

Process evaluation of uncomplicated malaria management in selected health facilities of Ahferom District, Tigray, Northern Ethiopia

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Abstract

Introduction: Malaria is a major public health problem in Ethiopia. Approximately 68% of the populations live in malaria risk areas. Early diagnosis and prompt treatment is one of the main strategies in malaria prevention and control. Likewise, Ahferom district shares the problem and the stakeholders had shown their interest to conduct process evaluation.

Objective: To evaluate the implementation of malaria diagnosis and treatment in selected primary health facilities of Ahferom district in 2016.

Method: Facility based descriptive case study was conducted. Focus of the evaluation was process with formative approach. Dimensions of the evaluation were availability, compliance and accommodation. Data were collected by reviewing a sample of 296 clinical records and were analyzed using SPSS version 20. It was supplemented through direct observation of health care providers practice. Finally, judgment was made based on the preset matrix of analysis and judgment criteria.

Result: Of the three health facilities, two (66.7%) provided malaria diagnosis and treatment services 24 hours/day and seven days/week. Although, there was no stock out of medical equipment, nearly 50% of anti-malaria drugs had exhibited stock out. Accordingly, the availability dimension was judged good (80%). Compliance of health care providers to the national guide line was judged fair (60%). Almost all (99.3%) of clients were not recorded their body weight and only (24%) were recorded their body temperature. Of the observed laboratory investigations, both thick and thin blood films were prepared for only 16.3% of patients. Accommodation was judged excellent (96%) in which almost all interviewed patients were satisfied by the services they rendered.

Conclusion and recommendation: The overall quality of the service was judged good. The absence of nearly half anti-malaria drugs and non-compliance of health care providers with the national guideline had found to be fair. Hence, anti-malaria drugs need to be imported through whole sellers and have to be purchased; and health care providers should be motivated to enhance compliance.

Introduction

Malaria is a mosquito-borne parasitic disease caused by one or more of four species of intracellular protozoan parasites; *P.falciparum*, *P.vivax*, *P. ovale*, and *P. malariae* which differ in geographical distribution, microscopic appearance, clinical features and potential for development of resistance to anti-malaria drugs (Peter 2001; WHO 2014). Globally, malaria is one of the most significant causes of morbidity and mortality with an estimated 3.3 billion of the world's population, living in areas of malaria risk (WHO 2012). Worldwide, an estimated 219 million malaria episodes and nearly one million deaths result from malaria infection every year (WHO 2012; WHO 2014). While malaria is endemic within most tropical and subtropical regions of the world, over 90% of all malaria deaths occur in sub-Saharan Africa (SSA) (Peter 2001). Most people

at risk of the disease live in areas of relatively stable malaria transmission (WHO 2012). A smaller proportion of people live in areas where risk of malaria is more seasonal and less predictable, because of either altitude or rainfall patterns (WHO 2012; EFMOH 2012). Very young children and pregnant women are at highest risk for malaria morbidity and mortality (Liu et al. 2012).

Malaria is the most important public health problem in Ethiopia (EFMOH 2012). Approximately 68% of the populations live in malaria risk areas mainly at altitudes below 2,000 meters with mostly unstable and seasonal transmission; and there have been an estimated 10 million clinical malaria cases annually (Addis Continental Institute of Public Health 2009; EFMOH 2004; EHNRI and WHO 2009).

Ethiopia's fight against malaria started more than half a century ago. "Initially malaria control began as pilot control project in the 1950's and then it was launched as a national eradication campaign in the 60's followed by a control strategy in the 70's." (Aynalem 2014). Since 2005, Ethiopia has strengthened the health system with the establishment and successive expansion of health extension program (HEP), allowing closer monitoring of epidemic precipitating factors at the local level. Despite significant progress in malaria control and reduction of cases considerably over the past years, it remains a major public health problem to date (Dawit et al. 2012; FMOH 2012; FMOH 2004; EHNRI & partners 2012; WHO 2013).

Unlike other sub-Sahara African countries, *P. falciparum* and *P. vivax* are the two main parasite species causing malaria in Ethiopia, with relative frequencies of about 60% and 40% respectively. This proportion varies from place to place and from season to season. In malaria epidemic situations, *P. falciparum* is the leading parasite species and causes severe, complicated manifestations and almost all malaria deaths. It has a notable biological multiplicity including an ability to develop resistance rapidly to a number of anti-malarial drugs, creating a major challenge in treating patients (FMOH 2012; EHNRI & partners 2012; WHO 2013; FMOH 2008).

Since the primary step to control malaria is ensuring universal availability of malaria prevention and treatment to all people at risk (Aynalem 2014), Ethiopia is implementing a variety of malaria control interventions that intend to improve access and equity to preventive as well as curative health services, which include timely and effective malaria treatment, selective vector control using insecticide treated nets (ITNs) and indoor residual spraying (IRS) (FMOH 2004; FMOH 2008; FDRE 2010).

