adequate information during consultation, not only promotes patient adherence, but also prevents the development of resistant parasites. Souares et al (2009:18) also reported that a lack of adequate and

clear information affects the adherence of patients to drugs prescribed for their health problems.

Adherence to drug treatment is also directly related to the adequacy of disease-related information provided to a patient during diagnosis, prescription and dispensing of medication. However, information only transmitted to patients is not adequate to cause patient adherence. The information should satisfy patients in order to promote adherence. The healthcare provider approach and attention to patients' health problems and condition are also one of those factors which affect patient adherence to medication (Souares et al 2009).

2.4.5.2 Patient-related factors

According to the Royal Pharmaceutical Society of Great Britain (1997), as cited in Morgan and Figueroa-Muñoz (2005:368), the reasons for patient non-adherence can be classified into: "intentional non-adherence and unintentional non-adherence. Intentional non-adherence refers to situations in which non-adherence is 'deliberate' and forms an outcome of individual's own decision making, whereas unintentional non-adherence refers to non-adherence that is 'accidental' due to forgetting and lack of knowledge or understanding of the requirements for prophylaxis or of drug regimes".

Patient knowledge about drugs prescribed and awareness about the consequences of inappropriate use are important factors that promote patient adherence. Kachur et al (2004:718) indicated that the knowledge of patients about correct dosage is directly related to the patient adherence to medication regimen. It is also reported by Kachur et al (2004:719) that good communication between health workers and patients create understanding and knowledge of the seriousness of malaria for patients and stresses the importance of medication adherence.

To increase the patient knowledge and awareness about the disease and antimalarial drugs, the adequate instruction of health workers as well as patient acceptance are very important. (Kachur et al 2004:719) indicated that those patients who have knowledge of the seriousness of malaria adhere to antimalarial medication more than those patients who do not have adequate information about it.

Besides knowledge and patient awareness about the seriousness of malaria, patient lack of belief in the benefit of medication has an equally strong effect on patient adherence to prescribed antimalarial drugs. Those patients, who accept the benefit and effect of the drugs and understand the consequences of non-adherence, are more likely to strongly adhere to medication. Kabanywany et al (2010) reported that patient beliefs that a drug is effective increases patient adherence.

A patient's language ability to communicate with the health workers also affects the patient's understanding and adherence to drugs. The language barrier between patients and healthcare provider during communication at the time of diagnosing malaria, prescription and dispensing of antimalarial drugs, also affects patient adherence. The patients' inability to read the instruction given may also affect patient adherence to medication. Therefore, health workers should clearly instruct the patient about the medication. The instruction or discussion between patient and healthcare provider should be mutual in order to create adequate awareness. Health care providers should check by asking patients whether it is understood how to take antimalarial drugs, and patients should be allowed to ask questions (WHO & MSH 1997:490).

Souares et al (2009:118) reported that the satisfaction during consultation also resulted in positive feedback on patient adherence to prescribed drugs. As cited by Souares et al (2009:118), those patients who are satisfied with consultation and health care treatment processes adhere to treatment at higher rate than those not satisfied.

2.4.5.3 Health care system factor

The health care system also plays an important role in patient medication adherence. Accessibility of health services for treatment and consultation about disease problem and medication is one of the most important factors affecting patient adherence. Kachur et al (2004:720) indicated that easily accessible health services and clinical appointments promotes patient adherence. Kokwaro et al (2007:81) also indicated that a patient's access to treatment sites facilitates patient adherence.

Another factor related to the health care system and affecting patient adherence is the availability of drugs. Availability of diagnostic facility and the cost of medications are factors influencing the patient adherence. Kokwaro et al (2007:81) indicated that one of

the factors which affect appropriate drug use is affordability of medications for patients. Those patients who are prescribed expensive drugs may not purchase drugs at all, or might purchase an insufficient dosage (Kokwaro et al 2007:81).

2.4.5.4 The disease related factors

The disease characteristics are also one of those reported factors that affect the adherence level of caregivers or patients to prescribed drugs (Kokwaro et al 2007:81). Soaures et al (2009) stated that those patients with severe symptoms of disease adhere more to their treatment regimen than those patients with a milder condition.

However, it is difficult to take a full course of treatment, according to the instructions provided by health care workers for seriously ill patients. Therefore, the severity of disease not only promotes patient adherence, but also hinders adherence (Ansah, Gyapong, Agyepong & Evans 2001:496-5011).

Kokwaro et al (2007:81) indicated that the speed of symptom relief is also one of those factors, which affect patient adherence to a full course of treatment. Some patients stop taking medication when the sign and symptoms of disease disappear. But the disappearance of symptoms does not mean that bacteria or parasites in the body have completely cleared. This can lead to drug resistance and to the relapse of the disease in the case of malaria and other similar bacterial or parasitically originating infections.

A study done in the Tanzania by Kachur et al (2004:718) indicated relieve of sign and symptoms of a disease affects the patient adherence. This study indicated that about 26.7% of patients discontinued taking medicine because their patients' condition became better than it was at the time of starting the treatment. However, Agyepong et al (2002:2215-2226) indicate that taking the full course of treatment (completing medication) is important, even after symptoms have been relieved, in order to prevent drug resistance and for a complete cure. Jackson, Chappuis, Loutan and Tylor (2006:5) assert that adequate advice to patients not to stop drugs "even if patients feel well" helps to minimise their resistance.

2.4.5.5 Medication related factors

Medication related factors such as the chemical nature of drugs, frequency and amount of daily doses; type of drug packaging; tastes of drugs and types of doses; are among medication factors that may affect patient adherence. Kokwaro et al (2007:81) indicates that the type of drug packaging and dosing are also among those factors that affect patient adherence.

The daily frequency of medication regimen is also one of the factors affecting the adherence of patients to the timing prescribed by their health care providers. A study done by Saini, Scheonfeld, Kaulback and Dubinsky (2009) indicated that medication dosing frequency has important effects on medication adherence. The same study indicated that those drugs administered once per day were adhered to twice as often as those drugs administered more frequently. Kokwaro et al (2007:81) also indicated that as the number of daily doses increased, adherence to the medication therapy and proper administration times, declined.

2.4.6 Measurement of adherence

Accurate assessment of adherence is very important in order to indicate the level at which patients use antimalarial drugs and helps to promote effective and efficient treatment of malaria and to implement appropriate intervention. To measure the adherence status of a patient, the amount of doses taken by that patient during a specified period/duration of treatment, the number of pills taken each day and the exact time at which drugs are taken on each day are points of measurement.

Patient adherence to prescribed medicines can be assessed using self-reporting; pill counts/container inspection; electronic counting; blood or urine drug assays; and a patient diary. The majority of adherence studies indicated that patient self report and pill count methods are easy and preferred methods to measure patient adherence (Alcoba, Cuevas & Perez-Simon, 2003:253-258; Yeung & White 2005:123).

Measuring the adherence status of patients helps to decide appropriate style of intervention that can improve the drug use of patients. The assessment of patient adherence to prescribed drugs also helps to design the strategy that can help patients

to use drugs appropriately and health workers to promote patient adherence (WHO 2003c:5). The WHO (2003c:5) also indicates that “accurate assessment of adherence is necessary for effective and efficient treatment planning”.

According to Steel, Nwokike and Joshie (2007:7), adherence assessment can be classified into two broad categories. These are: direct (objective measures) and indirect measures. Direct measurement method includes: directly observed treatment, therapeutic drug monitoring, biomarkers, and medication event monitoring system; the indirect method includes: pharmacy records, self-report, pill count, visual analogue scales, and a pill identification test.

Among indirect methods of measurement, self report, pill count, visual analogue scale, and pill identification test are relatively easy, commonly used and the best means of measuring adherence in resource-limited countries (Steel et al 2007:7). However, the adherence assessment based on patient self-report may lead to an over-estimation of adherence level when compared to other methods (Bell et al 2009).

2.4.7 Interventions to improve patient adherence

Munger, Tassel and LaFeur (2007:58) indicate that patients do not comply with the prescribed medication regimen, due to a lack of awareness about the problem of non-adherence. Hence, one of the interventions which are important to solving the problem of patient non-adherence to medication is patient education about the prescribed drugs (Latif & McNicol 2009:419). The WHO (2010a:24) also indicated that patient education is a vitally important part of malaria treatment in order to promote adherence to antimalarial drugs.

To enhance the patient adherence to the treatment regimen, medication-taking procedures should be easy and understandable. Giving clear written instruction to follow during the whole duration of treatment is one of those methods that can promote patient adherence. Therefore, intervention on providing easy, clear spoken and written instruction improve patient adherence for medication (Latif & McNicoll 2009:419).

Clear guidelines in the language understood by the local users, posters, wall charts, educational videos and other teaching materials, public awareness campaigns,

education, and the provision of information materials to shopkeepers and other dispensers, can also improve the understanding of malaria. This will increase the likelihood of improved prescription and adherence, as well as appropriate referral, and will minimise the unnecessary use of antimalarials. Using trained community health workers, shop keepers, community members, as well as mothers or other caretakers, has also been found to increase patient adherence to antimalarials (Latif & McNicol 2009:419).

A study conducted by Kabanywany et al (2010) in Tanzania has revealed that types of drug package, dosing instructions using pictures and patient education of antimalarial drugs increased patient adherence to antimalarial drugs. This study also indicated that the adherence of artemether-lumefantrine in patients is about 98%, which is an unusually good adherence to have been observed in Sub-Saharan Africa.

However, promoting adherence status cannot be achieved with a single intervention. Atreja, Bellam and Levy (2005:4) noted that “using a multidisciplinary approach with the ‘SIMPLE’ strategy (S=Simplifying regimen characteristics, I=Imparting knowledge, M=Modifying patients’ beliefs, P=Patients’ communication, L=Leaving the bias, and E=Evaluating adherence in the context of a healthcare team and system-related factors) to enhance drug adherence”, is important. Thiam et al (2007:380) indicate that a comprehensive approach, which includes activities such as providing adequate information to patients when dispensing antimalarial drugs, participation of community workers and close supervision or follow up, can also increase patient adherence.

Leslie et al (2004:168-173) assert that the problem of poor adherence may be overcome with simple health messages, even when the majority of individuals are illiterate and lack formal education. According to Soares et al (2009), patient adherence to drug treatment can be improved through health staff training, health education in schools, patient counselling and illustrated instructions.

In general, patient adherence is a major determinant factor in promoting the effectiveness of drugs and in prolonging the usefulness of antimalarial drugs. To achieve treatment success and to prevent treatment failure, an intervention which promotes the availability of effective drugs and promotes proper use, ought to be implemented. Antimalarial drugs such as ACTs are highly effective, if prescribed and

used correctly according to the guidelines. Studies on adherence suggest that 3-day regimens of medicines such as ACTs are adhered to reasonably well, provided that patients or caregivers are given an adequate explanation at the time of prescription and/or dispensing (Kabanywany et al 2010).

Therefore, the intervention of the healthcare providers, communities, patients and health facilities can increase the appropriate use of antimalarial drugs. This also increases the treatment success, minimises the malaria parasite resistance to antimalarial drugs, and prolongs the usefulness of newly-introduced drugs such as ACT.

2.5 HEALTH WORKERS COMPLIANCE TO MALARIA TREATMENT GUIDELINES

The WHO and MSH (1997:423) indicate that using drugs for treatment of a disease problem starts with diagnosis and includes drug prescribing; dispensing, patient adherence and patient follow up after treatment. Therefore, assessing the quality of drug treatment cannot be evaluated only by means of measuring patient adherence. Evaluating health workers compliance to treatment guidelines is also an important part of measuring the appropriateness of treatment.

Health workers compliance to treatment guidelines during prescription and dispensing, and providing adequate information at this time, is one of factors which affect patient adherence. The effectiveness of malaria treatment depends not only on the availability of efficacious antimalarial drugs, but also on appropriate prescription and dispensing process by the health workers (Kachur et al 2004:719). Zurovac and Rowe (2006:290) have indicated that the effective distribution of antimalarial drugs such as ACT is very important to reducing and controlling the malaria burden in Sub-Saharan countries, but that the deployment should be accompanied with an intervention to ensure appropriate treatment.

Besides contributing to non-adherence by patients and to treatment failure, health workers non-compliance to malaria treatment guidelines and antimalarial drug use procedures can cause adverse drug reactions, which can cause health problems such as disabilities in the patient. The report from the WHO meeting in Accra revealed that inappropriate administration of a quinine injection caused disabilities in children (WHO 2012).

Some studies indicate that health workers' compliance to malaria treatment guidelines is low. The study conducted in Kenya by Jumma and Zurvoc (2011:6) reported that "the use of anti-malarial drugs for test negative patients was widespread". A study conducted in Nigeria by Igboeli, Ukwe and Ekwunife (2010:246) also indicated that health workers' adherence to national treatment guidelines during malaria treatment, is low. The same study indicated that the adherence to treatment guidelines of doctors in diagnosis and prescription is inadequate. The over-prescribing of ACT drugs was one of the aspects of non-compliance reported in this study.

2.5.1 Compliance to malaria diagnosis

The appropriate treatment of malaria with effective drugs is a "fundamental pillar of the malaria control strategy" (Eriksen et al 2007:52). Health workers' adherence to diagnostic and treatment guidelines is one of the critical aspects determining effective implementation of malaria case management policies (Whitty, Chandler, Ansah, Leslie & Staedke 2008). For appropriate treatment to take place, making the malaria diagnosis according to treatment guidelines and adequately assessing malaria cases is vital, and helps to ensure correct treatment. Inadequate clinical assessment could cause incorrect diagnosis and inappropriate treatment of malaria episodes and other conditions (Eriksen et al 2007:53).

Unnecessary treatment can be reduced by using diagnostic instruments such as microscopy and RDT (Bloland 2001). Microscopic testing is also helpful in minimising unnecessary drug administration and unnecessary exposure to parasitic drugs, as well as minimising resistance (Laufer & Plowe 2004:279). However, it does not mean that all health facilities with diagnostic material perform appropriate diagnoses and comply with diagnosis and treatment guidelines.

2.5.2 Compliance to prescribing and dispensing

In addition to problems in diagnosis, another challenge is the quality of prescription by the health workers for those patients who attend health facilities. Studies indicate that prescribed treatment is often incorrect in dosage and duration and that unnecessary drugs are prescribed to patients (Eriksen et al 2007). But the WHO (2010a:24) strongly recommends that whilst prescribing and dispensing, all patients ought to get appropriate

drugs, adequate information about the drugs prescribed as well as become informed about the disease in order to fully promote adherence.

2.5.3 Factors affecting compliance to treatment guidelines

According to Wassuna et al (2008), the factors affecting health workers' compliance to antimalarial drug prescription include: "health workers perception, health workers concern about the cost of drug, health workers fear of drug stock outs, excess stock of non-recommended drugs, ambiguous training messages, severity of illness, and patient pressure". The quality of prescribing drugs also affected by the availability of diagnostic facility, the type of health facility, patient expectation, the level of training of health workers, availability of medical supplies, and drugs (Boonstra et al 2002). The health workers in-service training, patient load and health workers knowledge on disease and treatment are also major factors influencing health workers' compliance to treatment guidelines.

Health workers in-service training

One of the common interventions used to improve the use of drugs is training of health workers. Training on drug use affects the rationality of prescription. Grouws, Byce, Habicht, Amaraj, Pario, Schelleneberg and Fontaine (2004:511) indicated that trained health professionals prescribed better than untrained ones.

Ndyomugenyi, Magnussen and Clarks (2007:209) also indicated that providing training to health workers is important in improving malaria diagnosis and treatment. Wasunna et al (2008) also indicated that capacity of the health system to provide adequate training, staffing and follow up after training contributes in terms of compliance to treatment guidelines.

Health worker training is expected to increase malaria case management. However, some studies indicated that those health workers trained show no difference when compared with untrained workers. The study undertaken by Zurvoc et al (2004) in Kenya revealed that training plays an important role in uncomplicated malaria treatment, but that it should be integrated with other interventions, such as provision of guidelines, and wall charts.

Some of the studies also indicate that the training should be clear and not confusing. According to Meremikwu et al (2007), a study done in Nigeria indicated that from those health workers trained very few health workers comply with the WHO guideline when treating malaria. One of the reasons mentioned in this study is the unclear and incorrect messages they receive during training.

Patient load

Patient load is another factor affecting the diagnosis, prescribing and dispensing (counselling) of patients. Meremikwu (2007) indicated that in those health facilities with a high number of patients, the compliance level of health workers to treatment guidelines is less than in those health facilities with a low patient load.

Knowledge of health workers

The study done by Yasuoka et al (2010:7) amongst community health workers indicated that the knowledge of community health workers about the malaria transmission and types of malaria transmitting vectors affects the quality of malaria prevention and control services. These authors recommended refreshment training and supervision to community health workers in order to enhance knowledge and promote quality of treatment.

Rowe, Savigny, Lanata and Victoria (2005) have indicated that providing appropriate treatment guidelines is very important to promoting awareness and knowledge about diagnosis and treatment. However, providing simple guidelines alone will not be effective. Close supervision of health workers and periodic evaluation with effective feedback generally improves health workers' performance.

In general their capacity to treat patients is directly related to their knowledge of treatment procedures and to their awareness of malaria treatment guidelines. Yeung and White (2005:121) also argue that those interventions which increase the knowledge of health care providers increase patient adherence and lead to effective treatment.

2.6 CHALLENGES TO MALARIA CONTROL

2.6.1 Drug resistance

The inadequate health service coverage to provide access to antimalarial drugs and the inappropriate use of antimalarial drugs on the part of both health workers and patients, are major problems in developing countries trying to manage malaria. In fact, malaria endemic countries throughout the world and the WHO are working to increase health service facilities and access to effective antimalarial drugs in communities. However, another big challenge after solving the problem of antimalarial accessibility is drug resistance.

The WHO (2010b:3) has indicated that the malaria parasite resistance to antimalarial drugs is a major obstacle in the fight against malaria. The WHO reports also show that almost all drugs, except newly introduced ACTs, resisted malaria parasites. There is already some indication of emergence of ACT resistance at the Cambodian border. However, the WHO (2010b:4) reported that “artemether-lumefantrine” remains highly effective in most part[s] of the world, with the exception of Cambodia”.

According to the WHO (2006: v), drug resistance may be defined as

“the ability of a parasite strain to survive and/or multiply despite the administration and absorption of a medicine given in doses equal to or higher than those usually recommended but within the tolerance of the subject, with the caveat that the form of the drug active against the parasite must be able to gain access to the parasite or the infected red blood cell for the duration of the time necessary for its normal action”.

The problem of malaria parasite resistance to antimalarial drugs is two-fold. The first problem is resistance of a parasite to antimalarial drugs causing disease burden, which can lead to high mortality rate. The second problem is the increased cost of malaria treatment, which includes increased hospital admission, cost for another drug, increased duration of treatment, and the high cost of new drug development, which causes health and economic burdens to health facilities and community (see table 2.3 below) (WHO 2010b:3).

Table 2.3 Effect of antimalarial drug resistance on global malaria control

| | |
|----------------|--|
| Disease burden | <ul style="list-style-type: none">• Chloroquine resistance in Africa led to an increase in hospital admission.• Chloroquine and other drug resistance increased mortality rate in malaria endemic areas in the world.• Causes anaemia and low birth weight due to ineffective treatment in children.• Increased transmission of malaria in the community. |
| Economic cost | <ul style="list-style-type: none">• Increased cost of malaria control.• Therapeutic failure requires consultation at a health facility further diagnosis and treatment resulting in loss of working days for adults, absence from school for children and increased cost to the health system. |

(WHO 2010b:11)

According to White and Pongtavornpinyo (2003), one of the reasons for antimalarial resistance is parasite exposure to sub-therapeutic drug concentrations. Drugs in lower concentration than recommended amount will eradicate only those parasites that are still sensitive (WHO 2010b:12).

2.6.2 Factors which influencing the development of antimalarial drug resistance

White (1999), White and Pongtavornpinyo (2003) as cited in WHO (2010b:13) have indicated that the following factors affect the development of antimalarial drug resistance, among other factors:

- The number of parasites exposed to the drug.
- The concentration of drug to which parasites are exposed.
- The pharmacokinetics and pharmacodynamics of the antimalarial medicine.
- Individual and community patterns of drug use such as dosing, duration, adherence, quality of available drugs, availability and distribution.
- The simultaneous presence of other antimalarial drugs or substances in the blood to which the parasite is not resistant.

In order to maximise the effectiveness of artemisinins and its derivatives and to protect them from the development of resistance, the WHO has repeatedly recommended that

artemisinin must be combined with other drugs that have different mechanisms of action and larger half lives (WHO 2010b:3).

2.7 CONCLUSION

In this chapter the world, sub Saharan and Ethiopian situation of malaria was discussed in detail. Causes, types and management of malaria were also discussed. Diagnosis and treatment of malaria including the drugs used to treat uncomplicated malaria were also explained. Patient adherence, consequences of non adherence, factors affecting patient adherence also discussed in detail. The importance of health workers compliance and factors which influence the health workers compliance were also explained in detail. Measurement of adherence and the methods which used to measure the adherence status of patients were also discussed. The challenges to malaria control such as the malaria parasite resistance to antimalarial drugs also described.

Chapter 3 (next chapter) presents the research design and methodology.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

The literature review in chapter 2 described a global malaria situation that includes Ethiopia's problems with preventing the disease. It looked at the causes, types and management of malaria. In chapter 2, health workers compliance to malaria treatment guidelines was discussed in some detail, including the importance of compliance, consequences of non-compliance, and factors affecting health worker compliance to malaria treatment guidelines. The discussion of patient adherence in the literature review included the importance of patient adherence, types and consequences of non-adherence, factors influencing patient adherence, and the intervention strategies required to improve patient adherence to antimalarial treatment.

This chapter (chapter 3) deals with the research design and methods used to collect and analyse data. In this study, a qualitative, explorative and descriptive design is used to address the research questions identified by the researcher. The researcher also discusses the reasoning strategies used throughout the study. The discussion of the research design is accompanied by a comprehensive discussion of research methods used by the researcher in the study.

3.2 RESEARCH DESIGN

The procedural steps used to perform a particular manner of research determine the quality of findings of the research. To undertake the research in proper procedural steps and to a certain level of quality, an appropriate research plan is needed before applying different methods of data collection and analysis. Hence, the research design is the most important part of a research project (Babbie 2010:91).

Creswell (1998:2) defines the research design as "the whole process of conducting research from conceptualisation to narration". Creswell (2009:3) also states that the

research designs are plans and procedures that include the different types of assumptions and methods used for data collection and analysis in a study.

Punch (2005:62) indicates that a research design is the “all the issues involved in planning and executing a research project – from identifying the problem to reporting the results”. Punch (2005:62) also states that the selection of appropriate design to the study of a particular topic to be a very important part of a research process. As indicated by Creswell (2009:3), the plan of the study involves deciding on the types of design suitable to study a topic. The selection of type of design for a study depends on the “research problem, the researchers’ personal experiences, and the audience for the study”.

Agyepong et al (2002:2215) argue that the qualitative method is preferred when investigating the factors that affect patient adherence to medication. According to President’s Malaria Initiative (EFMOH 2008b:34), the qualitative approach is important when identifying the factors that are related to inappropriate use of antimalarial drugs by both patients and health workers.

In line with the above discussion, a qualitative, explorative, descriptive and contextual research design was used in this thesis to address the research questions identified by the researcher. The following sections present various aspects of the research design, followed by the researcher in this project, starting with the qualitative aspect of the design.

3.2.1 Qualitative aspect of design

According to Holloway (2005:3), qualitative research design uses techniques of data production and analysis that relate to textual or non-numerical data. Creswell (1994:15) defined a qualitative study as “an inquiry process of understanding a social or human problem, based on building a complex, holistic picture, formed with words, reporting detailed views of informants, and conducted in a natural setting”. Qualitative research design is an important research design, which helps to understand the “emotions, perceptions and practices of health professionals and patients” (Holloway 2005:1).

Qualitative researchers mostly try to find an insider view, such as personal experiences and beliefs, and systematically describe the culture of the individuals or group under investigation (Holloway 2005:216). Qualitative research also focuses on how everyday activities are understood and how social reality is produced (Bowling & Ebrahim 2005:216-217). Babbie and Mouton (2001:53) indicate that describing and understating the experiences and practices of individuals, organisations and informants are the primary aim of qualitative research. As cited by Creswell (2007:36), Denzin and Lincoln (2005) indicated that: “qualitative researchers study things in their natural settings, attempting to make sense of, or interpret a phenomenon in terms of the meanings people bring to them”. Jackson (2009:86) also indicates that “qualitative research focuses on phenomena that occur in natural settings”.

Qualitative methods in health services research prove useful in addressing the kind of research topic that cannot be fully explored by quantitative methods. Research questions which include the way in which the beliefs of patients and health workers about health or illness influence behaviour can be best identified using qualitative methods. The research issues such as how patients use prescribed drugs and the way in which health workers prescribe medicines to patients, can be best understood using qualitative research methods (Bowling & Ebrahim 2005:216; Agyepong, Aryee, Dzikune & Manderson 1994:31).

In this study, the qualitative aspect of the research design was used to explore and describe health extension workers’ compliance to malaria treatment guidelines and the way in which patients use antimalarial drugs. Understanding the compliance level of HEWs to malaria treatment guidelines and patient adherence, along with factors affecting HEWs compliance and patient adherence, will be used to enhance the already-existing malaria treatment guidelines followed by HEWs in the treatment of malaria.

3.2.2 Explorative aspect of design

In line with the research design followed by the researcher in this study, the use of a qualitative research design is accompanied by the ability of the researcher to conduct an in-depth exploration of the phenomenon under investigation. Babbie (2010:92)

indicates that an exploration of a topic under certain study is one of the main purposes of the social science research.

An exploratory study is most typically conducted for 3 purposes, namely: (1) to satisfy the researcher's curiosity to desire better understanding of the phenomenon under investigation; (2) to test the feasibility of undertaking the research in a wider way; and (3) to build up the techniques and procedures to be used in other research projects. Among the qualitative research methods, focus group discussions and in-depth individual interviews are the most commonly used methods by which to explore various research topics (Babbie 2010: 92; Rapport 2004:4).

Exploratory studies help to better understand populations, individuals, and social/cultural groups involved in the study (Babbie 2010: 92). The exploratory design is also useful to investigate the experiences or practices of individuals or institutions that are not adequately understood.

In this thesis in-depth individual interviews and focus group discussions (FGDs) were used to explore HEWs compliance to malaria treatment guidelines and patient adherence to antimalarial drug use. Exploring the practices of antimalarial drugs prescription by HEWs and the way in which patients use antimalarial drugs has helped to understand the overall malaria treatment performance of HEWs and patient adherence to antimalarial drugs, and the findings have been used for the development of guidelines to improve the HEWs performance and patient adherence.

3.2.3 Descriptive aspect of design

In both qualitative and quantitative research, describing the topic under investigation is a major priority (Polit & Hungler, 1999:16). In qualitative research, the description of data is produced in the participants' own words or narratives. Descriptive research designs are an explanatory type of qualitative research design. Babbie (2010:92) indicates that the major purpose of much social science research is to describe situations and events. In the descriptive study, careful observation of the area under study and describing the observed phenomenon are an essential part of research.

A descriptive study is important to “document and describe” the topic under study (Marshall & Rossman 2011:69). Punch (2005:15) states that

“to describe is to somehow draw a picture of what happened, for how things are proceeding, or of what something or someone is like. Descriptive studies involve finding the reasons of things, events and situations, showing why and how they have come to be what they are”.

Babbie (2010:94) argues that qualitative studies use primarily descriptive data. In a descriptive study, the researchers usually assess and are interested to finding out why the observed patterns exist and what they imply. Descriptive studies answer questions such as what, where, when and how of practices/experiences observed. Descriptive studies can provide valuable information about the characteristics of a population of interest and about the speed of social or longitudinal change, along with influencing factors (Babbie 2010:94). Bailey (2007:138) indicates that field research requires thick descriptions in order to fully understand the research topic.

Therefore, in this study, the descriptive characteristic was utilised by the researcher to:

- describe factors which affect patient adherence to antimalarial drugs
- describe HEWs compliance to malaria treatment guidelines
- describe guidelines to support HEWs in the treatment of malaria in Southern Ethiopia

3.2.4 Contextual aspect of design

According to Burns and Grove (2001:793) context refers to the world or setting within which the person can be studied or understood. Mouton (2002:133) stated that contextual design is a design used to study a phenomenon of interest at a certain context or situation. Patton (2002: 62) described context as: the setting or location within which the phenomenon is studied. The context is source for study of the experiences of the participants (Patton 2002:63). This study is conducted in Damot Gale district (southern Ethiopia) where the HEWs treat malaria patients using antimalarial drugs. Therefore, the study explored the malaria treatment practice of the HEWs in the

health post and the factors influencing the malaria treatment practice in the context of the study. The context of this study is described in chapter 1 section 1.9.2.

3.3 REASONING STRATEGIES

In addition to the description of various aspects of the research design, it is important to note that qualitative research utilises reasoning strategies to meaningfully interpret the data collected. The reasoning strategy refers to the set of ideas by which the study intends to proceed, in order to answer the research question (Punch, 2005:63). In order to make sense of data collected, different reasoning strategies were employed. These include: (1) inductive reasoning; (2) deductive reasoning; (3) analysis; and (4) synthesis. These reasoning strategies used in this study are discussed in further detail below.

3.3.1 Inductive reasoning

Inductive reasoning usually starts with specific research points and observations, and moves to broader generalisation and theories (Patton 2002:56). Sometimes inductive approach is known as “bottom up” approach. In an inductive strategy, the conclusion is based on premises. Qualitative research is inductive in nature because it originates from the observations, questions, and its understanding of the practices and real experiences of the participants of the study to generate theories or hypotheses (Belgrave & Zablotsky 2002:1437; Creswell 1994:14; David & Sutton 2004:36).

Most of qualitative research starts with inductive theory construction. The theory construction in an inductive reasoning strategy begins with observations of the phenomenon under study (see http://www.Pac-aspc.gc.ca/publicat/cdic-mcc/18-3/d_e.html). According to Babbie and Mouton (2001:293), the researcher who uses qualitative research methods starts with deep interaction with the natural setting and describes events as accurately as possible, rather than beginning with an existing theory or hypothesis.

The interest of the researcher in this study was to evaluate the practice of HEWs in malaria treatment and patient adherence to antimalarial drugs prescribed by HEWs. Conducting patient document analysis, HEWs and patients interviews about the performance of HEWs as well as patients use of antimalarial drugs allowed the

researcher to describe events as accurately as possible as they occurred. The findings were used to develop the guidelines by means of which to improve health extension workers' compliance to malaria treatment guidelines and patient adherence to antimalarial drugs.

3.3.2 Deductive reasoning

Apart from inductive reasoning, the researcher in this study used a deductive reasoning strategy to draw conclusions. Patton (2002:57) indicates that most qualitative studies involve inductive strategies, but also include deductive elements. Deductive reasoning starts from more general issues to specific or particular points of the research issues in question. For this reason, it is sometimes known as a 'top-down' approach (Polit & Hungler, 1999:9). In deductive reasoning, the available facts are important sources for the conclusion of a research question. Deductive theory construction starts from the theory from which we may derive hypotheses. In deductive reasoning, the researcher deduces from general theoretical understanding and derives (deduces) an expectation and ultimately, a testable hypothesis (Babbie 2010:48-50).

As indicated by a cycle of inductive and deductive reasoning (figure 3.1) below, inductive reasoning helps to generate theory and deductive reasoning helps to verify theory (O'Leary 2005:195).

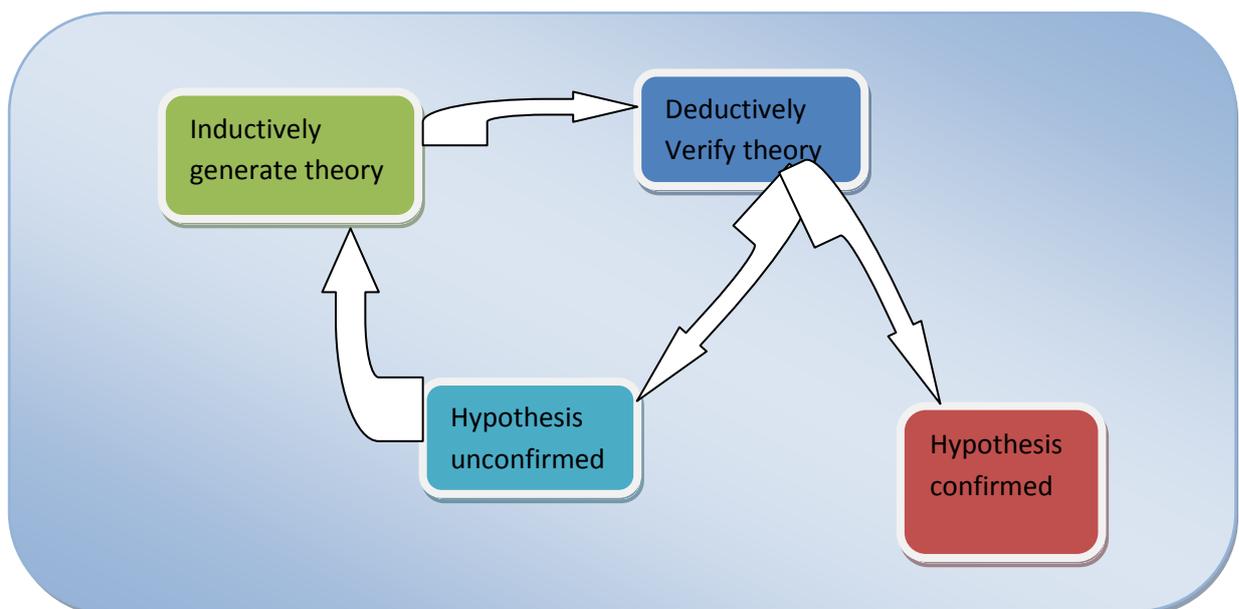


Figure 3.1 Cycles of inductive and deductive reasoning
(O'leary 2005:195)

In this study, the data collected from HEWs, patients and medical records about the practice of treating malaria and patient adherence, factors affecting HEWs compliance and patient adherence, provided the basis for deducing additional improvements to existing guidelines. Hence, these were used as input to develop new guidelines for improving HEWs' compliance and patient adherence to antimalarial drugs.

3.3.3 Analysis

Analysis refers to the breaking down of communication into pieces or units in order to understand component parts and their relationship to one another. The process of separating or breaking research materials into component parts is the main activity of qualitative data analysis. The major elements of qualitative analysis include: finding, building, clarifying, illustrating and explaining an argument in the thesis (Dembo, 1994:37). According to Blanche and Durrheim (1999:234), qualitative analysis mainly involved the explanation of interactions between research participants and context.

The aim of qualitative analysis is changing or transforming the raw data collected from data sources to findings. Patton (2002:41) describes data analysis as "immersion in the details and specifics of the data to discover important patterns, themes, and interrelationships; begin by exploring, then confirming; guided by analytical principles rather than rules; ends with creative synthesis".

In this study the data collected from different sources (HEWs, malaria patients and documents) were analysed and interpreted, and the findings were discussed in relation to the literature control.

3.3.4 Synthesis

According to the definition of Polit and Hungler (1999:575), synthesis is a process of combining parts into a whole. Patton (2002:120) indicates that analysis deals with the part, but synthesis deals with explaining the whole.

Synthesis is part of analysis (Polit & Beck 2008:751; Patton 2002:500). Patton explains that synthesis is the final activity of analysis in a qualitative study and a process by

which knowledge of a part is aggregated into knowledge of a whole. Patton (2002:500-502) also describes the qualitative synthesis as “a way to build theory through induction and interpretation”.

In this study, after organising data, discovering patterns and themes, the researcher discussed the findings with the literature control. See chapter 4 for a comprehensive discussion of findings and a literature control.

3.4 RESEARCH METHODS

In addition to the reasoning strategies employed, research methods are needed to answer the research questions identified by the researcher. Creswell (2009:233) has described research methods as “the forms of data collection, analysis, and interpretation that researchers propose for their studies”. O’Leary (2009:10) indicates that the methodological approaches are strategies or the set of procedures used to gather and analyse data.

Selecting the appropriate type of research methods in a research project depends on the type of design proposed for the project and the type of data to be collected and analysed (Creswell 2009:16). In this study, the methods used to explore and describe the HEWs compliance to malaria treatment guidelines and patients adherence to antimalarial drugs are discussed in detail below, starting with the population for the study.

3.4.1 Research population

The research population refers to the total number of units from which the study groups are selected for the research purpose. Polit and Beck (2004:50) and Burns and Grove (2001:366) indicate that a population is the entire set of individuals who meet the selection or conform to set specification. Punch (2005:101) defines population as “total target group who would, in the ideal world, be the subject of the research, and about whom one is trying to say something”. According to Babbie (2010:199), “a study population is that aggregation of elements from which the sample is actually selected”.

In this study, the research population were those health extension workers working in Damot Gale district (one of 12 districts in Wolaita zone in Southern Ethiopia) and malaria patients treated by health extension workers in the district.

3.4.2 Sampling methods and sample size

The sample is defined as “the actual group that is included in the study, and from which the data [are] collected” (Punch 2005:101). All research, including qualitative research, involves sampling (Punch 2005:101), because it is not possible to always include everything or everyone in the population, due to constraints such as time, finance, access to the participants and obtaining appropriate and high quality data (Punch 2005:187).

The sampling strategy considers the type of study approach or design, research purpose and research questions. The important points to be addressed in sampling strategy are: the sample selection methods and the size of samples included in the study (Punch 2005:101). The sample selection methods and the sample size used in this study are discussed below.

3.4.2.1 Sampling methods

Sampling method refers to the procedure of selecting and including participants or the sample to the study. The sampling technique is mainly based on the research problem or research question, the research purpose, research design and practical implication to research topic. Qualitative researchers mostly use purposive sampling methods (Punch 2005:187-188).

This research is aimed at evaluating the practice of the HEW's on malaria treatment in health posts and how patients use antimalarial drugs; using qualitative methods in Damot Gale district, which is one of most malarious areas in Wolaita zone (Southern Ethiopia). Therefore, Damot Gale district was selected for this study purposefully based on malaria prevalence and accessibility for researchers to collect data.

3.4.4 Sample size

In a qualitative study, sample size is determined by the extent to which the data collection provides the dense and full description or picture of the topic under study. Purposive sampling is the commonly used sampling method in qualitative studies and leads to select information rich cases. The selection of the Health posts, HEWs and malaria treated patients is described below.

Health posts

The total number of the health posts in the study area is 31. Data was collected until there was a redundancy of information in the form of data saturation. The researcher had collected data from 20 HEWs from 20 health posts.

Health extension workers

One HEW participated from each health post in an in-depth interview (one health post has 2 female HEWs). A HEW who is available at health post at the time of researcher's arrival and who is not overloaded with other activities was included in the study.

Patients

Three patients, who were treated for malaria in a one week period prior to data collection, were selected from patient registration book in each health post to participate in FGD. The selection of patients was based on the accessibility of patients for the researcher to conduct the FGD. Accordingly, those patients nearest to the health post were selected. In total, 59 treated malaria patients participated in 7 FGD (7-10 malaria treated patients in each group) to identify how malaria patients used antimalarial drugs and factors affecting patient adherence to antimalarial drugs.

3.4.5 Pilot study

A pilot study is useful in assessing the effectiveness of the research strategy and to identify the gaps in data collection procedures. A pilot study is also helpful to improve research validity, to consider ethical issues, as well as to eliminate barriers such as a

participant's resistance to tape recording, before conducting main study. The pilot study helps to identify the problems in study procedure/design and to redesign parts of the study (Marshall & Rossman 2011:96).

In this study, the researcher conducted the pilot study in two health posts. A HEW and a patient treated for malaria were selected from each health post. The aims of the pilot study were: to improve the interview guides/questions, to check the appropriateness of data collection procedures and to familiarise the researcher with data recording materials such as audiotape.

3.4.6 Method of data collection

Data collection methods depend mostly on types of research questions and the types of information needed. According to Agyepong, Aryee, Dzikunu and Manderson (1994:31), qualitative research methods help to collect detailed and full information about a topic under study. Using qualitative methods, it is possible to explain how health workers diagnose and treat health problems such as malaria. In this research, in order to answer the research questions in detail, the qualitative data collection methods of in-depth interview, document analysis and focus group discussion/FGD were used.

This research had three phases: phase 1 dealt with describing health extension workers compliance during diagnosing of malaria, prescribing and dispensing antimalarial drugs and determining those factors affecting HEW's compliance. Phase 2 dealt with evaluating the patient adherence and factors affecting patient adherence; and phase 3 deals with formulating guidelines to improve the HEWs compliance to malaria treatment guidelines and patient adherence. Therefore, the data collection was undertaken phase in phases (table 3.1).

Table 3.1 Research phases, objectives of the study, and methods of data collection

| Phases | Objectives of the study | Data collection methods/source |
|---------------|--|--|
| Phase 1 | The exploration of antimalarial drugs management of HEWs and factors affecting compliance | Document analysis and in-depth interview of HEWs |
| Phase 2 | The exploration by patient adherence to antimalarial drugs and factors affecting patient adherence | Focus group discussion (malaria treated patients) |
| Phase 3 | Development of guidelines to improve HEWs compliance and patient adherence | After data analysis of in-depth interview, document analysis and FGD, findings of the research was used to develop guidelines to improve HEWs compliance and patient adherence |

3.4.6.1 Phase 1: The exploration of antimalarial drugs management by HEWs

In this phase, the HEWs' compliance to malaria treatment guidelines and factors affecting compliance were explored using medical record/document analysis and in-depth interviews.

Document analysis (patient chart/medical record review)

O'Leary (2009:121) states that "one of good ways to understand the reality of practice is document analysis". O'Leary (2009:10) also states that investigating written documents such as medical records for content and/or themes is a useful method of data collection. According to O'Leary (2009:177), document analysis refers to "collection, review, interrogation, and analysis of various forms of text as a primary source of research data". In this study, the malaria patient medical records were used as sources of data to assess whether the health extension workers prescribed appropriate antimalarial drugs to malaria patients with an appropriate dose and duration.

Individual in-depth interview to HEWs

Interviews helped to obtain detailed information from participants using probing words (Fitzpatrick et al 2004:349). Patton (2002:341) indicates that "qualitative interviewing

begins with the assumption that the perspective of others is meaningful, knowledgeable, and able to be made explicit”.

In this study, to identify health workers' compliance to malaria treatment guidelines and factors affecting compliance to guidelines, individual in-depth interviews were conducted with HEWs working in health posts. The main question that the researcher asked of the health extension workers focused on the three main elements of treatment: on diagnosis of malaria, on prescribing and on dispensing of antimalarial drugs.

The interviews took place at the health posts in the health extension worker's office. The question was posed in both local and national languages to health extension workers. “Wolaitanga” is local language that all health extension workers understand and speak fluently, and Amharic is national language in which almost all the guidelines were written. Therefore, both Amharic and Wolaitanga languages were used for the interview with health extension workers. Data was collected using taperecords and field notes.

The main question to HEWs was:

Please tell me how you treat malaria patients. (Please tell me how you diagnose malaria, prescribe and dispense antimalarial drugs to malaria patients.)

Probing questions:

Please tell me how you diagnose malaria.

Please tell me how you prescribe antimalarial drugs.

Please tell me how you dispense antimalarial drugs.

What information do you provide to your patients during prescribing and dispensing antimalarial drugs?

How do you explain the patient antimalarial drug use/adherence of antimalarial drugs that you prescribed?

How do you monitor your patient's adherence to antimalarial drugs?

What do you think are the reasons for non-compliance of Health Extension workers to malaria treatment guidelines during malaria diagnosis, prescribing and dispensing of antimalarial drugs?

What intervention strategies do you suggest in order to improve the performance of HEWs in malaria treatment and patient adherence?

3.4.6.2 Phase 2: The exploration of patient adherence to antimalarial drugs dispensed by HEWs

In this phase, patient drug use was explored using FGD. A FGD is the most commonly-used method in health service research. According to Holloway (2005:56), FGD offers a very valuable alternative or supplement to other data collection techniques, such as individual interviews and observation. Holloway also indicates that the FGD methods are useful for allowing participants to generate their own questions, frames, and concepts. In health research, FGD can be used for the in-depth exploration of the experience of a diagnosis, disease or treatment (Holloway 2005:58).

In this study, FGD was conducted with those patients who were treated for malaria before three days prior to data collection, in order to assess patient experiences or the way in which patients used antimalarial drugs to identify factors affecting adherence to antimalarial drugs. From 20 health posts in study area, (Damot Gale district), 59 malaria-treated patients (about three patients from each health post), participated in 7 groups.

To determine the number of participants in the group, the researcher consulted the literature. Different literature suggested a different number of participants in focus group discussion. Agyepong, Aryee, Dzikune and Manderson (1994:44) recommend that 6–8 participants are adequate for the FGD to assess the quality of malaria treatment. Patton (2002:385) and Mack, Woodsong, Macqueen, Guest & Namey (2005:56) indicate that 6-10 participants are adequate for FGD. Marshall and Rossman (2009:149) suggest that 7 to 10 participants are adequate for FGD.

In this study, the researcher used 7-10 malaria patients for each FGD. During the FGD the researcher facilitated discussion by posing initial and periodic questions. Besides taking field notes, the FGD was recorded using audio tape. All of the residents in Damot Gale district fluently speak Wolaitanga. Therefore, the FGD questions were translated into Wolaitanga. The main question and probing questions posed to participants are as follows:

The main question posed to the patients in focus group discussion was:

Could you explain the process that you followed in taking your antimalarial drugs?

Probing questions:

Why do you think people do not complete courses of antimalarial drugs?

What strategy do you suggest in order to increase the adherence level of patients?

- ***Facilitative techniques***

Besides asking the main questions, the researcher used facilitative techniques to enhance the responses of participants in both in-depth interviews and FGD. Patton (2002:387) indicates that facilitating the discussion plays an important role in increasing the participation of the group members in FGD and encourages respondents to provide adequate information in in-depth interviews. In this study, the researcher used verbal and non-verbal communication skills such as paraphrasing, clarification and probing, to get adequate information from participants. Each of these processes is described below.

Paraphrasing

Paraphrasing involves “taking words, ideas and sentences from sources and crafting them into new sentences” without changing the meaning of the original sentence (<http://www.lib.usm.edu/legacy/plag/paraphrasing.php>). The aim of paraphrasing is to make clear the interview question or guide for participants and to obtain adequate responses.

Clarification

Clarification is a useful method for facilitating in-depth interviews in order to get more information from respondents. Clarification aims to resolve ambiguity in meaning. Patton (2002:374) argues that clarification should be used “naturally and gently”. Patton (2002:374) is of the view that:

It is best for the interviewer to convey the notion that the failure to understand is the fault of the interviewer and not a failure by the person being interviewed. The interviewer does not want to make the respondent feel inarticulate, stupid, or muddled. After one or two attempts at achieving clarification, it is usually best to leave the topic that is causing confusion and move on to other questions, perhaps returning to that topic at a later point.

Probes

“A probe is a technique to encourage the persons you are interviewing to continue to speak, and give you further information, or a fuller account of their ideas or beliefs, or a fuller version of their description of a certain event” (Agyepong, Aryee, Dzikune & Manderson, 1994:45). According to Patton (2002:374), probing is a skill that comes from knowing what to look for in an interview, listening carefully to what is said as well as to what was not said. According to Patton (2002:374), probes are used:

- to deepen the responses to the question
- to increase the richness and depth of responses
- to give cues to the interviewee about the level of response

According to Marshall and Rossman (2009:45), the skill of the qualitative researcher such as asking the follow up questions (probes) is crucial to obtaining adequate information from the participants. According to Rossman and Ralis (2003), as cited by Marshall and Rossman (2009:145) and Patton (2002:374) there are three main types of probes: (1) elaboration (2) open-ended clarification (3) detail-oriented questions.

An **elaboration probe** includes non-verbal gently **nodding** of head and “uh-huh”. This type of probing encourages the participants to continue talking and providing more information.

A **clarification probe** is a process of asking the participant to explain or tell more about the issue under discussion.

A **detail-oriented questions** are the basic “who”, “where,” “what,” “when” and “how” questions that are used to obtain a complete and detailed pictures of certain activities or experiences.

In this study, the researcher utilised clarification, paraphrasing and probing as methods based on the participants responses to the main interview and FGD questions, in order to obtain adequate, detailed and clear information.

3.4.7 Data analysis

Data analysis in qualitative research starts at the beginning of data collection (Marshall & Rossman 2011:208; Fitzpatrick et al 2004:362; Royse, Thyer, Padget & Logan 2006:102). Creswell (2009:184) and Pope, Ziebland and Mays (2000:114) have indicated that data analysis in qualitative study is undertaken together with data collection, interpreting and report writing.

According to Creswell (2009:184), preparing data for analysis, coding, categorising and identifying themes in the qualitative data are the primary concerns of data analysis. Creswell also indicates that data analysis in qualitative studies starts with organising data into manageable sizes.

Tesch (1990), as cited by Creswell (2009:186), has indicated eight data analysis steps in qualitative study. Data analysis, according to Tesch (1990), includes the following steps:

- To understand the whole data, carefully read transcripts.

- Read through an interview; write down ideas that emerge while asking yourself questions like “what is the importance of the information gathered or what is it about?”
- Read all transcripts, make a list of all topics, and then cluster similar topics together.
- Try to identify major categories and write these in the margin.
- Create codes for similar topics, rearrange these to see if they become categories.
- Find suitable wording for these and regroup them to categories.
- Draw lines between categories to indicate relationships.
- If necessary, recode the data for categories and subcategories.

Therefore, the researcher used the following data analysis steps developed from Creswell (2009:185) and Tesch steps:

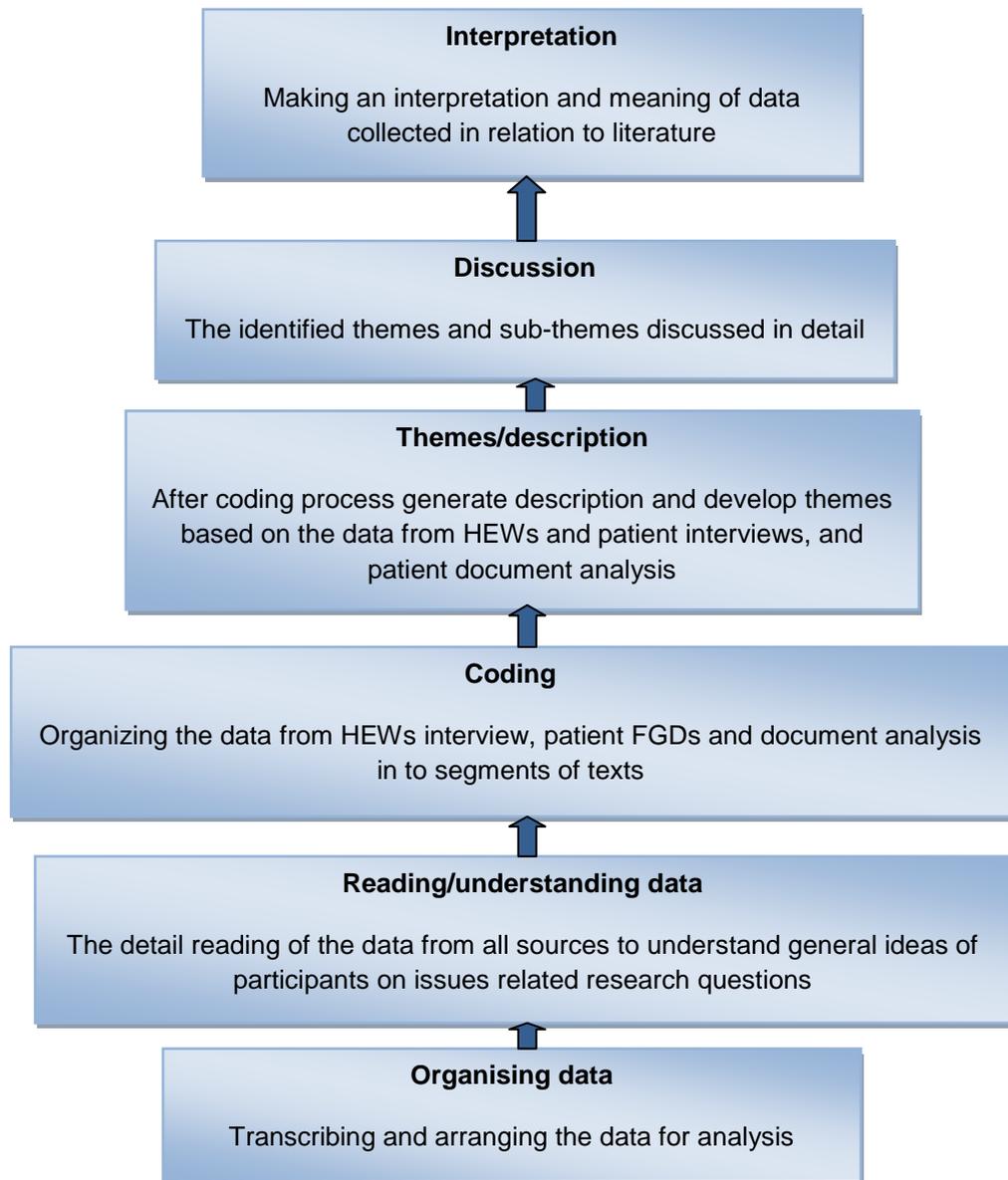


Figure 3.2 Data analysis steps

3.4.8 Phase 3: Development of guidelines to improve HEWs compliance and patient adherence

Once all data had been collected, the researcher utilised collected data and literature to formulate and enhance guidelines for malaria treatment in Ethiopia. The main objective of developing guidelines is to promote the compliance level of HEWs to malaria treatment guidelines during diagnosis, prescribing and dispensing antimalarial drugs

and patient adherence. Therefore, the researcher developed guidelines based on findings on HEWs compliance level and patient adherence.

3.5 ETHICAL AND LEGAL CONSIDERATIONS

Ethics is one of the most important issues in research, which is the major responsibility of all researchers during the research process. Cohen and Crabtree (2008) argue that considering the ethical issues is one of most important criteria in qualitative research. In the research process involving human beings, the researcher should strictly consider the ethical issues that require him/her to address in the research (O’Leary 2005:52; Marshall & Rossman 2011:47).

In this study the researcher ensured ethical and legal considerations through following ethical principles.

3.5.1 Informed consent

The aim of an informed consent is to make the participants understand the objective of the research and to promote their participation in the research project. Punch (2005:277) indicates that the people involved in research should be adequately informed and fully aware of the study and agree to participate in the research. The permission to conduct the study should also be obtained from gatekeepers of the community or government officials at different levels (Mack et al 2005:12).

Therefore, the informed consent of participants in this study was obtained from the Southern Ethiopia Regional Health Bureau, Wolaita Zone Health Department, Damot Gale district health office, HEWs and treated malaria patients. The HEWs signed consent forms and treated malaria patients provided oral consent after the researcher explained the purpose and the procedures of the study. The Regional Health Bureau and Damot Gale district health office wrote a supporting letter to conduct the study after brief presentation of proposal by the researcher (see annex 3 and 4). The information on the consent forms included the purpose of the study, data collecting methods and notes on the way in which the reports will be disseminated. The participants were also informed that they were free to withdraw from interview or FGD at any time.

3.5.2 Confidentiality and anonymity

According to O'Leary (2005:54), confidentiality refers to protection of the respondent's identity from public use and anonymity refers to the protection of the identity of respondents even from the researcher. Securing the storage of data, restricting access to raw data, using the data in a manner that will not allow the identification of the respondents, and coding, are some methods that prevent the identification of the respondents.

In this study, confidentiality was ensured by removing all names and addresses of participants from the data collecting tools. Only codes were used to identify participants, along with audio cassette tapes. Anonymity was ensured with use of codes, thus making it difficult to attribute responses to particular participants. Data collected were kept in the strictest confidence; they were not made public to other people. Audio cassette tapes were also erased after completion of the study. Only aggregate demographic information was reported, to maintain anonymity.

3.5.3 Harm and risk

O'Leary (2005:53) states that the researcher should ensure that no harm comes to the participants. In this study, the researcher ensured the protection of participants by addressing issues such as that in the case of withdrawal from the study, participants are free to do so, and no harm will be caused to them.

3.6 MEASURES FOR ENSURING TRUSTWORTHINESS

Trustworthiness refers to "the credibility of the findings in a piece of qualitative research and the extent to which readers can have trust in the research and its findings" (Holloway 2005:296). Lincoln and Guba (1985) in Bailey (2007:180-181) describe trustworthiness as the degree to which the findings of a research study are believable and worthy of attention. Lincoln and Guba (1985:293) identified four criteria to detect the trustworthiness of a qualitative study. These are: credibility, transferability, dependability and confirmability. The trustworthiness of this study was ensured by using these four criteria.

3.6.1 Credibility

According to Holloway (2005:290), credibility refers to “a quality assessment of whether the data convincingly describe the phenomenon which is being researched”. Credibility is used to assess the extent to which the research findings are based on the lived experiences of participants. Shenton (2004:64), Babbie and Mouton (2001:207) state that credibility is achieved through (1) prolonged engagement; (2) triangulation; (3) peer debriefing; and (4) member check. These are discussed below.

- ***Prolonged engagement***

According to Lincoln and Guba (1985), as cited in Marshall and Rossman (2011:40), prolonged engagement in the study setting is an important step in data collection of qualitative research. These authors advise that qualitative researchers should “be in the setting for a long period of time” in order to ensure credibility. In this study, the researcher spent an adequate period of time in the study area with HEWs and malaria treated patients, observing treatment procedures, interviewing and conducting patient medical record analysis.

- ***Triangulation***

Mays and Pope (2000:51) indicate that triangulation is the strategy of using different methods to collect and analyse data to test validity of a research. Creswell (2009:191) states that collecting multiple sources of information is useful in order to ensure validity of the study. Marshall and Rossman (2011:40) also emphasise that triangulating by gathering data from multiple sources and through multiple methods, is useful to creating credibility in the research. Patton (2002:559) classifies triangulation methods into four categories. These are: (1) method triangulation; (2) triangulation of sources; (3) analyst triangulation; and (4) theory/perspective triangulation.

Triangulation in this study was implemented using data sources triangulation (data triangulation) and theoretical triangulation. Data collection used in various qualitative methods, namely: interviews, document analysis and focus group discussion methods. The HEWs and treated malaria patients were used as sources of data to triangulate and

ensure credibility of the study. The study of different literature control sources also provided theoretical triangulation.

- ***Peer debriefing***

Shenton (2004:67) indicates that conversation with experts in the field of study is helpful for establishing credibility. Creswell (2009:192) also indicates that inviting other experts in the area of study to review the research work increases the accuracy of the research and validity of qualitative research.

In this study, the researcher had a conversation with colleagues from universities experienced in qualitative research and presented the findings to colleagues who are experts in the field of study in order to avoid biases and the erroneous interpretation of data.

- ***Member check***

Member check is one of the methods used to evaluate the accuracy of findings by inviting participants of the study (Creswell 2009:191). Babbie and Mouton (2001:477) state that researchers are encouraged to return to participants for confirmation of data collected and interpretation. Shenton (2004:67) as well as Marshall and Rossman (2011:40) state that member check is the way in which researchers share findings with participants in order to confirm that the responses of participants match with the researcher's findings.

Therefore, in this study, credibility was ensured by the prolonged stay of the researcher in the district during data collection, collecting and comparing data from different sources (triangulating), peer debriefing, conducting follow up interviews and presenting the findings and interpretations to participants (HEWs and malaria treated patients).

3.6.2 Transferability

Transferability in the qualitative study has meaning equivalent to external validity in a quantitative study (Shenton 2004:64). Polit and Hungler (1996:221) define external validity as "the degree to which the findings of the study can be generalized to settings

or samples other than the one studied". Transferability in a qualitative study indicates that lessons learned in research processes are applicable to other settings. A highly-detailed description of the study context, setting and methods helps to ensure transferability in qualitative study (O'Leary 2004:62-63). Foster (2004:230) also indicates that a "rich description" of study is a key point to ensure transferability of a study. According to Patton (2002:437), "thick description provides the foundation for qualitative analysis and reporting".

In this study, in order to ensure transferability, the researcher described the study context in detail (see section 1.10.2 in chapter 1). The findings are also discussed and reported in detail in chapter 4.

3.6.3 Dependability

Dependability refers to reliability in quantitative study (Shenton 2004:71). Polit and Hungler (1996:367) describe reliability as "the degree to which the instrument measures the attributes it is supposed to be measuring. Reliability encompasses stability, consistency, accuracy and dependability of a measuring instrument." Holloway (2005:143) indicates that the decision trail, which shows how decisions were reached during data collection; and analysis and the relation between methodology and methods used in the qualitative research, are helpful towards ensuring dependability. According to Lincoln and Guba (1985), cited in Shenton (2004:72), there is a relationship between credibility and dependability. These researchers indicate that the presence of credibility directly indicates dependability in the research.

In this research, dependability was ensured through triangulation of data sources and by ensuring credibility.

3.6.4 Neutrality or confirmability

Neutrality is defined as "the quality or state of being neutral" or free from "bias" (see <http://www.merriam-webster.com/dictionary/neutrality>). According to Shenton (2004:72), neutrality is the qualitative researcher's equivalent concept to objectivity in quantitative research. Neutrality refers to "findings of the research which are the result of the experiences and ideas of the participants, rather than the characteristics and

preferences of the researcher”. Triangulation is the method which has been used to ensure neutrality/confirmability as well as to minimise the researcher bias during research.

Therefore, in this research the researcher collected the data from different sources (HEWs, patients, documents) using different qualitative methods (interview, focus group discussion and document analysis) to triangulate the findings and to ensure confirmability.

The data collection methods and sources are presented below in table 3.2.

Table 3.2 Data collection methods, sources, objectives of the research, key activities and sample size

| Objective of the research | Methods | Key research data to be collected/key activities | Data sources and sample size |
|--|---|---|--|
| Phase 1. To describe the HEW compliance with national and WHO malaria treatment guidelines | Document analysis (patient medical record review) | Recording patient demographic data, diagnosis (type of malaria identified), drugs prescribed, dose and duration of antimalarial drugs prescribed | Patient medical record in each health post |
| | Individual HEWs interview | Interviewing HEWs to describe malaria treatment performance and to discover those factors affecting HEWs compliance to malaria treatment guidelines | 1 HEWs in each health post (20 HEWs) |
| Phase 2. To explore patient adherence | Focus group discussion to treated malaria patients | The data on how patients used antimalarial drugs and what factors are affecting adherence was collected | 7 FGD which includes 7-10 treated malaria patients |
| Phase 3. Developing guidelines to improve HEWs compliance to malaria treatment guidelines and patient adherence | Developing guidelines based on findings and literature review | Presentation of findings to participants and district malaria coordinators and developing guidelines based on findings | Discussion on guidelines developed with participants and district malaria coordinators |

3.7 CONCLUSION

This chapter described the research design and procedures, research methods, reasoning strategies, the population of the study, samples and sampling techniques. The data collection methods, the phases of study and the data analysis procedures were presented in detail. The trustworthiness of the research and ethical issues considered during the research procedures were also discussed in detail.

The discussion of findings and literature control for the study will be presented in chapter 4.

CHAPTER 4

FINDINGS AND DISCUSSIONS

4.1 INTRODUCTION

In chapter 3, the research design and methods are discussed in detail. This chapter presents the discussion of research findings. Such discussions were made with reference to literature in order to conceptualise the findings. This chapter describes findings with regard to HEWs practice in terms of malaria diagnosis, prescription of antimalarial drugs, antimalarial drug dispensing and patient counselling in relation to malaria treatment guidelines. In this chapter the researcher also describes the use of antimalarial drugs and factors related to adherence to antimalarial drugs among patients.

Data were obtained through multiple data sources, which included individual interviews, FGDs, patient record analysis and field notes. In-depth individual interviews were conducted with HEWs, whilst FGDs were held with treated malaria patients. In addition to both in-depth individual interviews and FGDs, the quality of treatment in each selected health post was assessed from patient registration books. The malaria registration book was also used as the source for treated malaria patients' addresses for the purpose of recruiting such patients into FGDs. Those patients who completed antimalarial treatment prior to data collection were included in the FGD. Consent forms were prepared in the Amharic language (the national language of Ethiopia) and were signed by HEWs prior to in-depth individual interviews. Consent from the malaria treated patients was also obtained before conducting FGDs. An audio tape-recorder was used in both in-depth individual interviews and FGD's to collect data.

In this study, the researcher had a sample of 20 HEWs from 20 health posts. Data were collected until there was a redundancy of information in the form of data saturation. During in-depth individual interviews HEWs were requested to describe how they treat malaria patients. For this purpose, the researcher asked the following open-ended question to each and every HEW who participated in the study: *"Please tell me how you*

diagnose and treat malaria patients?” This open-ended question allowed HEWs to relay the way in which they diagnose malaria patients, prescribe antimalarial drugs and describe the counselling process during antimalarial drug dispensing. Each in-depth individual interview lasted between 1 and 1:30 minutes.

In addition to in-depth individual interviews, the researcher conducted seven (7) FGDs, which consisted of four (4) male and (3) female groups. The number of FGDs was determined through data saturation. All of the FGD participants were patients who had been treated with antimalarial drugs by HEWs and completed the duration of treatment. Each FGD consisted of 8-10 participants, who actively participated in the discussion. The duration of each FGD was about an hour. The interview guide, the time allocated and audio tape recordings were evaluated during a pilot study in two health posts of the study area.

The biographical profile of all participants (age, marital states, sex, education status, year of service for HEWs) were requested and collected from HEWs and all the treated malaria patients before the in-depth individual interviews and FGDs began. Biographical data is presented in the form of tables in section 4.3 below. During data collection and analysis, three (3) main themes emerged. These included, namely: (1) HEWs compliance with malaria treatment guidelines, (2) antimalarial drugs usage by patients, and (3) factors influencing malaria treatment. The themes and categories are discussed in the light of appropriate literature in section 4.4 below.

4.2 RESEARCHER’S EXPERIENCE OF THE FIELD

The researcher submitted the ethical clearance certificate obtained from UNISA with an application letter to the regional government health bureau of Ethiopia for permission to conduct the study (see annexures 1 and 2). The regional government health bureau issued the supporting letter to the study setting i.e. the Damot Gale District (see annexure 3). Damot Gale district health office wrote a supporting letter to each health post (see annexure 4). Once the approval process was concluded, fieldwork began.

The interviews with HEWs were conducted on regular working days i.e. Monday to Friday. The major problem encountered during in-depth individual interviews was the workload at some of the health posts, due to a seasonal malaria burden. The majority of

the HEWs were busy with malaria treatment, prevention activities, and outreach services to the community. However, all of the HEWs were interested and volunteered to participate in the study after understanding its purpose. During in-depth individual interviews, the frequent patient visits at some of the health posts also presented further problems that diverted the attention of HEWs from the interviews at some moments. Due to the fact that the interviews were conducted during the rainy season, it also made the journey to some of the health posts a bit difficult for the researcher.

The FGDs with treated malaria patients were conducted during both working days and weekends. The problem encountered during FGDs was that most of treated malaria patients are farmers, and the time during which fieldwork was conducted is a busy seasonal farming time where farmers were busy with different agricultural activities. However, after explaining the purpose of the study to community leaders, the community leaders explained such a purpose to community members as well as to those that were interested to participate in the FGD, making the participants aware of the researcher's intentions.

The in-depth individual interviews with HEWs were conducted in both Amharic, the national language of Ethiopia, and Wolaitagna, a local language, whilst the FGD with malaria treated patients were only conducted in Wolaitagna language. The in-depth individual interviews and FGD's were then transcribed verbatim by the researcher and a public health specialist, who spoke both languages fluently. During data transcription, Wolaitagna, the local language, was translated to Amharic, which is a national language, by an expert translator. Then, the Amharic version of the transcripts was translated into English by an English expert translator, and subsequently entered into the computer. The transcribed data was then coded and grouped into themes.

4.3 METHOD OF DATA ANALYSIS

The data analysis process followed Tesch's (1990) steps, as cited in Creswell (2009:184). The steps of data analysis as described by Tesch included reading and understanding the transcripts, writing down the emerging ideas, creating codes, regrouping codes, creating categories, and themes. Therefore, the researcher read and re-read both Amharic and English transcripts and listed the emerging ideas from both. He then created codes, categories and sub-categories from the listed ideas. Themes

were generated from these categories. The transcripts were also given to a public health specialist, who was also an expert in qualitative research methodology to independently create codes and categories, and identify emerging themes. A consensus meeting between the researcher and the public health specialist was held, where the categories and themes identified were compared, revised and then used as research findings for this study.

After data reduction into themes, categories and sub-categories, the discussion of each theme and category was done and supported with appropriate literature. The themes, categories and sub-categories identified from both the interviews and FGD are presented in the table 4.3 below.

4.4 DISCUSSION OF FINDINGS AND LITERATURE CONTROL

Twenty (20) HEWs working in 20 health posts selected from 62 HEWs in Damot Gale District participated in this study. In FGD, 59 treated malaria patients participated. The following section presents the biographic data of research participants.

4.4.1 Biographic data of HEWs

All of the HEWs in the study area as well as in all health posts in the country are females. The average age of HEWs who participated in the study is 24 years, with the ages ranging from 23 to 27. Among the 20 HEWs who participated in the study, 70% (N=14) are in the 23–24 age group. This indicates that majority of the HEWs are young and very active in implementing outreach activities in the community. The majority (75%) of HEWs who participated in the study were unmarried. Another majority (95%) of HEWs are at education level of one year training after completing 10th grade (10+1), while only one (5%) HEW reported an education level of one year training after completing 12th grade (12+1). Half of the HEWs (50%) had served the community for approximately 3–5 years (see table 4.1 below for the distribution of HEWs in the study).

Table 4.1 Biographic data of HEWs

| Age | | Marital status | | | Educational Status | | | Year of experience | | | |
|--------------|----------------------|--------------------|---------------------|----------------------|---------------------|-------------------|----------------------|--------------------|---------------------|--------------------|----------------------|
| Age group | Frequency | Married | Unmarried | Total | 10+1 | 12+1 | Total | <3 years | 3-5 years | 6 years | Total |
| 23-24 | 14 (70%) | 1 (5%) | 13 (65%) | 14 (70%) | 14 (70%) | - | 14 (70%) | 4 (20%) | 10 (50%) | - | 14 (70%) |
| 25-26 | 5 (25%) | 3 (15%) | 2 (10%) | 5 (25%) | 5 (25%) | - | 5 (25%) | - | - | 5 (25%) | 5 (25%) |
| >26 | 1 (5%) | 1 (5%) | 0 | 1 (5%) | | 1 (5%) | 1 (5%) | - | - | 1 (5%) | 1 (5%) |
| Total | 20 (100%) | 5 (25%) | 15 (75%) | 20 (100%) | 19 (95%) | 1 (5%) | 20 (100%) | 4 (20%) | 10 (50%) | 6 (30%) | 20 (100%) |

Frequency in numbers are indicated in the table above the percentage

4.4.2 The biographic data of treated malaria patients

A total of 59 treated malaria patients participated in FGD. Twenty four females participated in three groups, and 35 males participated in four FGD. The average age of the focus group discussants in the study was 39 years with the ranges from eighteen to sixty two. About 31% (n=18) of the FGD participants were in the age group 21 and 30 years. The majority (78%, n=46) of the FGD participants were married. About 46% (27) of focus group participants were not educated (see table 4.2 for the demographic information of research informants who participated in FGD).

Table 4.2 The biographic data of FGD participants

| Age | | Marital status | | Educational Status | | | | |
|--------------|----------------------|---------------------|---------------------|---------------------|---------------------|---------------------|-------------------|-------------------|
| Age group | Frequency | Married | Unmarried | Not educated | 1-4 | 5-8 | 9-10 | above 10 |
| 18-20 | 4 (6.8%) | - | 4 (6.8%) | - | 1 (1.7%) | - | 1 (1.7%) | 2 (3.4%) |
| 21-30 | 18 (31%) | 9 (15%) | 9 (15%) | 4 (6.8%) | 6 (10%) | 4 (6.8%) | 2 (3.4%) | 2 (3.4%) |
| 31-40 | 17 (29%) | 17 (29%) | - | 5 (8.5%) | 4 (6.8%) | 8 (13.6%) | 1 (1.7%) | - |
| 41-50 | 14 (24%) | 14 (24%) | - | 13 (22%) | 1 (1.7%) | - | - | - |
| 50-60 | 4 (6.8%) | 4 (6.8%) | - | 4 (6.8%) | - | - | - | - |
| <60 | 2 (3.4%) | 2 (3.4%) | - | 2 (3.4%) | - | - | - | - |
| Total | 59 (100%) | 46 (78%) | 13 (22%) | 27 (46%) | 12 (20%) | 12 (20%) | 4 (7%) | 4 (7%) |

Frequency in numbers are indicated in the table above the percentage

4.4.3 Themes revealed by the analysis of qualitative data (HEWs and treated malaria patients)

Three themes were identified from in-depth individual interviews with HEWs and FGD with treated malaria patients, namely: (1) HEWs compliance with malaria treatment guidelines; (2) antimalarial drug usage by the patients; and (3) factors influencing malaria treatment. Table 4.3 below forms the basis for the discussion of themes, categories and sub-categories revealed during data analysis in this study.

Table 4.3 Themes, categories and sub-categories

| Theme 1 | Categories | Sub-categories |
|---|--|---|
| HEWs compliance to malaria treatment guidelines | HEWs compliance to malaria diagnosis | <ul style="list-style-type: none"> • A positive approach to patient during their visit to the health post • Malaria diagnosis based on clinical signs and symptoms • Malaria diagnosis using RDT • Patient participation in diagnosis process |
| | HEWs compliance to antimalarial drug prescribing | <ul style="list-style-type: none"> • Prescribing appropriate drug based on malaria types • First dose administration |
| | Patient counselling and communication | <ul style="list-style-type: none"> • Patient education (counselling) • Checking patient understanding of antimalarial drug use |
| Theme 2 | Categories | Sub-categories |
| The use of antimalarial drugs by the patients | Patient adherence status | - |
| | Patient knowledge | <ul style="list-style-type: none"> • Patient knowledge about seriousness of malaria • Patient knowledge about importance of early diagnosis and treatment • Patient knowledge of dose regimen • Patient knowledge of consequences of under dosage |
| | Community support to patients suffering from malaria | - |
| | HEWs follow-up to patients | - |
| Theme 3 | Categories | Sub-categories |
| Factors influencing malaria treatment | Health facility related factors | <ul style="list-style-type: none"> • Availability of diagnostic materials/RDT • Availability of antimalarial drugs • Availability of clean water |
| | Community related factor | <ul style="list-style-type: none"> • Community perception to antimalarial drugs |
| | HEWs related factor | - |
| | Patient related factors | <ul style="list-style-type: none"> • Patient pressure to obtain coartem • Workload of patients • Forgetfulness • Fear of adverse effects of antimalarial drugs • Shortage of adequate food |
| | Disease related factor | - |

4.4.3.1 Theme 1: HEWs compliance to malaria treatment guidelines

This theme dealt with the HEWs performance of diagnoses and the treatment of malaria patients in relation to national malaria treatment guidelines. The malaria diagnosis, antimalarial drug prescribing and patient counselling practice by HEWs was explored by interviewing HEWs and treated malaria patients. The three categories identified in this theme are: (1) compliance to malaria diagnosis; (2) compliance to prescribing antimalarial drugs; and (3) patient counselling during antimalarial drug dispensing (see table 4.3).

Table 4.4 Theme 1: HEWs compliance to malaria treatment guidelines

| Theme 1 | Categories | Sub-categories |
|---|--|--|
| HEWs compliance to malaria treatment guidelines | HEWs compliance to malaria diagnosis | <ul style="list-style-type: none"> • A positive approach to patients during their visit to the health post • Malaria diagnosis based on clinical signs and symptoms • Malaria diagnosis using RDT • Patient participation in diagnosis process |
| | HEWs compliance to antimalarial drug prescribing | <ul style="list-style-type: none"> • Prescribing appropriate drug based on malaria types • First dose administration |
| | Patient counselling and communication | <ul style="list-style-type: none"> • Patient education (counselling) • Checking patient understanding of antimalarial drug use |

These categories are discussed in detail below.

Category 1.1: HEWs compliance to malaria diagnosis

The HEWs use both parasitological confirmation method (RDT) and clinical signs and symptoms-based diagnosis in order to identify malaria in patients. During the in-depth individual interviews with HEWs and the FGD with the treated malaria patients, four sub-categories emerged, namely: (1) a positive approach to patients during their visit to the health post; (2) diagnosis based on clinical sign and symptoms; (3) diagnosis based on parasitological confirmation (RDT); and (4) patient participation in diagnosis. These sub-categories are discussed in sub-headings below.

Sub-category 1.1.1: A positive approach to patients during their visit to the health post

Almost all of HEWs reported that they approach their patients in a friendly manner. The HEWs believe that a friendly approach to patients is useful in convincing them to accept treatment following results of the diagnosis. Some of the HEWs also believe that a friendly approach is one of those treatment strategies used to relieve tension that are experiencing before they come to visit the health post. All of the HEWs indicated that they normally greet patients before they start the diagnosis process. The following statements are verbatim quotes mentioned by majority of HEWs who participated in the in-depth individual interviews:

“When one patient comes to me I welcome him with warm greetings. After that I give him a seat and ask him about his health problem.”

“We start the diagnosis with greetings because the community is living with us and we are from them. So that we first welcome them and ask them the health problem that brought them to the health post.”

“Greeting helps us to communicate with the patients easily and if we communicate smoothly that helps us to make the patient accept and implement the treatment.”

The majority of treated malaria patients indicated that they prefer HEWs to other health workers due to better communication and a friendly approach towards them. The following statement is made by most treated malaria patients:

“HEWs treat us smoothly and communicate with us clearly; therefore we prefer to be treated in [the] health post.”

A clear verbal communication between patients and health workers is important to increasing the patient adherence to antimalarial drugs (Conteh, Stevens & Wiseman 2007:388).

Subcategory 1.1.2: Malaria diagnosis based on clinical signs and symptoms

The WHO malaria treatment guideline, along with the national malaria diagnosis and treatment guideline indicate that in areas where parasitological confirmation is not available, accessible signs and symptoms are an alternative method of malaria diagnosis (EFMOH, 2004:8). But for appropriate treatment, adequately assessing and understanding signs and symptoms of malaria is crucial for diagnosing malaria. Eriksen et al (2007:53) have indicated that inadequate clinical assessment could cause incorrect diagnosis and inappropriate treatment of malaria.

The HEWs ability to take history from the patient and knowledge about malaria signs and symptoms are adequate to diagnosing malaria. A majority of HEWs understand and adequately diagnose malaria using signs and symptoms indicated in malaria treatment guidelines. All the HEWs use fever as major indication of malaria. The following are statements of some of the HEWs:

“When the patient comes to our health post I ask him his health problem in detail. Then the patient tells me his feelings. For example, fever, shivering, loss of appetite. Then I ask him when this symptom started. When the patient tells me he/she has fever for more than two days, then I check the fever using [a] thermometer. Then I give him/her coartem if the fever is more than 37 degree centigrade” (HEW at health post 4).

“Fever is a major symptom which I use to confirm the presence of malaria when I don’t have RDT. But I also check for joint pain, bitter taste in mouth, nausea or vomiting, shivering, stomach problem/pain and diarrhoea before I give the antimalarial drugs to the patient” (HEW at health post 6).

According to the national malaria treatment guideline, the signs and symptoms which indicate malaria are: nausea, vomiting, abdominal pain, diarrhoea, thirst and poor appetite (EFMOH 2004:8). Most of HEWs indicated that they check for these signs and symptoms adequately before prescribing antimalarial drugs to the patient.

Sub-category 1.1.3: Malaria diagnosis using RDT

According to the WHO (2010a: vi), RDT is defined as “an antigen-based stick, cassette or card test for malaria in which a coloured line indicates plasmodial antigens that have been detected”. The RDTs are easy to use and are the best method of malaria diagnosis at health facilities where there is no high quality microscopy. Even though, the shortage of RDT is a challenge in some health posts, RDTs are currently widely used in health posts in Ethiopia (ACIPH 2009:10).

All the HEWs indicated that they prefer using RDT to detect signs and symptoms when diagnosing malaria. The majority of HEWs mentioned the fact that they use RDT for diagnosing malaria without any problem and RDT helps them to identify all types of malaria e.g. *Plasmodium falciparum*, *Plasmodium vivax*, and mixed type of malaria with clarity. However, some HEWs indicated problems with using RDT. The two problems indicated by HEWs regarding RDT are (1) sometimes the result takes a longer time than expected and (2) sometimes the sample bloods do not pass through the test area. The HEWs explained the diagnosis procedures as follows:

“We take blood samples from the patients’ finger and put it to RDT. The RDT identifies all types of malaria so that we don’t have any problem to diagnose malaria when we have RDT.”

“Sometimes the duration of the result is more than 20mts but the guideline indicates that the RDT identifies malaria parasite in 15-20 mts. Sometimes it takes 30mts. Sometimes after we send patients telling him/her that he/she doesn’t have malaria the result becomes positive. The reason is not clear for me.”

“Diagnosis using RDT is the best method for us to convince the patient about the diagnosis result and to be sure of the type of malaria.”

The WHO malaria treatment guideline indicates that using parasitological confirmation is the most preferred method of malaria diagnosis (WHO 2010a:xi). The WHO (2006a:9) also indicated that using RDT is useful to minimise the amount of unnecessary prescribed antimalarial drugs and the cost of treatment of malaria. The EFMOH (2010:8) indicated that improved accessibility to RDTs increased the accuracy of

malaria treatment. The study conducted in Tigray (Ethiopia) found that using RDT in malaria diagnosis minimises the treatment cost (Lemma et al 2010:248).

Sub-category 1.1.4: Patient participation in diagnosis process

Apart from the type of malaria diagnosed, the majority of HEWs reported that they fully involve patients during malaria diagnosis. The HEWs also mentioned that they educate patients on signs and symptoms of malaria to increase patient awareness to signs and symptoms of the condition. The HEWs indicated that one of the big problems during malaria diagnosis is convincing the malaria-negative patient after diagnosis about their negative result. Therefore, to solve this problem, they started involving patients in the diagnosis process and in reading and understanding the result. The following are direct verbatim statements of HEWs:

“Patients do not want to hear about negative results. They want positive results because they always want to take antimalarial drugs (Coartem)” (HEW at health post 8).

“We explain to them (patients) that the malaria parasite can be checked by RDT and the result will indicate to us whether he/she (patient) has malaria or not” (HEW at health post 6).

“I first explain to them the types of malaria and how it will be checked by using the RDT. Then I take blood from the patients’ finger and I put in to the RDT in front of patient” (HEW at health post 11).

‘After checking the signs and symptoms we use RDT to test malaria. We always use RDT in front of the patient. After we add the blood to RDT we record the time, and we explain to the patients the types of malaria, which can be identified by the RDT and how the results are displayed in RDT. Then after 15-20 minutes we read the result together with the patients and the patients become convinced” (HEW at health post 13).

Patient-centred communication helps to make patients understand the disease and the treatment. Street and Epstein (2008:244) found that patient participation in consultation including decision-making is a predisposing factor for motivation and an enabling factor

for knowledge of treatment. These authors also emphasised the importance of patient-health worker (physician) communication and patient participation as the following:

Patient participation in consultations could help the physician to understand the patient's values and preferences and discover possible misperceptions the patient might have about treatment effects. The doctor can then communicate clinical information in a way the patient understands (a proximal outcome) and, together with the patient, arrive at a higher-quality decision that best matches the patient's circumstances (intermediate outcome) and leads to improved health (Street & Epstein 2008:241).

Category 1.2: HEWs compliance to antimalarial drug prescribing

Immediately after malaria diagnosis, HEWs prescribe antimalarial drugs to their patients. All HEWs interviewed indicated that they use age group for prescribing antimalarial drugs. They also prescribe the appropriate dose according to age and type of malaria suffered by the patient. In all of the health posts, malaria treatment guidelines are available to the HEWs. The guidelines are either posted on the wall or placed in front of HEWs on a table, and these guidelines indicate the dose in terms of age category. All of the HEWs reported that the guidelines are very clear and there are no problems of understanding them. The HEWs also indicated that they usually check the guidelines when they prescribe antimalarial drugs. In this category, two sub-categories were identified namely: (1) prescribing the appropriate drug based on malaria types; and (2) administering the first dose to the patient in the health post. These sub-categories are discussed in detail below.

Sub-category 1.2.1: Prescribing appropriate drug based on malaria types

All HEWs interviewed indicated that they prescribe antimalarial drugs based on the type of malaria treatment guideline and that such guidelines are clear to them. This is what they had to say about this sub-category:

“After confirming the presence of [the] malaria parasite in patients’ blood we give antimalarial drugs based on their age group. We have malaria treatment guideline and it is clear to us and we refer to it before we dispense antimalarial drugs.”

All the HEWs included in the study knew very well about the frequency of the drug per day and the duration of treatment. But some of the HEWs could not mention the appropriate dose based on the age group indicated in the national malaria treatment guideline.

“We prescribe coartem to take in the morning and in the night two times a day for three days and chloroquine once a day for three days.”

Some of HEWs reported that during the patient load or during epidemics, they prescribe antimalarial drugs only by using signs and symptoms. The following is the opinion of some of HEWs:

“We prescribe antimalarial drugs with only confirmation by RDT but during epidemics due to patient load and shortage of RDT we prescribe antimalarial drugs by checking for fever and the other symptoms.”

The majority of the HEWs reported that they prescribe antimalarial drugs to malaria patients in the following three ways, namely: (1) for those patients who are *plasmodium falciparum* positive they prescribed Coartem; (2) when there is no RDT for the patients with high fever or temperature measured with thermometer greater than 37 degree centigrade and vomiting they give coartem; and (3) for patients positive for *Plasmodium vivax* they prescribe chloroquine.

A majority of HEWs mentioned that they refer patients with high fever with a negative RDT to a health centre for further investigations. The HEWs also reported that they refer *Plasmodium vivax* positive patients to a health centre when they don't have chloroquine. But the HEWs mentioned that most patients do not want to go to the health centre for treatment. The following problems were mentioned by for patient's reluctant to go to health centers.

Communication problem

Most of the patients perceive that health centre professionals do not treat them appropriately. Patients have a negative attitude towards the health centre professionals.

When we refer them to the health centre they say, “Please give whatever you have here. Don’t send me to health centre”. One of HEWs mentioned the following:

“People in this community do not like to go to the health centre for any illness even though the health centre is near to them. They don’t seem to like the communication approach of health workers in the health centre. I think our approach to patients is better than those of the health centre professionals.”

The distance problem

Apart from poor communication, the distance to the health centre was yet another problem that made communities resist referral to a health centre. The HEWs reported that the distance from the village to the health centre also affects the referral to health centre. The following statement was made by most of HEWs:

“Some of health centres are far from the village and patients do not want to go far from their villages.”

Services are not free

Though distance is a problem, it is ultimately the payment that communities have to make when they reach the health centre that prohibits them from utilising the service. Such community members would rather use the health post due to free health services provided there. The following statement is given by the HEWs:

“Here in the health post treatment is free, but in the health centre including patient card most of health services are not free.”

In addition to what was stated by HEWs, patients also concurred with the HEWs during FGD. Patients mentioned that they prefer health posts (HEWs) to other health facilities (professionals). The following statements were mentioned by participants during FGD:

“... HEWs give us clear advices and they also visit our homes. They provide us with all the information regarding malaria prevention methods, treatment and clearly tell us how to use antimalarial drugs in detail. ... The antimalarial drugs

and diagnosis are free in health post. ... The health post is best for us because it is near to us”

This finding is supported by the study conducted in Nigeria. The study states that “the community health workers strategy could be used to improve and ensure near, timely and appropriate treatment of malaria” (Onwujekwe et al 2006).

Patient record data from patient registration books also indicates that about 92% (368) of patients received appropriate drugs in appropriate dose and duration. But some patients (8%; 32) were prescribed with drugs not in line with the guideline regarding dosage, based on the age of the patient and the types of malaria. The patient record data also indicate that of the incorrect dose is for those patients under 12 years old. The two main reasons indicated by HEWs for inappropriate prescription are: (1) the shortage of chloroquine, and (2) patient pressure to take coartem.

However, this is the best result compared to the study done in Uganda in two government health facilities and two drug shops, which reported that only 34% of the prescribed dose followed the malaria treatment guideline (Nshakira, Kristensen, Ssali & Whyte 2002:312). A study conducted in Tanzania also found that about 80.7% of adults were treated with appropriate dose of antimalarial drugs (Heztle et al 2008). Igboeli et al (2010:245) found that the compliance of health workers at tertiary and secondary hospitals is about 38.5% and 66.7%, respectively. Pfeiffer et al (2008:23) reported that only 34% of malaria diagnosed patients prescribed with appropriate dose and duration of chloroquine. The study done in five hospitals of Southern Ethiopia region also indicated that only 60% of antibiotics prescriptions were in line with the national standard treatment guideline (Gidebo 2009:35).

Sub-category 1.2.2: First dose administration

After deciding the dose and prescribing based on the patient’s age most of HEWs administer the first dose of antimalarial drugs at the health post. Administration of the first dose of antimalarial drugs under the supervision of health workers is strongly recommended in the malaria treatment guidelines (EFMOH 2004:10). However, some of the HEWs do not administer the first dose, due to a shortage of clean water. The following are statements of some of HEWs:

“We know the importance of first dose administration to treat malaria as soon as possible and also we are informed that all patients should be administered the first dose in the health post but sometimes we don’t have clean water.”

“We give the first dose in health post when we have water. We have ORT corner so that we have water most of times.”

“We always give the first dose of antimalarial drugs in the health post because we have clean spring water near to our health post.”

The patients also agreed that HEWs administer first dose. The following statements mentioned treated malaria patients during FGD:

“The HEW gave me 4 tablets of Coartem with glass of water and I swallowed 4 tablets at health post in front of HEW” (the male focus group discussant at FGD 4).

All of the HEWs clearly understand the importance of the first dose administration.

“The main reasons we give the first dose are: (1) to reduce the malaria parasite load in the blood of the patient (2) to show the patient how to take the next doses.”

The HEWs pay special attention to adults and children in the administration of the first dose. One HEW explained that:

“I usually administer first dose of antimalarial drugs here for those people who are old and cannot understand the dose regimen. For such people I administer the first dose and I explain to a younger family member how to give the remaining doses at each time.”

Another HEW explained that:

“We give the first dose for those relatively sick and who cannot easily understand the dose. The first dose also can be served as an example and demonstration for the remaining doses.”

Another HEW also indicated that:

“We don’t have clean water here to give the first dose. But I bring with me some water from my home to give the first dose of antimalarial drug to children and very old people ... after giving the first dose I usually advise family members to follow what I did in the first dose and I also follow the patients every day until they complete the dose and become fully recovered.”

Both the national malaria treatment guidelines and the malaria prevention and control health extension package strongly indicate that the first dose administration is very important for reducing the malaria parasite load and for improving the patient drug use/adherence (EFMOH 2003:28; EFMOH 2004:11). The study done in Tanzania reported that 98.9% of patients received the first dose under supervision of health workers in the health facility, which is a better performance when compared with the results of this study (Kachur et al 2004:715-722).

Category 1.3: Patient counselling and communication

After prescribing antimalarial drugs, the patients should be adequately advised and educated on how to use antimalarial drugs in order to increase patient adherence (EFMOH, 2004:9). In this regard, all of the HEWs reported that they educate and counsel their patients about the drug regimen and how to take drugs. The HEWs also check the patient understanding of antimalarial drug use after counselling. The two sub-categories found in this category are: (1) patient counselling; and (2) checking of patient understanding after patient counselling.

Sub-category 1.3.1: Patient education (counselling)

All of the HEWs mentioned that they advise patients how to use antimalarial drugs. The following are statements of most HEWs:

“We tell the patients clearly how to take antimalarial drugs. We explain the dose, the frequency and how to keep the drugs at home. We also strongly advise the patients to complete the prescribed doses because the main problem of inappropriate use here is not completing the dose after relief of sign and symptoms of malaria.”

The HEWs advise the patients to take the full dose of antimalarial drugs:

“Drug sharing with other person is one of the problems of inappropriate use of antimalarial drugs observed in the community. Therefore, I advise the patients [of] the effects of not taking the full dose and not to share the drugs with family members and others. I also tell them the consequences of under dose.”

“Taking an under dose causes two problems. The drug will not give any effect and the patient will not be cured. The second problem is that under dose exposes malaria parasites to inadequate dose which causes drug resistance. This also affects the whole community. Therefore, we strongly advise the patients to complete the dose.”

According to the WHO (2010a:24), adequate counselling of patient has two benefits. These are: (1) it creates adequate knowledge in the patients that helps the patient to use drugs appropriately as to be cured from the health problem; (2) it helps to minimise or to prevent resistance to the drugs.

Sub-category 1.3.2: Checking patient understanding of antimalarial drug use

After explaining the drug use to the patients, the HEWs check a patient understands of the dose regimen, by asking the patient to repeat what they (HEWs) explained to them. One of the HEWs in the district explained:

“The philosophy of health extension program is educating the community and capacitating them to create healthy environment and making themselves to be aware of disease prevention and treatment methods. Therefore we always educate patients to make them understand the treatment and prevention methods of malaria. Our communication is [in] both directions and the patient’s also ask us anything which is not clear and we check the patient understanding by asking to repeat what we explained to them.”

Another HEW also explained:

“To check the understanding of patients about the treatment we ask the patients to tell us back all information that we told them before they leave the health post. If the patients don’t tell exactly what we told them we explain again to make them understand exactly how to take the dispensed drugs. Most times very old people and children less than 10 years old do not give us adequate feedback. In this case we dispense antimalarial drugs for family members who can understand and administer appropriately.”

The information provided by the HEWs was supported by the majority of patients. The treated malaria patients indicated that HEWs adequately counsel them on how to take antimalarial drugs and that HEWs are better than other health workers in malaria treatment and counselling. The following captures the feeling of most of malaria treated patients who participated in FGD:

“They (HEWs) tell us everything about antimalarial drugs. But those health workers at other health facilities simply give us drugs without explaining what to do. No one in other health facilities ask us to repeat what they explained about the drugs.”

Patient understanding of the drugs prescribed is very important to make the treatment effective and to increase the treatment adherence (WHO, 2010a:24). Ley and Liewelyn (1995), as cited in Soares et al (2009) found that patient understanding of the drug regimen is very important for completing the prescribed drug regimen. The most important method of ensuring patient understanding of the treatment regimen is asking the patient to repeat what was explained to them by the health workers (DACA 2007:21).

4.4.3.2 Theme 2: The use of antimalarial drugs by the patients

In addition to HEWs practice of malaria treatment, the researcher also identified patient antimalarial drug use through in-depth individual interviews and FGDs. The in-depth individual interviews with HEWs revealed that the patient antimalarial use is generally good and patient knowledge about malaria and antimalarial drug use is adequate. Treated malaria patients also indicated that HEWs adequately educated them about the

prevention methods and treatment of malaria, and provided close follow-up during treatment. But HEWs and treated malaria patients also mentioned that not completing the dose and sharing the antimalarial drugs with neighbours or family members are inappropriate use of drugs seen in some patients.

In this theme four categories were identified. These are, namely: (1) the adherence status of patients, (2) patients' knowledge of malaria, drugs and non-adherence, (3) community support to patients, and (4) HEWs follow up visits to patients treated for malaria (see table 4.4).

Table 4.5 Theme 2: The use of antimalarial drugs by the patients

| Theme 2 | Categories | Sub-categories |
|---|--|---|
| The use of antimalarial drugs by the patients | Patient adherence status | - |
| | Patient knowledge | <ul style="list-style-type: none"> • Patient knowledge about seriousness of malaria • Patient knowledge about importance of early diagnosis and treatment • Patient knowledge of dose regimen • Patient knowledge of consequences of under dosage |
| | Community support to patients suffering from malaria | - |
| | HEWs follow-up to patients | - |

These categories are discussed below:

Category 2.1: Patient adherence status

All the HEWs stated that most patients take antimalarial drugs according to the advice given to them. However, some patients do not complete the required dose. Missing the 5th and 6th doses is a problem encountered by some patients who fail to use the drugs as indicated by HEWs. The main reason mentioned by the HEWs and patients for missing 5th and 6th doses was the relief of symptoms of malaria after three or four doses of Coartem. The HEWs also indicated that follow-up of patients after 4th doses increased the adherence and helped the patients to complete the drugs. Most of the HEWs stated the following:

“Some of patients do not continue taking drugs after the relief of symptoms.”

“Most of the patients complete the dose. But some share drugs with other persons in the family or neighbourhood after relief of malaria symptoms”.

The participants of FGD (treated malaria patients) also indicated that not completing the dose was a common problem among them. One of the FGD participants said the following:

“After taking 8-12 tablets, malaria signs and symptoms disappear. Therefore, some patients stop taking drugs and give [them] to other patients. But they (HEWs) clearly told us to complete the dose even though there is no sign and symptoms” (Male participant at FGD site 7).

The HEWs indicated that after recognising that the malaria patients have stopped taking drugs after three to four doses (second day), they (HEWs) closely follow patients on the third day because this improves the adherence of patients to the drugs.

“... besides patient counselling during malaria treatment at the health post we follow patients after treatment and we teach the community during the weekly meeting to increase patient adherence” (HEW at health post 2).

“We visit the patients at the 3rd day. But previously some of patients miss the third day doses” (HEW at health post 3).

“The most common drug use problem is stopping drug taking after 4th dose because of relief of sign and symptoms...” (HEW at health post 7).

“We usually go to them at 3rd and 4th day to ask how they used drugs and we also check the package. Now almost all patients complete the dose due to continuous follow up and community education” (HEW at health post 6).

The treated malaria patients also mentioned that due to continuous follow up and education by HEWs that the current adherence to antimalarial drugs improved in the community.

“I completed all doses of antimalarial drugs because they (HEWs) told me that not completing antimalarial drugs causes malaria to come back again” (Female discussant at FGD 2).

“I become well after 4 doses but I continued taking the other doses because I know that malaria would come back again if I don’t complete the dose” (Male discussant FGD 4).

Souares et al (2009) also found that not continuing antimalarial drug administration after relief of symptoms was one of the factors associated with non-adherence.

Category 2.2: Patient knowledge

Patient knowledge about malaria, antimalarial drugs and the consequences of non-adherence is very important for adherence to antimalarial drugs (Kachure et al 2004:718). Therefore, the HEWs continuously counsel patients and educate the community to increase their awareness. The HEWs, as well as treated malaria patients mentioned that the patient awareness about malaria and antimalarial drugs improved due to counselling and continuous community education and discussion. The subcategories that emerged in this category are: (1) patient awareness of the seriousness of malaria; (2) patient awareness of the importance of early treatment; (3) patient awareness of the dose regimen; and (4) patient awareness of the consequences of under dosage. These subcategories are discussed below.

Sub-category 2.2.1: Patient knowledge about seriousness of malaria

Knowledge about the seriousness of the disease determines the adherence of patients to antimalarial drugs ((Kachure et al 2004:718). During in-depth individual interviews, the HEWs and treated malaria patients in FGD revealed that almost all of the patients know about the seriousness of malaria and are actively involved in malaria prevention activities. The majority of patients also correctly mentioned the sign and symptoms of malaria, the causes of malaria, and the prevention methods. Yewhalaw, Kassahun, Woldemichael, Tushune, Sudaker, Kaba, Duchateau, Bortel and Speybroeck (2010) indicated that caregivers (parents of children) have adequate knowledge about the signs and symptoms of malaria.

“They (the community) know that malaria is a very serious disease. They even know more than us because they lived with malaria for many years. They know malaria is a killing disease. They also understand [that] the only solution for malaria is immediate treatment and the appropriate use of antimalarial drugs” (HEW at Health post 5).

This finding is supported by a study undertaken by Legesse and Deressa (2009:45). These authors did their research in the highlands of central Ethiopia and found that all participants knew about the seriousness of malaria.

Sub-category 2.2.2: Patient knowledge about importance of early diagnosis and treatment

Early diagnosis and prompt treatment is the most important part of the malaria prevention and control strategy (EFMOH 2004a:5). Therefore, awareness of the community or patients of early treatment of malaria is a crucial issue for the prevention of death. The HEWs indicated that people in the village are highly aware of the benefit of early diagnosis and treatment. The followings are statements of HEWs:

“... They immediately come to us when they observe some signs and symptoms of malaria such as fever ...”

“...everybody in the community is aware of benefit of immediate treatment of malaria...”

“... The education given to the community during regular village meeting created very good awareness to the community for early diagnosis and treatment...”

“... Most of the people come to health post immediately when they observe fever...”

Sub-category 2.2.3: Patient knowledge of dose regimen

Almost all patients who participated in the FGD correctly mentioned the dose of Coartem and chloroquine. Therefore, the patients' knowledge about their drug regimen is determined to be adequate. The HEWs also indicated that the patients have adequate knowledge about antimalarial drug use. One of the HEWs indicated the following:

“They know everything about how to take antimalarial drugs. I don't say that the lack of knowledge that causes non-adherence in some patients. But it is negligence that causes non-adherence to antimalarial drug use” (HEW at health post 17).

All female discussants correctly explained the dose of Coartem and chloroquine prescribed to them and their children. This is better performance compared with the study done in Tanzania, that reported the mother knowledge and reporting of the dosage schedule was not consistent with recommended doses (Kamat & Nyato 2010).

Sub-category 2.2.4: Patient knowledge of consequences of under dosage

The main reason mentioned by HEWs with regards to not completing antimalarial drug for some patients is a lack of awareness about the consequences of not taking a complete dose of antimalarial drugs. Most HEWs indicated that previously patients used to stop taking prescribed antimalarial drugs after there was a relief of signs and symptoms. However, now there is improvement after continuous communication and education. The HEWs also reported that almost all patients treated for malaria previously complete their drug doses. Some HEWs said the following:

“The big reason for not completing the dose is relief of symptoms and sharing drugs with another person. They assume symptom relieve as complete cure so that they stop drug taking after 4th dose. Now they take complete doses” (HEW at health post 3).

“Those patients previously treated for malaria complete antimalarial drugs without any problem” (HEW at health post 8).

This finding is supported by Souares et al (2009) who found that previous consultation increased patient adherence.

Category 2.3: HEWs follow-up of patients

The HEWs mentioned that they follow the treated malaria patients daily in order to assess how they take drugs. Table 4.4 shows that most of HEWs follow malaria patients daily. The treated malaria patients also mentioned that their close contact with HEWs increased their awareness of malaria and antimalarial drug use, and decreased the advent of malaria deaths. The following is the statement of treated malaria patients:

“They are better performing than other health professionals and health facilities. They come daily to us and ask the disease condition and how we are taking the drugs. They also better counsel us compared to other health professionals.”

“... due to close follow up, now the death due to malaria is minimised very much. There is no death this year” (The female FGD discussant at site 2).

The researcher observed the HEWs follow-up schedule posted in health posts. Table 4.6 indicates the weekly program of HEWs. According to table 4.3, the HEWs spent about 5 hours a day visiting community, conducting prevention activities and following malaria-treated patients.

Table 4.6 HEWs daily schedule for outreach activities posted at each health post

| Time | Activity |
|---------------|------------------------|
| 2:30 to 4:00 | Health post activities |
| 4:00 to 6: 30 | Outreach activity |
| 7:30 to 9:00 | Health post activities |
| 9:00 to 11:30 | Outreach activity |

Bekele, Kefale and Tadesse (2008:303) also indicated that the HEWs spent most of their time visiting the community at their residence. Follow-up and close communication between health workers and the community can increase malaria treatment seeking practice of community and patients (Cropley 2004:9). Barnabas (2009:3-11) found that involvement of community health workers increased their access to antimalarial drugs

and decreased malaria mortality by 40%. Lehmann and Sanders (2007:13) also reported that community health workers improved malaria treatment accessibility to the community and helped to minimise morbidity due to malaria.

Category 2.4: Community support to patients suffering from malaria

This study revealed that there is community interconnection in the village and good support to malaria patients to adhere to treatment. The HEWs and treated malaria patients mentioned that the community support is implemented through two teams and regular community meetings. These are: (1) village team; (2) development team; and (3) regular community team meetings. The teams have leaders elected from each team. All of the team leaders are trained by HEWs about malaria prevention and treatment. The team leaders regularly report to HEWs regarding implementation of health extension packages, including malaria prevention and treatment in the villages. The following sections discuss how the teams are involved in supporting malaria patients.

- ***Village team approach (one to five connection- ande le amist tesisir)***

In every kebele there is a village team, which includes 5 households. These households are very close to each other and perform different activities together. They are very close neighbours and most of the times they farm together, eat together, and they hold coffee ceremony together. One of the people (male or female) in this team is selected as a team leader. The team leader is selected based on the performance on 16 health extension packages, including malaria prevention and control health extension package. The main aims of this team are participating in the development activities together, implementing health extension service packages such as sanitation, disease prevention and control (HIV, TB and malaria). Everybody in the kebele is a member of the village team (RHB 2011: 45).

The HEWs also mentioned that the village team is a team that includes five (5) households which are very near to each other. The HEWs mentioned the following statements:

The village team, led by the team leader, daily follows every house-hold about malaria prevention activities and sends anybody that has malaria signs and symptoms to health post to be checked for malaria.

Most of the HEWs mentioned that they trained the village team leaders about malaria prevention and treatment and the team leaders help them. The following statements were mentioned by the HEWs:

“... We trained the village team leaders about malaria prevention and control. The team leaders follow the malaria situation in the team. They send any body that is sick to health post and we check the presence of malaria by using RDT...”.

“... In our Kebele we have 125 team leaders trained on malaria prevention and treatment. These team leaders support malaria treated patients to complete the treatment ...”.

The participants of this study indicated that the awareness of the community about malaria and appropriate use of antimalarial drugs highly improved after implementing the village team connection or village team follow up. Certain HEWs said the following:

“Previously, voluntary malaria workers (VMWs) supported [the] village community with us. But now village team leaders perform better than voluntary malaria workers (VMWs). Because community accepts and respects village team leader more than voluntary malaria worker”.

- **Development team leaders (Yelemat Budin)**

The next structure after village team is the development team or *Yelemat Budin*. The *yelemat budin* (development team) consists of 8 villagers (*ande le amist tisir*) or 40 households. The HEWs indicated the following about *yelemat budin*:

“The team leader for development team elected from the 8 village team leaders and coordinates all of [the] village team leaders. The team leader leads the development issues and follows the implementation of health service extension packages in the team. The team leader is trained by HEWs on the 16 health

extension packages including malaria treatment and control package. This team also follows the malaria situation in the villages and supports patients who are treated for malaria to complete and use appropriately the antimalarial drugs”.

- **Community meeting**

The HEWs indicated that the community meeting is the best way to transfer important health information to the community easily. According to the HEWs, there are regular community meetings at the village team and the development team level. The village team discusses the whole issue about disease prevention and control weekly and the development team discusses the performance every two weeks. Most of the HEWs explained the following:

“... We always participate in the team discussion...”

“... during the team discussion the report presented by each team leader and the experience of each of the members is presented. This helps to increase the knowledge of the community on malaria and antimalarial drugs ...”

All the HEWs believe that the communication in these meetings improved the patients' knowledge and adherence to malaria treatment. The following are statements of HEWs:

“... this is good media for communication and education ...”

“... malaria issues and antimalarial drug use status is discussed in this meeting. The discussion in this meeting created very good awareness of the community about malaria treatment and improved the patient adherence ...”

“... The patient awareness and antimalarial drug use behaviour improved since the start of regular team meetings (discussion) ...”

“... people in this village accept and implement the idea of their village members discussed in meeting than face to face individual discussion. Therefore, the discussion in the meeting is even more powerful to convince the community than our education in the health post ...”

Kokwaro et al (2007:81) found that the support to patients from family, neighbourhood or community is important to increasing the adherence of patients to prescribed drugs. These authors also indicated that the community involvement in patient treatment is one of the mechanisms for improving the patient drug use. Nigatu, Berhane, Hailu and Seyum (2009) indicate that the involvement of community leaders in malaria treatment increases the community acceptance to treatment.

4.4.3.3 Theme 3: Factors influencing malaria treatment

This study revealed that most HEWs adequately diagnose malaria, prescribe and dispense antimalarial drugs and adequately counsel/educate the patients on how to use antimalarial drugs. This study also revealed that the HEWs counselling (education) and follow-up to malaria patients increased patient knowledge and adherence to antimalarial drug use.

But there are some factors influencing the malaria treatment practice of HEWs and patient antimalarial drug use. The in-depth individual interviews with HEWs and the FGD with patients revealed that the following factors affect the HEWs malaria treatment practice and patient adherence to antimalarial drugs:

- (1) health facility related factors
- (2) community related factors
- (3) HEWs related factor
- (2) patient related factors
- (5) disease related factor (see table 4.7).

Table 4.7 Theme 3: Factors influencing malaria treatment

| Theme 3 | Categories | Sub-categories |
|---------------------------------------|---------------------------------|---|
| Factors influencing malaria treatment | Health facility related factors | <ul style="list-style-type: none"> • Availability of diagnostic materials/RDT • Availability of antimalarial drugs • Availability of clean water |
| | Community related factor | <ul style="list-style-type: none"> • Community perception of antimalarial drugs |
| | HEWs related factor | - |
| | Patient related factors | <ul style="list-style-type: none"> • Patient pressure to obtain coartem • Workload of patients • Forgetfulness • Fear of adverse effects of antimalarial drugs • Shortage of adequate food |
| | Disease related factor | - |

These are discussed below.

Category 3.1: Health facility related factors

The health facility related factors that influence the malaria treatment practice of the HEWs mentioned by the study participants are: shortage of RDT, shortage of antimalarial drugs, and shortage of clean water.

Sub-category 3.1.1: Availability of diagnostic materials/RDT

Some of the HEWs stated that there is a shortage of RDT and this influences the quality of malaria diagnosis in the health posts. This is what HEWs had to say about this issue:

“... Sometimes there is a shortage of RDT. As a result of this, we diagnose the patient using signs and symptoms only. We cannot be accurate in treating a patient only using sign and symptoms ...”

Most of the HEWs indicated that free malaria diagnosis and a high number of negative results caused a shortage of RDT.

“The big problem in malaria treatment here in health posts is a shortage of RDT. Due to the fact that diagnosis of malaria in health posts is free to all, most people come to health posts when they experience fever. We test many people using RDT and most of them become negative. That causes the shortage of RDT ...”

“... Most of times shortage of stock of RDT occurs before that of antimalarial drugs ...”

“... the presence of coartem without RDT pressurises HEWs to dispense antimalarial drugs without parasitological confirmation which leads to over prescribing of antimalarial drugs ...”

“... malaria testing is free in health posts. So that, many people get tested every time when they have some indication of fever. But most of tested patients become negative. That causes the shortage of RDT while the antimalarial drugs available ...”

“They (the district health department) give us two doses of RDT with one dose of Coartem. But negative cases are more than two times of antimalarial drugs dose. That causes the shortage of RDT before the Coartem”

The HEWs indicated that atleast three doses of RDT required for one dose of coartem.

Sub-category 3.1.2: Availability of antimalarial drugs

Some of the HEWs reported that there is shortage of one of the antimalarial drugs (coartem or chloroquine) at least once a month. They (HEWs) indicated that chloroquine shortages occur more frequently than coartem, and this pushes them to use coartem for treatment of *Plasmodium vivax* malaria positive patients. This is what they had to say about the shortage of drugs:

“... we don't have a problem of coartem but there is shortage of chloroquine ...”

“... we treat Plasmodium vivax positive patients with coartem due to the shortage of chloroquine. But it is clearly indicated in the guideline that plasmodium vivax should be treated only using chloroquine ...”

Most of the treated malaria patients during FGD indicated that the shortage of drugs in health post is a main problem on malaria control. This is what one of the participants said:

“... now the health post is near to us, malaria treatment is accessible to us and HEWs also visit us frequently but a big problem is a shortage of drugs in the health post ...”

Some of the HEWs reported that the inadequate request by the HEWs and a lack of knowledge to forecast future quantity caused the shortage. The distance from the district health office is also one of the reported problems for a shortage of drugs in some health posts. Some of the health posts also indicated that the slow response or feedback from the district health office to their drug request is one of the contributing factors for the drug shortage in the health post. Those health posts far from the district reported the shortage of antimalarial drugs more frequently than those closer to the district head office.

A shortage of antimalarial drugs caused the non-adherence of health workers to antimalarial drugs prescription (Wasunna et al 2008). Rowe et al (2005:1027) indicated that availability of resources such as drugs is one of those factors that influence the performance of health workers.

The HEWs also mentioned that the shortage of antimalarial drugs affected patient adherence. Some HEWs indicated that:

“... patients do not complete antimalarial drugs during the shortage of drugs in the health post ...”

“... After taking 2 or 3 doses they keep the remaining drugs for future use ...”

“... When there is shortage of drugs in the health post they use one patient’s dose for more than two persons. When we prescribe drugs so that they collect them from the health centre or buy from other health facilities they don’t go to the health centre or other health facilities but they go back home and borrow antimalarial drug from neighbours and use less than required ...”

“The adult patients usually share their drugs with their children when there is shortage of drugs in [the] health post, both the adults and children would take fewer doses than required” (HEW at Health post 10).

The treated malaria patients during FGD also explained that a shortage of antimalarial drugs in the health post is the main factor influencing their adherence to antimalarial drugs use. The following statement was mentioned by one of the participants:

“The HEWs diagnosed malaria and gave me 24 tablets of Coartem. After I started using the drugs, my children also got malaria, but there was no coartem at the health post. I shared with two of my children the antimalarial drugs given to me. The HEWs told me not to share drugs with another person but I could not leave my children with malaria. I know that malaria is a killing disease” (The female discussant at FGD site 1).

In a study conducted by Addis Continental Institute of Public Health (ACIPH) (2009:51), findings also indicated a shortage of antimalarial drugs reported by both health workers and community. Kokwaro et al (2007:81) indicated that the shortage and cost of drugs is one of the factors that affects patient adherence to drugs.

Sub-category 3.1.3: Availability of clean water

All of the HEWs know about the importance of administering the first dose in the health post. The HEWs indicated that the first dose administration in the health post helps them to show the patients how to take antimalarial drugs. But the shortage of clean water influences the performance of most of the HEWs. Most HEWs indicated the following:

“We administer the first dose in the health post when we have water. But sometimes we don’t have water and we give the drugs with adequate advices to the patients to take at home”.

This finding is supported by Conteh et al (2007) that water shortage is a significant factor affecting first dose administration in the health facility.

Category 3.2: Community related factor

Besides individual patient-related factors which influence the HEWs malaria treatment practice, the HEWs mentioned that there are community-related factors (the community’s perception of antimalarial drugs) that affect the HEWs compliance to malaria treatment guidelines.

Sub-category 3.2.1: Community perception of antimalarial drugs

The in-depth interview with the HEWs revealed that the community perceives chloroquine not to be effective for the treatment of malaria. HEWs also indicated that the community also perceives coartem as a drug that can treat any health problem. The HEWs indicated that most of community members do not like to take chloroquine. The following statements were given by some of the HEWs:

“... most of the people in this community perceive that only coartem is effective drug to treat malaria ...”; “... they perceive coartem can treat any health problem related with fever ...”; “... People do not like to take chloroquine...”; “... They always need coartem ...”; “... When we prescribe chloroquine some of patients either not complete the dose or totally don’t take it ...”

Most of the HEWs mentioned that the message previously given to the community was a cause for the negative perception of certain antimalaria drugs. This is what they had to say about this message:

“... The information given to the community previously from district affected the community perception. The information was ‘for any patient with fever coartem should be prescribed’ created the problem and patients understand that whenever they have fever they can take coartem to treat the fever and coartem

is the best drug for any cases which are related with fever ...”; “... due to the perception that only coartem is effective for malaria treatment they do not take chloroquine when we prescribe it...”

This finding is supported by the study done by Kamat and Nyato (2010), which indicated that “people’s prior experience and perceptions significantly influence the extent to which they adhere to drugs”. Kamat and Nyato (2010) also found that distribution of coartem has significantly changed community perception of antimalarial drugs. Wasunna et al (2008) also found that inaccurate messages affect the health workers’ compliance to malaria treatment guidelines. Walter et al (2008) also found that patient perception of the drug affects patient adherence.

Category 3.3: HEWs related factor

Most of the HEWs counsel and provide adequate information to malaria patients during antimalarial drug dispensing, but some of the HEWs did not give patients adequate information about the consequences of not completing the drugs, what to do after vomiting, and on the side effects of antimalarial drugs. The following are mentioned by 4 treated malaria patients during a FGD:

“They told me to complete the dose to be cured. But I became well after two days and I left the remaining doses and kept it for future use. I didn’t hear anything about what happens, if I don’t finish the drug” (Male discussant at FGD site 1).

“I become well after 4 doses and I gave the remaining ‘kortom’ (coartem) to my neighbour. I become well and I think it is not necessary to use all drugs” (Female discussant at FGD site 2).

“I gave to my daughter 1 tablet at night and immediately she vomited everything. I gave her the next dose in the morning. I don’t know what to do after vomiting” (The female discussant at FGD site 3).

“... I took 4 tablets of kortom (coartem) immediately after I reached my house. But I become sick due to strong abdominal pains and I didn’t take the next (2nd)”

dose at appropriate time ... I escaped the next dose and took the third dose. I completed the drugs in 4 days ..." (Male discussant at FGD site 4).

Kachur et al (2004:719) in their study found that those who were dispensed antimalarial drugs with adequate information adhered more than those who didn't get adequate information. The study conducted by Beer et al (2009:771) found similar results, which indicated that the information was rarely provided to patients on what to do after vomiting.

Category 3.4: Patient related factors

Besides the HEWs related factor, patient-related factors also influence the HEWs malaria treatment practice and patient adherence. Those patient-related factors which influence the HEWs malaria treatment practice mentioned by participants are: (1) patient pressure to obtain coartem, (2) patient load or workload, and the factors affecting patient antimalarial drug use mentioned by HEWs and treated malaria patients such as: forgetfulness due to workload; fear of adverse effects; and shortage of adequate food. These factors are discussed below.

Sub-category 3.4.1: Patient pressure to obtain coartem

Most HEWs mentioned that the malaria-negative patients also want to take antimalarial drugs (coartem) due to the perception that coartem can treat any health problem. The HEWs mentioned the following statements:

"... patients perceive that coartem can treat all health problems/diseases ..."

"... because the drug is free in the health posts all of patients including malaria negatives also want take coartem ..."

"... almost all of the patients do not want to hear the word negative ..."

"... convincing malaria negative patient is more work load than treating malaria positive patients ..."

All of the HEWs also indicated that patients do not like chloroquine. The following are statements of HEWs:

“... almost all patients who are Plasmodium vivax positive do not like to take chloroquine. The guideline indicates that coartem for Plasmodium falciparum and chloroquine for Plasmodium vivax. But they don't like to take chloroquine. They like to take only coartem. They say: 'why you don't give me yellowish colour tablet?' (Coartem)”

Some of the HEWs indicated that due to patient pressure, they give coartem to *Plasmodium vivax* positive patients. The following statement was mentioned by some of HEWs:

“We sometimes dispense coartem for Plasmodium vivax malaria-positive patient due to high patient demand. But coartem is not indicated in national treatment guideline for Plasmodium vivax. Patients sometimes refuse to go without coartem”

This finding is corroborated by a study done by Wasunna et al (2008) which indicated that patient pressure to obtain types of antimalarial drugs affects the compliance of health workers during prescribing and dispensing antimalarial drugs to the patients. Rowe et al (2005:1027) also indicated that patient demand is one of the factors influencing health worker performance.

Sub-category 3.4.2: Patient workload

Besides patient pressure to take coartem, HEWs indicated that patient load during the epidemic and high malaria season affects the quality of malaria diagnosis in the health post. Most of HEWs mentioned the following:

“During malaria season and malaria epidemic the patient load is high. Therefore, during this time we don't check malaria with RDT in all of the patients due to time constraints and RDT shortage.”

Meremikwu et al (2007) found that in those health facilities with a high load of patients, the compliance to treatment guidelines is minimal. Wasunna et al (2008) also found that the work load of health workers affects the quality of care in rural health facilities.

Sub-category 3.4.3: Forgetfulness

Some of the HEWs indicated that forgetting the drug taking time due to work load is one of the factors influencing malaria patients' adherence. The following is mentioned by some of the HEWs:

"Most of time women are busy with preparation of dinner at night in rural areas. Therefore, they forget the antimalarial drug dose at night."

Forgetting the correct dosage is one of the reasons which decreases patient adherence (Beer et al 2009:769). Unni (2008:181) also reported that forgetfulness is one of four major reasons for medication in non-adherence.

Sub-category 3.4.4: Fear of adverse effects of antimalarial drugs

Some treated malaria patients stated that fear of side effects of the antimalarial drugs influenced their use of these drugs. Some of HEWs also indicated that malaria patients complained of abdominal pains and fever immediately after the first dose of Coartem. The following statement was given by a malaria-treated patient:

"I took the first 4 tablets of Coartem with water and there was no problem. But when I took the second dose of Coartem it caused me abdominal pain/Gomppa Mishuwa and I postponed the next dose for 1 day because of fear of pain" (The 61 old male discussant at FGD site 4).

Most of the patients also indicated that when they take drugs on an empty stomach the abdominal pain increases, and when they don't have food they postpone the drug dose to other times due to a fear of such side effects. Some patients and HEWs also mentioned that immediately after taking coartem, the fever (*bolaa tuggyaa*) increased. The worsening of fever in children after coartem administration was also one of findings indicated by Kamat and Nyato (2010:5) in Tanzania. Kokwaro et al (2007:79) also

indicated that the gastrointestinal reaction and abdominal pain are side effects of Coartem. Agomo, Meremikwu, Watila, Omalu, Odey, Oguche, Ezeiru and Aina (2008:172) reported that artesunate combined with mefloquine caused abdominal discomfort in certain patients. The WHO (2003c:55) also indicated that the adverse effects of drugs are one of the factors affecting patient adherence.

Sub-category 3.4.5: Shortage of adequate food

Besides adverse effects, a shortage of adequate food to take with antimalarial drugs is another reason mentioned by the HEWs that prevented patients from taking their antimalarial drugs appropriately. Some of the HEWs mentioned that patients do not take coartem when they don't have food to eat.

“We advise the patients to take antimalarial drugs with food but patients respond that we don't have adequate food to take with Coartem” (HEW at health post 18).

One of the patients also mentioned the following:

“They (HEWs) told me to take adequate food with coartem, but I don't have adequate food and I postponed the drug until I get the food” (The male discussant at FGD site 4).

The study conducted in the Free State province in South Africa found that a lack of food or hunger affected the patients' adherence to medication (Matebesi & Timmerman [sa:8] http://humanities.ufs.ac.za/dl/userfiles/Documents/00000/196_eng.pdf).

Category 3.5: Disease related factor

The disease-related factor which influences the antimalarial drug use by patients revealed by the HEWs is the disappearance of signs and symptoms. Almost all of the HEWs mentioned the main reason for not completing antimalarial drugs to be relief of symptoms. Kokwaro et al (2007:81) stated that symptom relief is one of those factors that affect the patient adherence to a full course of treatment. These authors stated the following:

“Some patients stop taking medication when the signs and symptoms of the disease disappear. But the disappearance of symptoms does not mean that bacteria or parasites in the body are completely cleared. This can lead to drug resistance and relapse of disease in the case of malaria and other similar bacterial or parasitic originated infections.”

Kokwaro et al (2007:77) also indicated that coartem causes rapid relief of symptoms. Munger et al (2007:58) also found that those patients with the severe symptoms of disease adhere to treatment regimen more than those patients with the mild symptoms of the disease. Ansah et al (2001:496) indicated that most people stop taking drugs when they feel better.

4.5 APPLICATION OF THE FINDINGS WITHIN THE HEALTH CARE SYSTEMS MODEL

In this study, the systems models (basic system model and health care system model) were used to develop the conceptual framework and to interpret and discuss the findings. The basic systems model includes input, throughput or activities, output and feedback. The healthcare system model (result-based logic model for primary health care) includes outcome component in addition to input, activities, and output (Watson et al 2004:6). Therefore, the conceptual framework is adapted from these two models and the findings of the study (see figure 4.1 below). The following section discusses the findings (HEWs compliance to malaria treatment guidelines, patient adherence and factors influencing malaria treatment practice in relation to the components of the system models).

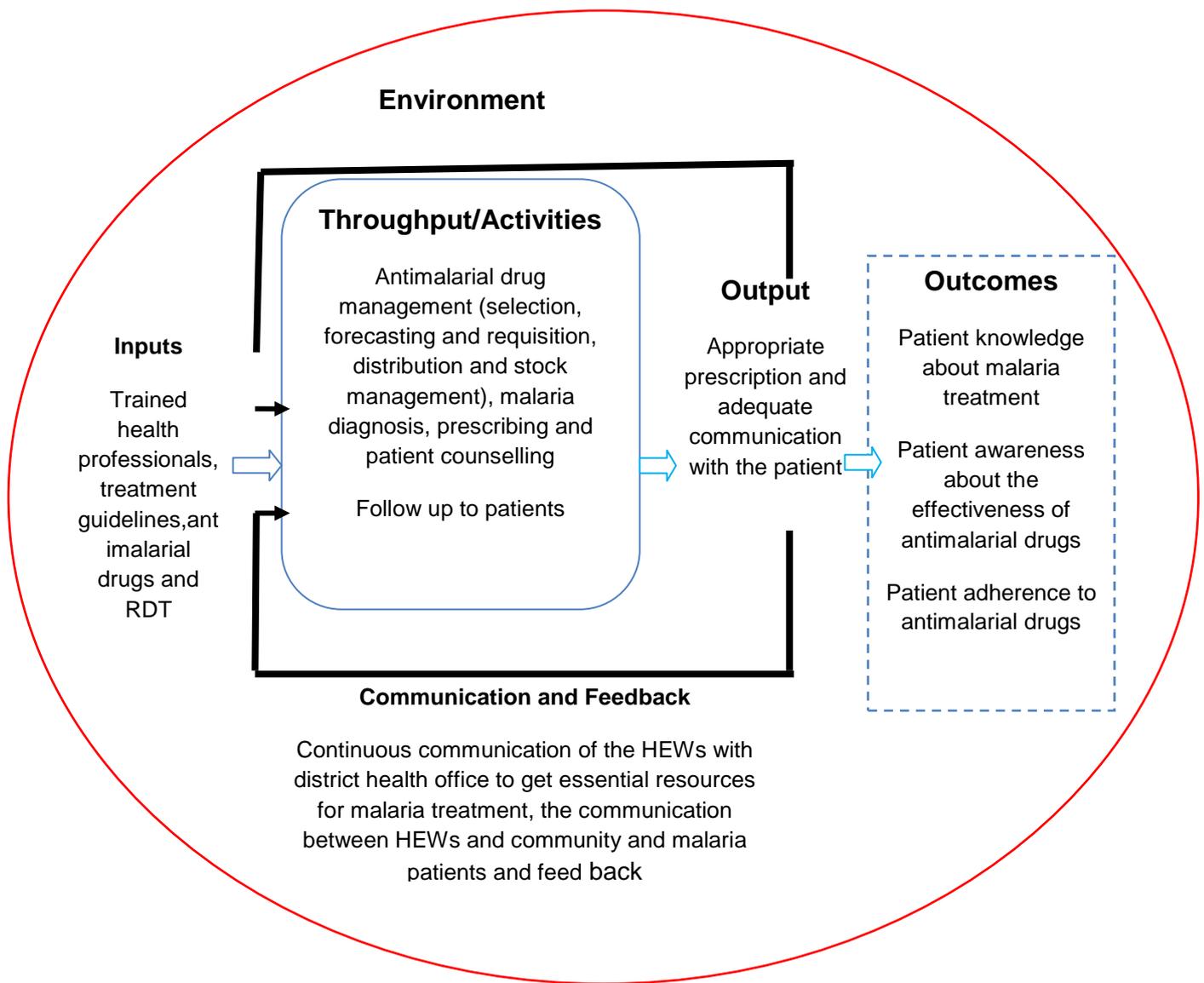


Figure 4.1 *Conceptual framework adapted from the basic system model and healthcare system model (result based logic model)*

(Watson et al 2004:6)

4.5.1 Inputs

The findings of this study indicate that the availability of resources needed for the health posts is adequate in the most of health posts, but the shortage of antimalarial drugs, clean water and RDT in some of health posts influenced the HEWs practice of malaria treatment. The findings also indicated that the quality of malaria treatment by the HEWs or the HEWs compliance to national malaria treatment guidelines decreased during the shortage of antimalarial drugs in the health post. Those health posts with the stock outs

of antimalarial drugs and RDT were found to be less compliant with the malaria treatment guidelines than those with adequate antimalarial drugs and RDT. The findings in this research also indicate that the shortage of antimalarial drugs influences the patient adherence to antimalarial drugs. When there is a shortage of antimalarial drugs, patients' adherence decreases due to drug sharing with one another and keeping the drugs for future use, due to fear of future shortage of antimalarial drugs.

According to Watson et al (2004:3), the availability of adequate human and material resources (trained health workers, antimalarial drugs, and diagnostic materials) is essential for quality of treatment. Castro et al (2009:2076) also indicate that the availability of adequate antimalarial drugs, diagnostic materials and trained health workers is essential for quality of treatment and patient adherence. The WHO (2010a:119) also emphasise that the availability of diagnostic facilities is important to provide the quality of treatment. The MSH and WHO (1997:6) also indicate that "the shortages of pharmaceuticals in the facilities frustrate and discourage both health workers and patients". Therefore, adequate resources are essential for HEWs treatment performance, as well as patient adherence to treatment regimens.

Therefore, an application of the systems model helped to offer meaningful interpretations of the findings of the study, and confirmed that resource availability is essential to of the way health posts operate, with a notable influence on HEW's practice of malaria treatment and patient outcome (adherence).

4.5.2 Activities

For adequate management of malaria in addition to resource availability, the HEWs workers activity is an important issue. Activities are the essential link to the resources and outputs in the systems model, in order to achieve the outcomes (Watson et al 2004:8). Activities such as forecasting an adequate quantity of drugs; timely request of antimalarial drugs; and prescribing and dispensing of appropriate drugs to patients with adequate information; are the determinant components of malaria treatment (Castro et al 2009:277). Prescribing drugs to a patient includes adequately diagnosing the patients' health problems; selecting the appropriate drug items from treatment guidelines; deciding the appropriate dose according to the patient age or weight; and providing adequate information about the disease and prevention methods.

The findings in this study indicate that the activities: diagnosis of malaria, prescribing and dispensing of antimalarial drugs are performed very well in most health posts and promoted patient knowledge of how to use antimalarial drugs. But inadequate communication with the HEWs, HEWs inadequate knowledge leading to request inappropriate resources creates the shortage of antimalarial drugs and has influenced the practice of malaria treatment in health posts.

4.5.3 Outputs

Outputs of this study include: adequately calculated and timely delivery of antimalarial drugs from district head office; availability of needed antimalarial drugs in the health post; prescriptions corresponding to malaria diagnosis; patients informed about the correct use of antimalarial drugs; and adequate patient follow up to promote patient adherence. According to the WHO (1997:423), patient adherence is mainly dependent on the quality of prescription and dispensing.

The adequacy of information provided during prescription, dispensing and diagnosis are very important to promoting adherence of the patient. According to Watson et al (2004:3), "outputs are the direct products or services from the activities of a policy, program or initiative, and are delivered to a target group or population". Castro et al (2009:277) state that 'products' or outputs refer to the immediate effect of activities such as antimalarial drug forecasting, prescription and dispensing of antimalarial drugs to patients, and patient counselling.

4.5.4 Outcomes

The findings of this study indicate that patient knowledge about malaria treatment and patient awareness of the effectiveness of antimalarial drugs are the outcomes of the HEWs counselling and follow up activities and very important for patient adherence. According to Watson et al (2004:4), patient adherence to antimalarial drugs is the overall result of resource availability, adequacy of prescribing and dispensing quality. Patient adherence is the final goal of treatment, determining the effectiveness of overall performance of malaria treatment. Watson et al (2004:6) also indicates that patient adherence is determined by resource availability and the quality of health worker performance (Castro et al 2009:81).

4.5.5 Feedback

Feedback is core to communication and communication is essential for existence of the system. In the healthcare system, communication between the health care provider and receiver are extremely important for health outcomes. The community-centered health service delivery such as health extension programme requires communication skills (feedback) at every step of the activity in order to achieve the planned activity and for future planning (EFMOH 2003:46).

The findings of this study indicate that communication among the HEWs, community, patients and the district staff is very important to implementing malaria treatment effectively and according to the guidelines. One of the problems influencing the malaria treatment practice of the HEWs is the shortage of resources (RDT and antimalarial drugs). The main reason for the shortage of antimalarial drugs and RDT in the health post is a lack of adequate information or feedback from both sides. The HEWs inability to request for the resources from the district health office was mentioned as a reason for shortage of resources in health posts by both the HEWs and district staff. Most of the HEWs also indicated that inadequate supply and delayed feedback from the district office on the resource request caused the shortage. Therefore, effective communication with timely feedback between the HEWs and the district health office can improve resource availability, the HEWs compliance to malaria treatment guidelines, and the adherence of patients. As a result, Rowe et al (2005:1) argue that feedback is important for the improvement of health workers' practice or performance.

Another factor influencing the malaria treatment practices of the HEWs identified in this study is the community and patients' beliefs regarding antimalarial drugs effectiveness. This is due to lack of understanding of the effectiveness of antimalarial drugs, and can be improved by effective communication between the HEWs and the community, as well as by individual patients. Community teaching that involves active community participation and feedback, particularly with regard to their beliefs, can solve the problem. Therefore, feedback or communication among the HEWs, district staff, malaria patients and the community is vital to the improvement of malaria treatment in the district.

As a result, improving communication and feedback will improve the malaria treatment practice and patient adherence (WHO 2003c:138). As indicated in the health systems model, the communication between the HEWs and the district staff will improve the resources availability. Timely sending of antimalarial drug requisitions to the district health office and feedback from the district office to the health post, will improve the resource availability in the health post, malaria treatment compliance of the HEWs, and patient adherence. The effective communication between the HEWs and patients such as adequate counselling, educating patients and the patients' response to the education provided by the HEWs will improve the patients perception of the effectiveness of antimalarial drugs and antimalarial drug use, or patient adherence. The communication between the HEWs and the community will improve the community beliefs in the effectiveness of antimalarial drug use. The communication chain created in the community with the malaria patients will also improve awareness among patients resulting in adherence to antimalarial drugs. Hence, communication, which includes feedback, is an important finding of this study, which can improve the malaria treatment practice.

4.6 CONCLUSION

This chapter has presented ways in which HEWs manage malaria patients in health posts and the ways in which treated malaria patients use antimalarial drugs. Three themes emerged from the in-depth individual interviews with HEWs, FGD with treated malaria patients and patient medical records. These are: (1) HEWs compliance with malaria treatment guidelines, (2) patients antimalarial drug use, and (3) factors influencing malaria treatment. The findings in each theme are discussed in light of relevant literature, with the aim of placing them within the context of public health.

This study revealed that the HEWs communication with patients during diagnosis is adequate. Patient involvement during diagnosis, first dose administration at health post and patient counselling improved the patients' knowledge about antimalarial drug use. However, there are some factors influencing the malaria treatment practice of HEWs. These are: shortage of diagnostic kit, shortage of antimalarial drugs, and shortage of clean water, patient and community beliefs in antimalarial drug effectiveness, work load, patient related factors such as the availability of food to patients, and patient pressure to receive coartem.

This study also revealed that the patient knowledge about the seriousness of malaria, antimalarial drug use, as well as the importance of early diagnosis and treatment is generally good. The HEWs follow up after treatment to the patients and community support (village, development team, community meeting and discussion) improved the treated malaria patients' adherence to antimalarial drug use. However, there are some factors influencing the patient antimalarial drug use. These are: forgetfulness, fear of shortage of drugs, adverse drug effects, duration of treatment, rapid relief of malaria symptoms and low awareness of consequences of incomplete dose by some patients.

Chapter 5 presents the guidelines for support of HEWs in malaria treatment practice in Ethiopia.

CHAPTER 5

GUIDELINES FOR SUPPORT OF HEW'S IN MALARIA TREATMENT PRACTICE IN ETHIOPIA

5.1 INTRODUCTION

Chapter 4 discussed the research findings of the study in the light of the literature. This chapter presents the guidelines generated by the researcher, based on findings and literature used, in order to support the HEWs in the treatment of malaria in Ethiopia.

The main purpose of this study is to improve the performance of the HEWs in the treatment of malaria and to enhance patient adherence to antimalarial drug use in Ethiopia. According to Rowe et al (2005:1027), "an essential first step towards improving performance involves the understanding of the factors that influence it". The findings of this study revealed that the treatment practice of malaria by HEWs was influenced by (1) health facility-related factors (shortage of essential resources for malaria treatment); (2) community-related factors (community beliefs on the effectiveness of antimalarial drugs); (3) factors related to the HEWs (inappropriate prescription and inadequate counselling); and (4) patient-related factors (patient pressure, drug sharing and fear of adverse effects).

As a result, the researcher developed guidelines to support HEWs in their practice or performance of malaria treatment, in order to improve patients' adherence to antimalarial drugs with the aim of addressing the issues identified during fieldwork.

5.2 PROCESS OF DEVELOPING THE GUIDELINES

The guidelines were formulated based on the findings that emerged during the analysis of the data collected from the HEWs and patients through in-depth individual interviews, FGDs and patients' medical record reviews. The first step in the development of guidelines was the consideration of the survey list as proposed in the Dickoff, James and Wiedenbach (1968:245) model.

5.3 THE APPLICATION OF THE SURVEY LIST IN THE DEVELOPMENT OF GUIDELINES

In this study, in order for the researcher to develop the guidelines to support the HEWs in the treatment of malaria, the researcher made use of the survey list proposed by Dickoff et al (1968:245) as an infrastructure (see figure 5.1 below).

The survey list proposed by Dickoff et al (1968:245) lists six aspects of activities. These are: the purpose or terminus, the agent, recipient, framework (context), dynamics and the procedures. These components of the survey list are discussed in detail below (and in figure 5.1).

5.3.1 Purpose

The World English Dictionary (<http://dictionary.reference.com/browse/purpose>) defines purpose as “the reason for which something exists or is done”. According to Dickoff et al (1968:245), purpose refers to the categories of activity and goals in which someone engages. The purpose also refers to the end point of an activity or works that result to the final goal or outcome. In this study, the purpose or the final goal was to improve malaria treatment practice of the HEWs by developing guidelines for support of HEWs in the practice of malaria treatment through:

- Promoting adequate resource availability
- appropriate diagnosis of malaria
- appropriate prescribing and dispensing of antimalarial drugs
- adequately educating malaria patients and community about malaria treatment, and
- adequate follow up of patients after treatment

5.3.2 Agent

According to the survey list of Dickoff et al (1968:245), the agent is a person who has adequate awareness and capacity to carry out certain activities. In this study, the agents are the HEWs diagnosing and treating malaria patients in Damot Gale district (Southern Ethiopia) and the health professionals at district health office, who participate in

planning, monitoring and evaluation of the health post, and are responsible for the distribution of RDT and antimalarial drugs to the health posts.

5.3.3 Recipient

According to the Free Dictionary (<http://www.thefreedictionary.com/recipient>), the term recipient refers to “a person who receives something”. Dickoff et al (1968:245) indicate that the ‘recipient’ is the receiver of the activity designed by the agent. In this study the recipients are the malaria patients in Damot Gale district in Southern Ethiopia, the community in each kebele and the community leaders who follow and support the malaria patients under the guidance of the HEWs mentioned above.

5.3.4 Framework or context

The ‘framework’ refers to the context or the setting in which the activities takes place. According to Merriam Webster Dictionary (<http://www.merriamwebster.com/dictionary/context>), the context refers to “the interrelated conditions in which something exists or occurs”. According to Watson, Broemeling, Reid and Black (2004: i), contextual factors such as social, cultural, economic and physical environment influence health service delivery in the community. Context, together with the input from the environment, directly determines the output of health service activities. In health service delivery, the context is vital, and influences input, activities, outputs, and outcomes.

According to Watson et al (2004:3), for efficient service delivery and effective outcomes in the healthcare system, the interrelationship between environment or the context in which the health service delivery takes place, inputs (human, material, information), activities such as clinical care, and outputs (immediate result of activities) and final outcomes, which benefit both the individual patient as well as the community, are necessary. The external environment (social, physical and economic contexts) influences availability of resources (inputs), activities, outputs and outcomes. The level of participation and characteristics of community also influence the outcomes of health service activities.

The context or setting, as indicated in section 1.9.2 in this study, refers to the Damot Gale district, to health posts and the community in which the HEWs diagnose and treat malaria patients.

5.3.5 Dynamics

According to the survey list, dynamics refers to the factors that encourage activities such as malaria treatment practice. In this study, the dynamics are those factors which facilitate the malaria treatment practice of HEWs as well as patient adherence. The HEWs are regularly evaluated by the community at the district level for their treatment practice. According to their performance level, they are promoted to higher level, or provided with incentives such as training opportunity by the district health office. Hence, the factors such as the HEWs training, interest in helping the community, community participation in malaria control, and community leaders' commitment to supporting the treated malaria patients, are all important dynamics which motivate malaria treatment practice in the community. Patient outcomes such as patient satisfaction, community acceptance and treatment outcomes are also motivating factors. The dynamics are important to improving malaria treatment practice of the HEWs.

5.3.6 Procedures

The procedures are those methods, techniques or sets of rules that direct activities and which a given responsible person is required to perform (Moleki 2008:30). In this study, the procedures entail the guidelines proposed in order to support the HEWs practice in malaria treatment.

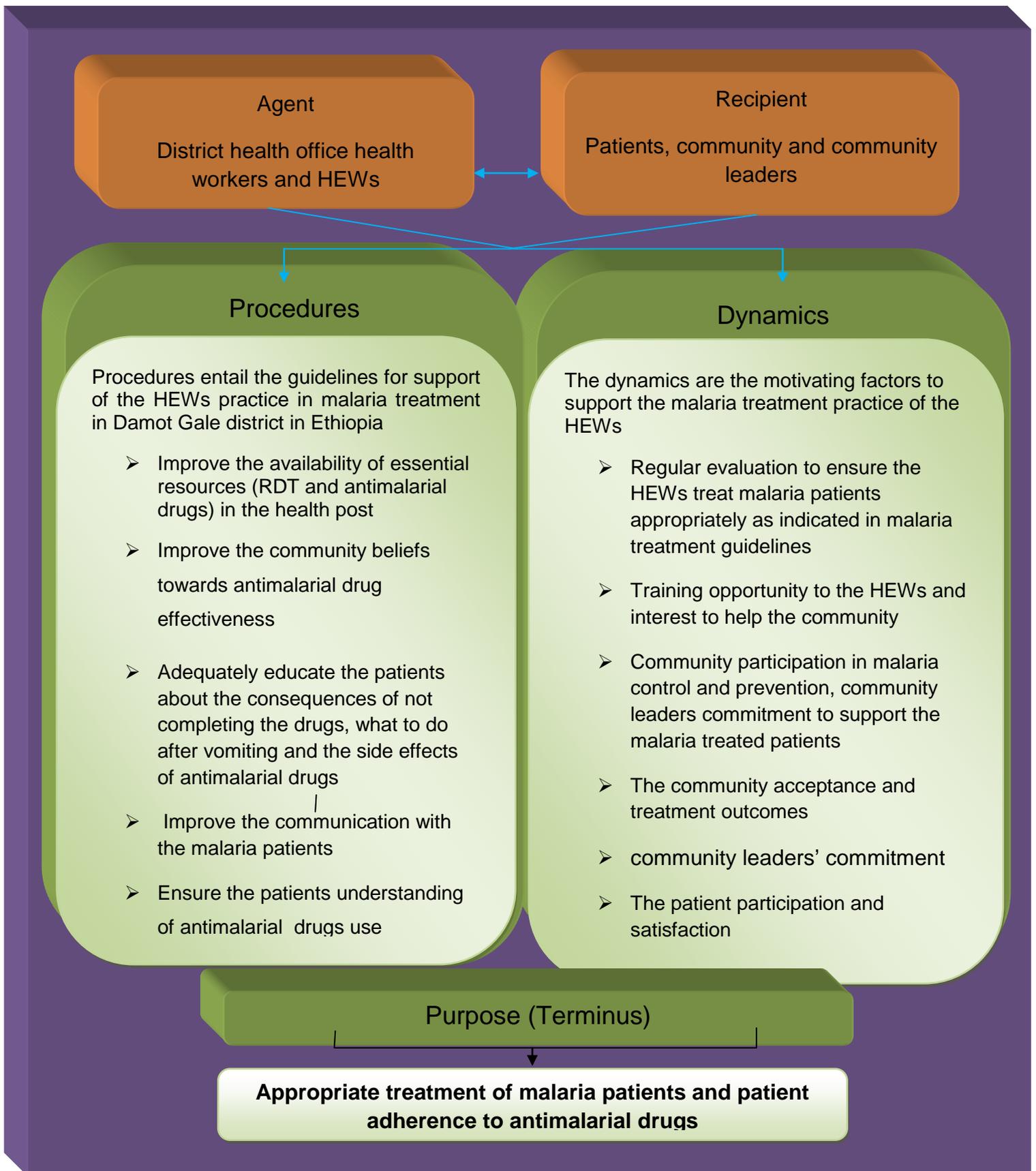


Figure 5.1 Framework for support of HEWs in malaria treatment practice in Ethiopia

5.4 FORMULATION OF GUIDELINES FOR SUPPORT OF THE HEWS IN MALARIA TREATMENT PRACTICE IN ETHIOPIA

The guidelines formulated to support HEWs in malaria treatment practice deal with the problems related to the resource availability, the performance gap of the HEWs during malaria treatment, and the problems related to patient adherence as identified during the data analysis of the this study. The guidelines are developed based on activities indicated in Dickoff et al's (1968:243) survey list. After synthesis of the research findings, the researcher drew conclusions and developed the following guidelines.

5.4.1 Guideline to support the HEWs maintain adequate availability of resources within the health facility (health post) in order to appropriately diagnose and treat malaria

The main purpose of this guideline is to promote requisition and adequate storage of material resources (diagnostic materials and drugs) required by HEW's to diagnose, prescribe, dispense and treat malaria in Ethiopia.

In order to formulate this guideline, the researcher summarised the findings related to the essential resources needed for malaria treatment in the health post. See box 5.1 for a summary of findings that were used by the researcher to deduce the guidelines in this section.

Box 5.1 Summary of conclusion statements for health facility-related factors influencing the malaria treatment practice of HEWs

- The shortage of RDT pressurizes HEWs to dispense antimalarial drugs without parasitological confirmation, which leads to over prescribing of antimalarial drugs. The district health department supplies a lesser dose of RDT than required by the health post.
- The shortage of chloroquine in the health post pushes the HEWs to prescribe coartem for *Plasmodium vivax* positive patients, which is not recommended in the national treatment guidelines.
- It is reported that inadequate requests for RDT and antimalarial drugs from the district office by the HEWs due to lack of forecasting knowledge, results in the shortage of RDT and antimalarial drugs in the health posts.
- Those health posts far from the district reported the shortage of antimalarial drugs more frequently than those nearest to the district health office.
- The shortage of drugs in the health posts leads to non-adherence by malaria treated patients.
- The weakness of drug selection, quantification and distribution leads to shortage of drugs and wastage of financial resources (WHO, 1997:122; PAHO, WHO, RAVREDA-AMI and USAID SA:5).
- Improving the quantification, requisition system, and drug use by the HEWs helps to improve the availability of antimalarial drugs in health post (EFMOH, 2010:33).

Therefore, based on the summary provided in box 5.1 above, the researcher formulated guidelines as detailed below.

GUIDELINE 1: Improve the availability of essential resources (RDT and antimalarial drugs) in the health post

OUTCOME: Appropriate diagnosis of malaria, appropriate prescription and the use of antimalarial drugs.

RATIONALE: The availability of antimalarial drugs is the major contributing factor to improve the quality of malaria treatment and patient adherence (Alba et al 2010:32). Shortage of diagnostic materials such as RDT leads to the treatment of malaria based

on clinical symptoms and causes the overuse of antimalarial drugs, which can promote the resistance of the malaria parasite, in addition to causing a shortage of antimalarial drugs. The WHO (1997:6) indicates that the shortage of drugs causes irrational drug use, both by health workers as well as patients. Castro et al (2009) also indicate that availability of effective antimalarial drugs is among important factors contributing to health worker compliance to treatment schedules. Ssekabira et al (2008: 833) also indicate that adequate availability of diagnostic materials and effective antimalarial drugs are essential for effective malaria treatment. Improving drug selection, quantification and requisition systems can improve the availability of RDT and antimalarial drugs in the health post (WHO 1997:122).

Recommended activities and procedures for the implementation of the guideline:

(1) To improve the availability of RDT in the health post

- Train HEWs in forecasting and requisition methods.
- Consider the malaria situation in the kebele (village) when supplying RDT to health posts from the district health office.
- Refill the RDT on time without causing a shortage in the health post when the request is being sent to the health office.
- Monitor availability of RDT continuously in the district health office.
- Provide the weekly report on the malaria situation, RDT use and the RDT stock with the submission of the required quantity of RDT to district health office weekly.

(2) To improve availability of antimalarial drugs in the health post

- Carry out adequate antimalarial drug forecasting and quantification monthly and quarterly in the health post.
- Review antimalarial drug pipeline quarterly.
- Maintain adequate and accurate drug logistics data in the health post and district level.
- Fill supply gaps well in advance, where necessary.

- Consider the lead time, i.e. the total time between the request sent to the district office and the antimalarial drugs reach to the health post, when sending the request to the district office for antimalarial drugs.
- Facilitate the storage of antimalarial drugs in the nearest health centre to avoid the shortage of antimalarial drugs due to the distance from the district health office to the health post.
- Create linkages with the nearest health centre, to assist the health post staff in loaning drugs, whenever in urgent need.
- Train the district health office staff on drug supply management and drug distribution mechanisms.
- Improve quantification and forecasting skill of the HEWs:
 - Train the HEWs on drug management, including drug selection and quantification.
 - Train the HEWs on drug requisition and forecasting.
 - Gather the information sources regarding malaria situation, drug stock, drug use or drug consumption data for requisition and forecasting of antimalarial drugs.
- Improve drug use
 - Prescribe/dispense antimalarial drugs after confirming malaria parasite using RDT. Ngasala et al (2008) also indicated that prescribing antimalarial drugs after confirmatory diagnoses using RDT or microscopy can minimise the wastage and unnecessary use of antimalarial drugs.
 - Prescribe/dispense appropriate antimalarial drugs and doses to malaria patients according to the type and age or weight of patients.
 - Train the HEWs on rational/appropriate use of antimalarial drugs. Training is an important method to improve the drug use (Ngasala et al 2008).

5.4.2 Guideline to improve community beliefs regarding antimalarial drugs and their effectiveness

The purpose of this guideline is to address the widely held community beliefs, which influence the practice of malaria treatment by HEWs. To formulate this guideline, the researcher summarised the finding related to the community beliefs that influence the practice of malaria treatment by HEWs. See box 5.2 for a summary of findings that were used by the researcher to deduce the guidelines in this section.

Box 5.2 Summary of conclusion statements for the community beliefs regarding antimalarial drugs and their effectiveness

- The majority of community members believe that only coartem is effective for all types of malaria. This belief of the community influences the HEWs performance in malaria treatment, by pressurising them to prescribe coartem for all types of malaria.
- Almost all community members believe that chloroquine is not effective for malaria treatment. The community beliefs regarding the effectiveness of chloroquine influence the adherence of patients to antimalarial drugs.
- Nearly half of the population perceive that chloroquine is not effective for treatment of malaria (Deressa, Ali, Enquoselassie 2003: 103).
- The success of malaria treatment is directly affected by the community perception to the effectiveness of antimalarial drugs (Deressa et al 2003:100).
- Improving the communities' perception of chloroquine effectiveness can help to improve both HEWs performance in treating malaria and also enhance patient adherence to chloroquine in the treatment of *Plasmodium vivax* and further prevent the misuse of coartem.

GUIDELINE 2: Improve the community's perception towards antimalarial drug effectiveness

OUTCOME: Appropriate use of antimalarial drugs in the community, and the promotion of patient adherence to antimalarial drugs and effective treatment of malaria.

RATIONALE: The community perception of antimalarial drugs influences the HEW's compliance to malaria treatment guidelines as well as patient adherence to antimalarial drugs. The community perception towards the effectiveness of antimalarial drugs also influences the effectiveness of treatment. Therefore, addressing the community perception of antimalarial drugs can improve the usage of antimalarial drugs in the community, as well as in individual malaria patients. Cropley (2004:446) indicates that an important reinforcing factor for adherence is the perception that the treatment is effective. Soares et al (2009) indicated that community awareness can be increased through community education.

Recommended activities and procedures for the implementation of the guideline

(1) *To improve community awareness about the effectiveness of antimalarial drugs*

- Teach the community by using drama or comedy in local language, emphasising that antimalarial drugs are effective when used appropriately.
- Invite patients who have used drugs appropriately and been cured to the community meetings to address the community members on effective use of antimalarial drugs.
- Explain the effectiveness of the antimalarial drugs and types of malaria in the community meeting.
- Prepare brochures about the use of antimalarial drugs and distribute for those who can read them.
- Teach the community using posters which indicates the appropriate use and benefit of antimalarial drugs.
- Use pictures to teach the community (e.g. about how to give an antimalarial drug to a young child).
- Use songs, poetry and informal conversations in local languages to teach the effectiveness of antimalarial drugs and the benefit of appropriate use.
- Demonstrations are a very important means of teaching in order to create adequate knowledge. Therefore, demonstrate how to use antimalarial drugs at community meetings and teach them about the drugs.

5.4.3 Guideline to support the HEWs in the teaching and counselling of patients to promote patient adherence to antimalarial drugs

The purpose of this guideline is to promote patient adherence to antimalarial drugs.

To formulate this guideline the researcher summarised the findings related to the factors influencing patient adherence to antimalarial drugs. See box 5.3 for a summary of findings used to deduce the guidelines in this section.

Box 5.3 Summary of conclusion statements for factors influencing patient adherence to antimalarial drugs

- The factors influencing patient adherence to antimalarial drugs identified in this study are: forgetfulness; lack of awareness about the consequences of not completing antimalarial drugs; what to do after vomiting; adverse effects of antimalarial drugs; and patient belief on effectiveness of antimalarial drugs.
- The HEWs during in-depth interviews indicated that certain patients return back to health posts to ask the dose after forgetting what they were told.
- The HEWs also indicated that patients requests written information about drugs dispensed.
- Participants indicated that certain patients do not complete their course of antimalarial drugs due to lack of awareness about the consequences of not doing so. The malaria treated patients indicated that some of the HEWs didn't provide patients with adequate information about the consequences of not completing the drugs, about what to do after vomiting and about the common side effects of antimalarial drugs.
- Patients believe that coartem is effective for any health problem and chloroquine is not effective for malaria treatment. This contributed to inappropriate prescription of coartem by the HEWs and patient non-adherence to chloroquine.
- Due to patient pressure, some of the HEWs prescribed coartem to *Plasmodium vivax* positive patients, which is not appropriate for malaria treatment guidelines.
- Almost all patients did not like to take chloroquine, and pressurized the HEWs to prescribe coartem.

Therefore, based on the summary provided in box 5.3 above, the guidelines were formulated in this section of the chapter, in order to address the issues that are detailed in box 5.3.

GUIDELINE 3: Adequately educate patients on how to take antimalarial drugs

OUTCOME: Appropriate prescription of antimalarial drugs and promotion of patient adherence to antimalarial drugs.

RATIONALE: The adequacy of counselling provided to the patient and information delivered during prescription and dispensing of antimalarial drugs is important for their appropriate use. Communication to patients, such as patient education and written instructions plays an important role in promoting rational use of drugs and improving patient awareness to effectiveness of antimalarial drugs. Patients do not comply with the prescribed medication regimen, due to a lack of awareness about the problem of non-adherence (Munger et al 2007:58). The WHO (2010a:24) also indicated that patient education is very important part of malaria treatment, that promotes adherence to antimalarial drugs. Jackson, Chappius, Loutan and Tylor (2006) indicated that adequate information provided by health workers to patients to take full doses along with the advice not to stop “even if patients feel well” are important in order to increase patient adherence and to minimise resistance.

Recommended activities and procedures for the implementation of the guideline

(1) *Provide written information to the patients with the following points:*

- The drug name, strength, the dose, quantity dispensed, frequency, and direction for use
- When to take antimalarial drugs (before or after meals)
- How long the treatment is to last (the treatment lasts for three days)
- Why the entire course of an antimalarial treatment must be taken
- How to take the antimalarial drugs (e.g. with water)
- How to store the drug (e.g. avoid heat, light and damp)
- Not to share the drugs with other persons and the consequences of sharing drugs (DACA 2005:21)

(2) *Adequately inform the patients about the consequences of not completing antimalarial drugs:*

- Educate patients adequately on the benefit of completing the dose.
- Inform the patient that there is no benefit if drugs are not taken in complete doses (Kokwaro et al 2007:80).
- Inform the patient that not completing the prescribed drug can cause treatment failure and death.
- Inform the patient that not completing the dose can cause drug resistance and affect the future use of antimalarial drugs.

(3) *Inform the patients adequately that the relief of malaria symptoms before completion of antimalarial drugs does not indicate a complete cure:*

- Tell the patients that antimalarial drugs can relieve signs and symptoms after two or three doses.
- Tell the patients not to stop taking the drugs at the middle of the treatment duration (during the relief of malaria sign and symptoms), which can cause malaria to relapse.
- Explain clearly to the patient that he/she ought to continue drug taking until having completed all doses, even if there are no malaria symptoms.
- Tell the patients that not completing antimalarial drugs can cause malaria parasite resistance to antimalarial drugs, which can cause malaria treatment difficulties in individual patients as well as in the community.

(4) *Address patient's fear of adverse effects of the drug*

- Mention the common side effects of antimalarial drugs to the patients. The most common side effects of antimalarial drugs includes abdominal discomfort, diarrhoea, nausea or vomiting, loss of appetite, headache, itching, difficulty concentrating, dizziness, light headedness, and sleep problems. Inform the patients that they will experience relief from these side effects after some doses of antimalarial drugs.

- Tell the patients that these side effects cannot harm them as much as malaria can.
- Explain to the patients how to manage the side effects of antimalarial drugs and tell the patients not to stop taking antimalarial drugs due to side effects.

(5) *Adequately inform patients about measures to take after vomiting*

- Tell the patients that if patients vomit within one hour of taking the medication, the remaining dose is not adequate to cure malaria, and they ought to take a replacement dose immediately (Kokwaro et al 2007:84).
- Tell the patients to come to the health post to replace the drugs used after vomiting.
- Inform the patients that vomiting can cause treatment failure and that they ought to come to the health post if there is frequent vomiting (WHO & UNICEF 2008:14).

(6) *Improve patients perception towards antimalarial drug effectiveness:*

- Provide adequate patient education using pictures of antimalarial drugs and their uses.
- Inform patients that negative result means the absence of malaria, and coartem is not useful for malaria-negative patients.
- Tell patients that coartem treats only malaria and does not treat other health problems.
- Educate patients in their local language that there are two major types of malaria in the district (*Plasmodium vivax* and *Plasmodium falciparum*).
- Tell the patients that *Plasmodium falciparum* can be best treated with coartem.
- Inform patients that chloroquine is effective for *Plasmodium vivax*.
- Educate patients that the relief of symptoms without completing does not indicate complete cure.
- Educate malaria patients that the antimalarial drug dose provided is for only one person, and is not adequate for more than one patient, and explain that drug sharing is not good for both patients involved.

(7) *Check whether the patients have understood the following points before the patients leave the health post.*

- The antimalarial drug prescribed (dispensed)
- The duration of treatment
- The daily frequency of dose of antimalarial drugs
- The amount of tablets at each dose
- The benefit of the full dose and the risk of incomplete dose
- The use of antimalarial drugs

5.5 EVALUATION OF THE GUIDELINES

The guidelines formulated for support of HEWs' malaria treatment practice and patient adherence to antimalarial drugs were given to experts in the field of malaria prevention and control activities at the regional and district level for evaluation of clarity, simplicity and adequacy for implementation. The researcher also provided the guidelines to the HEWs in some health posts in order to obtain their feedback and suggestions. The regional health bureau HEP coordinators, malaria experts and HEP coordinators at zonal and district health departments also participated in giving comments and in building the guidelines so as to improve the HEWs practice in malaria treatment and patient adherence. Therefore, the guidelines were evaluated for clarity, simplicity and operational adequacy.

5.6 CONCLUSION

In this chapter, the guidelines were formulated to support the HEWs practice in malaria treatment and to improve patient adherence to antimalarial drugs. The guidelines are based on findings from the study, the literatures reviewed, and Dickoff et al's (1968:245) survey list. The next chapter (chapter 6) deals with the conclusion and limitations of the study and makes recommendations for practice and further research.

CHAPTER 6

CONCLUSION, LIMITATIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

In chapter 5, the researcher developed guidelines to promote the practice of HEWs in malaria treatment, with the aim of promoting patient adherence to antimalarial drug use. This chapter outlines the conclusions of the study. The chapter also presents the limitations that are acknowledged here by the researcher in terms of methods followed in the study. The researcher presents recommendations that are necessary for improving malaria treatment in Ethiopia in terms of practice, education and further research. The conclusions are presented below.

6.2 CONCLUSIONS

This study focused on evaluating the malaria treatment practice of the HEWs and patient adherence to antimalarial drugs. The main purpose of the study was to improve the malaria treatment practice of the HEWs in Ethiopia by evaluating their compliance to malaria treatment guidelines. The researcher conducted in-depth individual interviews with HEWs to explore their practice in malaria treatment. The researcher also conducted FGD with treated malaria patients. The medical records of patients were also reviewed in order to evaluate if the antimalarial drugs were prescribed in terms of approved guidelines. Three themes emerged after data analysis. These were: (1) HEW's compliance with malaria treatment guidelines; (2) antimalarial drug usage by the patients; and (3) factors influencing malaria treatment.

During in-depth individual interviews, the HEWs were asked to explain how they diagnose, prescribe and dispense antimalarial drugs to malaria patients. The HEWs described in detail their experiences of malaria treatment. The treated malaria patients' medical records were also analysed in order to find out how the HEWs prescribed and dispensed antimalarial drugs.

The findings revealed that most of HEWs adequately diagnose malaria, prescribe appropriate drugs in an appropriate dose and duration and dispense antimalarial drugs to malaria-diagnosed patients with adequate information. The findings also indicate that the HEWs involve malaria patients in diagnosis and decision-making, before prescribing antimalarial drugs to promote patient adherence. The HEWs' approaches to the patients and clear communication have since created satisfaction in the malaria patients and almost all patients appreciate and accepted the HEWs malaria treatment practice. Due to this, malaria patients in the district generally prefer to be treated by the HEWs than other health professionals. It was also found that most HEWs adequately understand and follow the malaria treatment guidelines.

The study also revealed that most HEWs provide adequate information to patients during prescription and dispensing of antimalarial drugs. The information provided to patients during prescribing includes: causes for malaria; prevention methods for malaria; and importance of early treatment. The majority of HEWs clearly explain to the patients and provide adequate information to patients on how to take antimalarial drugs and check the patient understanding before patients leave the health post. But some of the HEWs do not adequately explain the consequences of not completing drugs and not all of the HEWs do not provide written instructions to patients on how to use antimalarial drugs.

This study also identified factors which influence the HEWs malaria treatment practice. The factors that influence the HEWs compliance to malaria treatment guidelines revealed in this study are: shortage of resources (antimalarial drugs and RDT); patient pressure to obtain coartem; patient load (especially during malaria epidemics); and community perception of the effectiveness of antimalarial drugs.

During FGD, the treated malaria patients were asked to explain how they used antimalarial drugs. The data analysis of data collected through FGD revealed that the HEWs follow up patients after treatment in order to improve patient adherence to antimalarial drugs. The community support given to patients through village team leaders and regular community discussion about malaria and antimalarial drug use also helped to promote patient adherence to antimalarial drugs. In general, besides increasing the antimalarial drug accessibility to the community, the HEWs promoted the appropriate use of antimalarial drugs. The community support mechanisms

implemented in the health extension program were found to be the best method for increasing the awareness of patients about the prevention and treatment methods of malaria, and promoting patient adherence to antimalarial drugs. However, some patients do not complete the dose, and share the prescribed antimalarial drugs with neighbours or family members, due to a lack of awareness about the consequences of not completing antimalarial drugs.

The factors influencing patient adherence to antimalarial drugs identified during the study are: inadequate information provided to patients about the consequences of not completing antimalarial drugs; how to manage adverse effects of antimalarial drugs; forgetfulness of patients in taking antimalarial drugs; patient fear of adverse effects; and patient fear of shortage of drugs.

The findings also indicated that the development of guidelines was needed to improve the HEWs malaria treatment practice and patient adherence. Therefore, three guidelines were developed to improve the malaria treatment practice of the HEWs and patient adherence to antimalarial drug use. These are: (1) Guidelines to support HEWs in maintaining adequate resources within the health facility (health post), in order to appropriately diagnose and treat malaria; (2) Guidelines to improve the community beliefs regarding antimalarial drugs and their effectiveness; and (3) Guidelines to support the HEWs in the teaching and counselling of patients to promote patient adherence to antimalarial drugs. To develop the guidelines, study findings, available literature, and Dickoff et al's (1968) survey list were used. The guidelines were analysed and evaluated for clarity, generality, and adequacy in order to implement them at the health post level.

6.3 LIMITATIONS OF THE STUDY

The following limitations were identified during the study:

Generalisability: Due to the qualitative nature of the study, low number of HEWs (only 20) and treated malaria patients (only 59) participated in the study. Therefore, the findings from the study may not be generalised beyond the health posts included in the study, or to the whole country.

Recall bias: Even though an adequate and detailed focus group discussion was conducted with malaria patients to explore how they used antimalarial drugs, the researcher cannot discount the existence of a recall bias. Treated malaria patients may forget how they used antimalarial drugs. Due to this, they might not provide adequate information about their drug use.

Despite these limitations, the researcher is of the opinion that the study offers adequate insight into HEWs malaria treatment practice and patient adherence to antimalarial drugs.

The following section provides recommendations based on the findings.

6.4 RECOMMENDATIONS

The main gaps/problems in the malaria treatment practice of the HEWs identified in this study are related to resource shortages, the HEWs capacity in management of antimalarial drugs and counselling of patients, and community/patient perception to antimalarial drugs. Therefore, the researcher made the following recommendations based on these study findings.

6.4.1 Recommendations to support the HEWs compliance to malaria treatment guidelines and improve patient adherence to antimalarial drugs

Training

- Training on forecasting and requisitioning of antimalarial drugs is important to improving the HEWs knowledge to request antimalarial drugs and manage appropriately. Therefore, the HEWs should be trained on how to forecast and request the antimalarial drugs and RDT needed for the health post.
- One of the reasons behind the shortage of antimalarial drugs and RDT in health posts is inappropriate distribution of both antimalarial drugs and RDT from the district health office. The study revealed that some of the health posts suffer from the shortage of antimalarial drugs due to delays in the supply chain from the district health office. Another problem indicated by the participants, is the low

amount of RDT supplied to the health posts when compared to antimalarial drugs, which causes a shortage of RDT while antimalarial drugs are available. This causes the prescription of antimalarial drugs without laboratory investigation of malaria. The training of health workers who coordinate the health posts and involved in antimalarial drug supply at district office is important to promoting adequate availability of antimalarial drugs and RDT. Therefore, district level health workers should be trained in systems of antimalarial drug management and distribution.

Storage of antimalarial drugs and RDT at nearest health centre

- The study revealed that those health facilities far from the district experience a shortage of both antimalarial drugs and RDT more than those nearest health posts. Therefore, the storage of antimalarial drugs at the nearest health centre is important for the health posts in order to facilitate the availability of antimalarial drugs without delay.

Implementation of the guidelines

- The guidelines prepared (with the following major points) in this study to support the HEWs malaria treatment practice and patient adherence should be implemented in health posts.
 - Improve the availability of essential resources (RDT and antimalarial drugs) in the health post
 - Improve the community's perception towards antimalarial drug effectiveness
 - Adequately educate patients on how to take antimalarial drugs

6.4.2 Recommendations for further study

Conduct study on the impact of community support to patient adherence

The support from the family or community is one of the mechanisms that increase the patient adherence to the prescribed treatment. When there is low community/family support, patient adherence decreases and the effectiveness of the treatment becomes

low. The community support system (village team or *ande leamist tisisir*) implemented in the community through the HEWs is promoting patient adherence to antimalarial drugs. Conducting a study on the impact of community support (village team or *ande leamist tisisir*) on patient adherence to malaria treatment, will help in exploring how the community support system functions in order to promote malaria treatment practices and to identifying factors that influence it. Therefore, the researcher recommends a study on the impact of village team or *ande leamist tisisir* in supporting patient adherence to antimalarial drugs.

Conduct quantitative study on patient adherence

Patient drug use can be studied using both qualitative and quantitative methods. In this study, patient adherence to antimalarial drugs was conducted using qualitative methods, and the participants involved in the study are fewer and it is not possible to generalise to a wider area. Therefore, the researcher recommends a quantitative study involving an adequate number of both the HEWs and treated malaria patients, in order to generalise the findings to the whole country.

6.5 CONCLUDING REMARKS

Generally, the HEWs compliance to malaria treatment guidelines is adequate, but factors such as the shortage of antimalarial drugs, patient pressure to obtain antimalarial drugs, and community perception of the effectiveness of antimalarial drugs (chloroquine), are influencing the HEWs practice of malaria treatment.

Community support and the HEWs' follow up of patients contributed towards improving patient adherence to antimalarial drugs. However, factors such as patient perception of antimalarial drugs effectiveness, and community awareness about the effectiveness of antimalarial drugs, early relief of symptoms of malaria, and side effects of antimalarial drugs are other factors influencing patient adherence. Improving communication of the HEWs with the district office, community, malaria patients and timely feedback are important to improving malaria treatment practice.

In achieving the overall purpose of the study, the guidelines for supporting the HEWs malaria treatment practice were developed. Therefore, it is recommended that using the

guidelines formulated in this study can improve both HEWs practice of malaria treatment and patients' adherence to antimalarial drugs.

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Annexure 1: Ethical clearance from UNISA



**UNIVERSITY OF SOUTH AFRICA
Health Studies Higher Degrees Committee
(HSHDC)
College of Human Sciences
ETHICAL CLEARANCE CERTIFICATE**

Date of meeting: 10 March 2011 Project No: 4773-156-7
Project Title: Evaluation of antimalarial Drug Use Practices of Health Extension Workers and Patient Adherence in Southern Ethiopia
Researcher: Kassa Daka Gidebo
Degree: D Litt et Phil Code: DPCH504
Supervisor: Prof TR Mavundla
Qualification: D Litt et Phil
Joint Supervisor: -

DECISION OF COMMITTEE

Approved

Conditionally Approved

E Potgieter
Prof E Potgieter
RESEARCH COORDINATOR

M Bezuidenhout
Prof MC Bezuidenhout
ACADEMIC CHAIRPERSON: DEPARTMENT OF HEALTH STUDIES

PLEASE QUOTE THE PROJECT NUMBER IN ALL ENQUIRIES

Annexure 2: Request to conduct research

To The Regional Health Bureau Research and Technology Transfer Department

Hawassa

Ethiopia

Re: Request to Conduct Research

I request permission to conduct a research in the Wolaita zone in the Damot Gale district. The title of my study is: Evaluation of Antimalarial Drug Use Practice of Health Extension Workers and patient adherence.

The purpose of this study is to evaluate the performance of Health Extension Workers in malaria treatment in Damot Gale district based on national and WHO malaria treatment guidelines, and patient adherence, to identify factors affecting HEWs compliance and patient adherence in order to develop guidelines to promote Health Extension Workers compliance to malaria treatment guidelines and patient adherence.

Therefore, I intend collecting data from patient medical record, health extension workers and malaria treated patients. The study will not influence the daily activity of the health extension workers. The participants will be assured of voluntary participation, confidentiality, and that they would retain the right to terminate their involvement in the study at any time should they so wish.

A research report will be made available to Regional health bureau and Damot Gale district health office.

With the best regards

Kassa Daka Gidebo

Doctoral Student: University of South Africa

Annexure 3: Letter of permission from regional health bureau to conduct the study



የደቡብ ብሄሮች ብሔረሰቦችና ሕዝቦች ክልላዊ መንግሥት ጤና ቢሮ
 South Nations Nationalities and People's Regional State Health Bureau

ቁጥር ዘክ 1-3 / 11, 416
 Ref. No
 ቀን 24/7/04
 Date

ለወላይታ ዞን ጤና መምሪያ ሰዶ

ጉዳይ፤ ለጥናት ስለሚደረግ ትብብር

አቶ ካሳ ዲካ በደቡብ አፈሪካ የንቨርስቲ ጤና ሳይንስ የዶክተራት ድግሪ ተማሪ ሲሆኑ መመሪያ ጽሁፍ በ “Evaluation of Antimalaria Drug use practice of Health Extension Workers and patient Adherence in Wolyta Zone .” በሚል ያቀረቡት የመመሪያ ፅሁፍ የዩኒቨርስቲው እቲካል ሪቪው ቦርድ (Ethical Reviw board) ያፀደቀላቸው ስለሆነ ለጥናታቸው በእናንተ በኩል አስፈላጊው ትብብር እንዲደረግላቸው እንጠይቃለን።



አንድም ሰው በእኛ አይ ቪ ኤድስ መያዝ የለበትም!!
 የጤና ምርምርና ቴክኖሎጂ ሽግግር ደጋፊ የሥራ ሂደት ባለ-ኮት
 Health research and technology transfer support process owner

ግልባጭ
 ለጤና ቢሮ ኃላፊ ጽ/ቤት
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Annexure 4: Letter of permission from Damot Gale district to conduct the study



የደ/ብ/ብ/አ/ክ/መ/ጠ/ና/ቤ/ፎ ብተላይታ ዞን ጤና
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 ቀን 26-7-04

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አቶ ካሣ ዳካ በደቡብ አፋር ክፍለ ገዢዎች ጤና ሳይንስ የደክተሬት ድግሪ ተግራ ሲሆኑ መመሪያ ጽሁፍ " በEvaluation of Antimalaria Drug use practice of Health Extension Workers and patient Adherence in Wolyta Zone" በሚል ያቀረቡት የመመሪያ ጽሁፍ የዩኒቨርሲቲው አቲካል ሪቪው ቦርድ ያፀደቀላቸው መሆኑን የደ/ብ/ብ/አ/ክ/ጤና ቤር ብቁጥር ዘሴ.1-3/11316 በ4/7/2004 በተባራ ደብዳቤ መሠረት በወረዳችን ጥናታቸውን የሚያካሂዱ ስለሆነ ለጥናታቸው በእናንተ በኩል አስፈላጊው ትብብር ሁሉ እንዲደረግላቸው እንጠይቃለን።

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 ሚካኤል ጠሰቆይ
 MICHAEL MESKELE

Annexure 5: Consent for HEWs

Dear participant

Thank you for your willingness to participate in this study. The purpose of the study is to evaluate the HEWs performance in malaria treatment and patient adherence to anti-malaria drugs in Damot Gale District, Southern Ethiopia.

Your participation in this research project involves taking part in individual interview. Individual interviews will be conducted for a period of 45 minutes to one and half hours, and where necessary, follow up interviews will also be conducted to seek further clarification or additional information. With your expressed permission, all the interviews will be tape-recorded.

The information you provide during interviews will be treated with utmost confidentiality and your anonymity is fully guaranteed. This means that your name and that of your organization/Health Post, including any identifiable features, will not be used in any reports or scholarly publications based on this research, nor will data obtained for this study be made available to outsider without your further written consent. Results from this research will be used for academic purpose only.

To the best of my knowledge there are no actual or potential risks - be they physical, psychological, legal, social or otherwise - that might result from your participation in this research project. Your participation in this study is voluntary, and you have the right to withdraw from the study at any time with out adverse consequences to you.

Your signature below indicates that you have been fully informed of the nature of this research, and agree voluntarily to participate in this study.

Participant (Full Names)

Signature

Date

Researcher (Full Names)

Signature

Date

Annexure 6: Consent for malaria treated patients

Dear participant

Thank you for your willingness to participate in this study. The purpose of the study is to evaluate the HEWs performance in malaria treatment and adherence of malaria treated patients to anti-malaria drugs in Damot Gale District, Southern Ethiopia.

Your participation in this research project involves taking part in focus group discussions which will be conducted for a period of 1 to one and half hours for 6-8 participants in each group. With your expressed permission, all the interviews will be tape-recorded.

The information you provide during focus group discussions will be treated with utmost confidentiality and your anonymity is fully guaranteed. This means that your name and address, including any identifiable features, will not be used in any reports or scholarly publications based on this research, nor will data obtained for this study be made available to outsider without your further written consent. Results from this research will be used for academic purpose only.

To the best of my knowledge there are no actual or potential risks - be they physical, psychological, legal, social or otherwise - that might result from your participation in this research project. Your participation in this study is voluntary, and you have the right to withdraw from the study at any time without adverse consequences to you.

Your signature below indicates that you have been fully informed of the nature of this research, and agree voluntarily to participate in this study.

Participant (Full Names)

Signature

Date

Researcher (Full Names)

Signature

Date

Annexue 7: The interview guide

Please tell me how you treat malaria patients? (Please tell me how you diagnose malaria, prescribe and dispense antimalarial drugs to malaria patients?)

Probing questions:

Please tell me how you diagnose malaria?

Please tell me how you prescribe antimalarial drugs?

Please tell me how you dispense antimalarial drugs?

What information do you provide to your patients during prescribing and dispensing antimalarial drugs?

How do you monitor your patient adherence to antimalarial drugs?

What intervention strategies do you suggest to improve the performance of HEWs in malaria treatment and patient adherence?

Annexure 8: Focus group discussion guide

Could you explain the process that you followed in taking your anti-malarial drugs?

Probing questions

Why do you think people do not complete anti-malarial drugs?

What strategy do you suggest to increase adherence level of patients?

Annexure 9: In-depth interview with HEWs

I= interviewer (researcher) R=respondent (HEWs)

I. Please tell me how you treat malaria patients?

R. When one patient comes to me I welcome him with warm greetings. After that I give him a chair and ask him about his health problem. We start the diagnosis with greetings because the community is living with us and we are from them. So that we first welcome them and ask them the health problem that brought them to the health post. Greeting helps us to communicate with the patients easily and if we communicate smoothly that helps us to make the patient accept and implement the treatment. Then we use paracheck/ RDT for testing of malaria.

I: Please tell me how you diagnose malaria using paracheck/RDT

R: We take blood samples from the patients' finger and put it to RDT. The RDT identifies all types of malaria so that we don't have any problem to diagnose malaria when we have RDT. But sometimes the duration of the result is more than 20mts but the guideline indicates that the RDT identifies malaria parasite in 15-20mts. Sometimes it takes 30mts. Some times after we send patients telling him/her that he/she doesn't have malaria the result becomes positive. The reason is not clear for me

I. Do you use paracheck always to test malaria?

R: There is some times shortage of parachek/RDT. At this time we diagnose the patient using sign and symptoms only. But Diagnosis using RDT is the best method for us to convince the patient about the diagnosis result and to be sure of the type of malaria

I: Please tell me the sign and symptoms which you see in the patient to test malaria?

R: Temperature in the patients body more than 37 or 38° C and symptoms such as joint pain, bitter taste in mouth, nausea or vomiting, shivering, stomach problem/pain and diarrhoea before I give the antimalarial drugs to the patient indicates also the presence of malaria in the patient

I. Do you mean that you are using both paracheck and sign and symptoms to diagnosis malaria?

R. Yes, we use both. When we have paracheck we use paracheck to confirm malaria and if we don't have paracheck we see only sign and symptoms previously. But now the health centre near to us started treating malaria and when we don't have paracheck/RDT we send patients to be tested to health centre after measuring temperature. We don't administer antimalarial drugs with out malaria parasite confirmation. But during epidemics due to patient load and shortage of RDT we prescribe antimalarial drugs by checking for fever and the other symptoms such as joint pain, bitter taste in mouth, nausea or vomiting, shivering, stomach problem/pain and diarrhoea before I give the antimalarial drugs to the patient.

I. Please tell me how you prescribe antimalarial drugs to patients?

R. After confirming the presence of malaria parasite in patients' blood we give antimalarial drugs based on their age. We have malaria treatment guideline which indicates the dose according to age and weight of patients and it is clear to us and we refer it (guideline) before we dispense antimalarial drugs.

I. Please tell me how you dispense antimalarial drugs to the patient?

(Probe: What information do you provide to the patients?)

R. When we give coartem we tell them to take in the morning and night. We also tell them to complete the dose in the three days; we tell them the number of tablets to take at one dose according to their age. When we give them chloroquine we explain them to take once a day the dose prescribed according their age. We also explain them how to keep drugs at home. At rural area at all house there is a big box made from wooden materials which used for keeping clothes. Therefore, we advise them to keep the drugs in that box because it is the safest place. We strongly tell them that if the patients don't complete the dose he cannot be cured completely. We also tell them that if you don't complete the dose malaria come again

I. How do you know whether patients understood the information you provides to them?

- R. To check whether the patient understand what we tell them we ask the patient to tell us back all information we told them. Most of times they tell us. If they don't tell us exactly the information we know that they didn't understand the dose and how to take drugs, at this condition we explain again to them and ask again to tell us how they understood the dose regimen. The philosophy of health extension program is educating the community and capacitating them to create healthy environment and making they themselves be aware of disease prevention and treatment methods. Therefore, we always educate patients to make them understand the treatment and prevention methods of malaria. Our communication is both direction and the patients also ask us anything which is not clear and we check the patient understanding by asking to repeat what we explained to them
- I. What do you think is the problem during drug prescribing and dispensing?
- R. The big problem in malaria treatment is shortage of paracheck/RDT. Diagnosis here is free. People come to us when they see some indication of fever and other malaria symptoms. Therefore, we test many people using paracheck. There are many negative cases. So that paracheck shortage occurs before antimalarial drugs. Because it is free people at this area (village) want to be checked malaria frequently. Most of people are negative so that paracheck finishes before antimalarial drugs. The other problem is shortage of antimalarial drugs. We have coartem and now we don't have shortage of coartem. But most of time s we don't have chloroquine.
- I. Do you think that patients use antimalarial drugs as you tell them (appropriately)?
- R. Some of patients do not take drugs appropriately. We are trying to make them to take in appropriate way. But some of patients do not continue taking drugs after relieve of sign and symptoms. Also they give to other person with malaria sign and symptoms in the family or in neighbour. But not more people do like this. Those don't complete the drugs are not more than 1%.
- I. What do you think the reason which people don't complete the dose?
- R. Lack of awareness. Some people who do not use appropriately think that relieve of sign and symptoms indicates complete cure. And they give the remaining dose

for anybody at neighbourhood who tells them sick and most of times they give freely.

- I. What are the major inappropriate uses of antimalarial drugs?
- R. Missing one of the doses in the day is the other problem. They miss either the morning or evening dose. They sometimes miss one of the doses per day for the coartem. But they use the dose for one time exactly as we told them. Missing the dose in the middle and not completing the dose are two big problems of non adherence.
- I. What they tell you the reasons not completing the dose and missing the middle doses?
- R. Forgetfulness is the major reason. They tell us for missing dose –I forgot dose. Especially females are busy with preparation of dinner and due to that they forget the dose. The other people tell us that I gave to other people who is sick at home or neighbour. Most of times women are busy with preparation of dinner in the night at rural area. Therefore, they forget the antimalarial drug dose at night.
- I. What do you suggest to improve the adherence?
- R. Teaching the community in wide. House to house visiting and 1 to 5 team work can improve the patient adherence. Community teaching at the meeting places is there in our kebele but strengthening it is very important. The community discussion can be conducted during development work (meeting), at school, and so on. Therefore, widely educating people can improve the drug use.
- I. Do you give the first dose in the health post?
- R. Yes we give them first dose in the health post to show them how to take and how many at once. Because if they don't take the first dose they cannot differentiate the next dose. For example if we give them the first dose in the morning it is easy for them to take the next dose at evening /night/. Because morning and evening convenient for them.
- I. How do the patients accept you?
- R. We communicate with the patients here in the health post very closely and friendly so that all of community member prefer to be treated here. They accept

our advice and education more than other health workers either at private or government. But the problem is convincing malaria negative patients to go without drugs and plasmodium vivax patients to take chloroquine. People come to us when they have pain or fever. These symptoms may not indicate malaria. When we check with RDT some patients become negative. Those patients who are negative with paracheck also want to take drugs specially they want to take coartem. The negative patients we refer to health centre. But people in this community do not like to go to the health centre for any illness even though the health centre is near to them. They don't seem to like the communication approach of health workers in the health centre. I think our approach to patients is better than those of the health centre professionals. The other problem is the drug is free here (health post). I tell for those patients with fever but negative to go to health centre. But they don't want to go to health centre.

Probe: Why they don't want to go to health centre when you refer them?

Because at health centre the drugs are not free. Here the drugs are free. Almost all of the patient's wants to take drugs and don't like to hear the word negatives. They say that "I am sick it can't be negative", convincing the negative people and referring to the health centre is more work than treating positive malaria cases. Sometimes I show paracheck to convince them especially those educated I try to show how it is negative. I explain patients how RDT identifies malaria and show the diagnosis procedure. So that the diagnosis process done with participation of patients to convince them after result. But due to the perception that only coartem effective for malaria treatment they do not take when we prescribe chloroquine.

Probe: Who told them that only coartem is effective?

The information transferred to the community previously from district affected the community perception. the information was 'for any patient with fever coartem should be prescribed' created the problem and patients understand that whenever they have fever they can take coartem to treat the fever and coartem is the best drug for any cases which related with fever and they want take it always.

I. **How do you follow/monitor the patients whether they used drugs appropriately or not?**

- R. In every village we have team which follows the patient's after treatment how they (patients) use drugs. The team leader of 5 house hold follow any sick person at that area and follow any person who is taking drugs to take appropriate and report to us. In addition to following the drug use pattern of patients, the village team led by the team leader daily follows every house-hold about malaria prevention activities and sends anybody that has malaria signs and symptoms to health post to be checked for malaria.
- I. How do you see the patient adherence level in your kebele?
- R. Most of patients use drugs according to the advice given to them but some of patients don't take antimalarial drugs appropriately. We also teach them during meeting.
- I. Probe: why the patients do not take antimalarial drugs according to your advice?
- R. Some of patients forget the time, some stop due to adverse effect, relive of malaria symptoms also the other factor, drug sharing, fear of feature shortage are reasons for not taking the drugs correctly
- I. What are mechanisms you use to improve the patient adherence?
- R. Here we teach adequately the patient to take antimalarial drugs appropriately. And also we follow (we go to patients house) patients who prescribed with antimalarial drugs. We go to their house and we ask them how they are taking drugs. We also inform the team leaders of (one to five "*ande le amist tisir*" team or team of five) the village to follow the patient. The leader also follows the patient whether he/she take appropriately and report to us about the patients' condition and how the patient using drugs daily.
- I. Please explain how the team of five (one to five "*ande le amist tisir*") leaders supports malaria treatment or patient adherence to antimalarial drugs?
- R. They (team leaders) advise village members to go to health post when they observe any sign of malaria to be checked. And they send anybody in the team five family sick to go to health post and after treatment they follow patient. After treatment the team leader and others also check whether the patient taking the drugs according to the advise given to the patient, and completed antimalarial

drug or not. They also discuss malaria prevention methods together. Team leader supervise houses about ITN usage also.

I. **What do you think the reason the people don't use the antimalarial drugs appropriately.**

R. Awareness gap. They accept when we teach them but some of them (patients) stop taking drugs after relieve of sign and symptoms of malaria, some of the patients share drugs with the children or neighbour. But we clearly tell them that malaria cannot be completely cured if drugs not taken adequately and properly. Malaria come back after one week if antimalarial drugs not taken appropriately. We also tell to the patients if you don't take appropriately the drugs are not useful.

I. **What strategy do you suggest to improve the adherence?**

R. Strengthening house to house follow up, strengthening team of five or the village team approach, widely educating the community about the effectiveness of antimalarials and malaria treatment at community meeting. Community meeting is very important to convince the community. Because they clearly learn each other in the community meeting. Because they accept what was discussed in the community than individual teaching. Training the community leaders is also important because they (community) accept community leaders more than anybody.

I. What do you think the reason for the shortage of antimalarial drugs in the health post?

R. We give reports usually after the stock outs of antimalarial drugs. I went to them (district office) last week but they (district office) don't have drugs. RDT also supplied to us fewer doses than required. Most of times we don't have problem of coartem but there is shortage of chloroquine frequently. Due to this some times we treat plasmodium vivax positive patients with coartem due to the shortage of chloroquine. But it is clearly indicated in the guideline that plasmodium vivax should be treated only using chloroquine. Delayed response from the district health office to our request is one which created the shortage also. Some times we also send request after the drugs finished in our health post. Some of health

extension workers also do not have knowledge to estimate the amount of antimalarial drugs which should be requested.

- I. Do you have any other comments?
- R. I suggest drug supply on time to us. There is also RDT shortage sometimes so that to treat malaria effectively antimalarial drugs and RDT should be supplied without interruption. Training of the health extension workers on drug requisition process and estimation of the amount of drugs to be requested is also necessary to improve the shortage of both malaria drugs and RDT.

Thank you very much for your participation

Annexure 10: Focus group discussion with malaria treated patients

Researcher: Could you please explain the process that you followed in taking your antimalarial drugs?

Participant: The HEW took blood from my finger and added it to the small instrument. Then she told me to stay outside for some minutes. The other patient, my neighbour was also sick and she (HEW) also did the same to him. After some minutes she called me and invited me to sit. She told me that my problem is malaria. She ordered me to take 'Kortom'. The HEW gave me 4 tablets of 'kortom' with glass of water and I swallowed 4 tablets at health post in front of the HEW. Then she told me to take the other doses in the morning and evening. She told me to take four tablets in the morning and four tablets in the evening for three days. I took the medicine at the evening about 8: pm with water. But I suffered a lot with abdominal pain. I took the next dose early in the morning but still I have fear of abdominal pain/Gompa Mishuwa/. After taking the drug in the next morning I became well, fever, headache and other malaria symptoms disappeared. I completed all doses like that in three days.

Participant: She (HEW) diagnosed me and told me malaria is in the body. I took 4 tablets of kortom (coartem) immediately after I reached to my house. But I become sick due to strong abdominal pain and I didn't take the next time drug (dose) in the morning due to a problem which the medicine ("Talle") causes to my body. Therefore, I escaped that time (dose) and take in the evening the third dose. I took the next day in the morning and evening but I am worried for the stomach pain due to kortom. I completed the drugs in 4 days.

Probe: Would you please tell me what the HEW told you during providing antimalarial drugs?

Participant: The HEW told me that I have malaria and gave me 24 tablets of Koartom. Then I went to home and immediately I took 4 tablets of Kortom with water. She (HEW) told me to take the drugs evening and morning. Four tablets of Kortom each time. To take enough water with Kortom. She also told me to complete the medicines in three days. She also told me that if all drugs is not taken the malaria will come again. She also told me not to give for other person. She also told me if any patient in the home or neighbour is sick to bring to the health post and not

to share the drugs with any person. She also told me to keep the drugs at clean area. The HEW also told me to take drugs with water and adequate food. She told me to take with foods such as milk and meat. But I don't have such foods. Therefore, I took the drugs sometimes at empty stomach and I was sick. I feel stomach pain I became weak.

Participant: They told me to complete the dose to be cured. But I become well after two days and cured, and I left the remaining doses and keep it for future use. I take the first 4 tablets of Kortom/coartem/ with water and there was no problem. But when I take the second dose of kortom/coartem/ it caused me abdominal pain/Gomppa Mishuwa/ and I postponed the next dose for 1 day because of fear of pain.

Participant: They told me to complete the dose to be cured. I become well after 4 doses but I continue taking the other doses because I know that malaria come again if I don't complete the dose. She told me that. Therefore, I completed all doses of antimalarial drugs because they (HEWs) told me that not completing antimalarial drugs causes malaria come back again.

Participant: The health extension workers explained me how to take Kortom. They told me that taking drugs evening and morning with out missing the dose and the time is very important to cure. They (HEWs) told me to take adequate food with Kortom but I don't have adequate food and I postponed the drug until I get the food.

Probe: How do you compare the counseling of the HEWs with other health workers?

Participant: They are treating us better than other health professional's /Hakimoch/ and health facilities. They come daily to us and ask the disease condition and how we are taking the drugs. They also better counsel us compared to other health professionals/Hakimoch/. They follow us closely. They come to us after sending us to our home. They visit us many times. Due to close follow up, now the death due to malaria is minimized very much. There is no death this year. But the problem is shortage of "talle" (medicine). Some times when we go to health post there is no medicine/Talle/. That is a big problem. The health post nearest to us helps us more. But the shortage of "Talle"/medicines/ and shortage of food to take with the kortom is a big problem.

Researcher: Why do you think people do not complete anti-malarial drugs?

Participant: When they take some tablets of kortom or chloroquine the patients become well very quickly. After taking 8-12 tablets of Kortom malaria signs and symptoms disappear. Therefore, some of patients stop taking drugs and give to other patients. But they (HEWs) clearly told us to complete the dose even there is no sign and symptoms.

Participant: Some of the patients forget to take drugs on time as ordered by the health extension worker. Some of patients do not like to take the white coloured tablet /chloroquine/. We prefer the kortom. Kortom is nice. When we take kortom it avoids malarias very quickly.

Participant: Drug sharing with the family members or neighbour and friends is common when there is no medicine at health post. They (patients) give from their drugs for some one who have fever or symptoms of malaria in the house or neighbour.

Participant: Some of patients stop taking antimalarial drugs due to side effects such as abdominal pain, fever and headache

Participant: Some of patients keep the remaining drugs for future use after relieve of symptoms due to fear of shortage of drugs in the health post

Researcher: What strategy do you suggest to increase adherence level of patients?

Participant - I think teaching the people in the village about how to take drugs and benefits, the consequences of not taking the complete dose is important because most of the people do not use drugs appropriately due to lack of awareness about benefit of taking drugs.

Participant – Sometimes we use one person's medicines for two or more due to shortage of drugs in health post. Therefore, if you increase the availability of antimalarial drugs we will not use together (share drugs each other) and it will help us to use the drugs appropriately.

Participant – most of us do not have enough food to eat before or after taking the drugs. The HEWs told us to take Kortom with adequate food. We don't have adequate food here. But if I take antimalarial drugs at empty stomach the pain in stomach affects me too much. Therefore, improving the feeding condition or availability food can improve the patient adherence to antimalarial drugs.

Thank you very much for your participation