Early diagnosis and prompt treatment is one of the main strategies in malaria prevention and control (FMOH 2004). Nowadays it is one of the weekly reportable diseases (FMOH 2014). For victorious management of malaria patients, health care providers at all health facilities of the health care delivery system need to follow the national guidelines (FMOH 2012; EHNRI & partners 2012).

Currently parasite resistance to artemisinins has been detected in five countries of the Greater Mekong sub

region: Cambodia, Laos, Myanmar, Thailand and Viet Nam (WHO 2014). This could be due to many factors that contribute to the emergence and spread of resistance; non-compliance of health care providers to national guide line, non-compliance of patients to drug intake, potential of the parasite to be treated by anti-malaria drugs (PETER B 2001; FMOH 2012).

Finding of this study would help program coordinators, service providers and all those concerned by providing information to create a better basis for health care planning and management to improve malaria diagnosis and treatment service.

Materials and Methods

Formative approach facility based descriptive case study was conducted at Ahferom district, central zone of Tigray region at 185 Km North West of Mekelle. One primary hospital, Enticho and two health centers, Dibdibo and Gerhu-Sernay were selected purposely from one primary hospital, 6 health centers and 22 health posts. Patients' cards diagnosed and treated for malaria between Yekatit 2007 to Tir 2008 E.C were selected using simple random method. The sample size was determined by using single population proportion formula assuming level of confidence 95%, margin of error 5% and taking the compliance of diagnosis, $P=36\%$, 10% non-response rate and using finite population factor. Of 312 total sample size, 296 patient cards were reviewed. Forty seven *exit interview*, 47 laboratory practices and 235 providers-patient interactions were assessed conveniently. Availability of resources for diagnosis and treatment of malaria, compliance of health care providers with national guideline, and accommodation of the service were dimensions of this evaluation.

Matrix of analysis and judgment scores was determined based on relevance/importance of the dimensions and the agreement between the evaluator and stakeholders (Richard et al 2002; CDC 1999). The weight of dimensions and the respective indicators were given depending on their level of relevance to the program. In each evaluation dimension, detailed indicators that were used to decide the performance of the diagnosis and treatment of malaria were listed. The values of dimensions were the sum of respective indicators, and then the sum of all dimensions was attributing to the quality of the service. Quantitative data entry was done using Epi info version 7, cleaned and analyzed

using SPSS version 20 for windows. Descriptive statistics was done using frequencies and percentages. Data obtained from different sources were triangulated and the dimensions of quality in the diagnosis and treatment of malaria were judged based on the pre-set judgment matrix. Ethical approval was obtained from the institutional review board of Mekelle University College of Health Sciences.

Results

A total of 296 clinical records of patients reviewed, 235 health care provider-patient interaction and 47 laboratory practices were observed and interview of 47 patients diagnosed and treated for malaria was also conducted from three health facilities. Malaria diagnosis and treatment were provided 24 hours/day and seven days/week in the two health facilities. Even though the third health facility is also supposed to serve 24 hours/day and seven days/week, service interruption for a day and lack of trained health care

providers on malaria diagnosis and treatment were observed in Gerhusernay health center. All health facilities had at least two functional weighing scale, thermometer and standard registration format for each OPD. Blood film staining reagents and at least one electrical microscope were also available, but lancet was in shortage three months prior to the study period in Enticho primary hospital and Dibdibo health center. Lack of Chloroquine was also observed in Enticho primary hospital and Gerhusernay health center; so that, patients were treated with Coartem. Injectable Artesunate, Artesunate suppository and Primaquine were not ever available in the health facilities. There were no information education communication materials and diagnosing procedures at the OPD of all these health facilities. Laboratory standard operating procedure was posted in all health facilities. Over all availability of trained health care providers, anti-malaria drugs, medical equipment and laboratory reagents according to pre-set judgment criteria found to be good (80%) (Table 1).

Table 1: Matrix of Judgment of availability of resources required for malaria diagnosis and treatment at Ahferom district health facilities, 2016

S. no	Indicators within health facilities	Expected	Observed	Weight	Weighted	Observed (%)	Judgment
1	At least two functional thermometers	3	3	15	15	100	Excellent
2	At least two functional weighing scale	3	3	15	15	100	Excellent
3	At least one functional microscope	3	3	20	20	100	Excellent
4	At least one trained laboratory technician	3	2	10	6.7	66.7	Fair
5	Standard malaria register available at OPD	3	3	5	5	100	Excellent
6	Full time diagnosis	3	2	10	6.7	66.7	Fair
7	Full time treatment	3	2	10	6.7	66.7	Fair
8	Anti-malaria drugs at least for 3 months	3	0	10	0	0	Poor
9	National malaria guide line	3	3	5	5	100	Excellent
Over all availability dimension				100	80	80	Good

Note: >90 Excellent, 81-90 V. good, 70-80 Good, 60-69 Fair, < 60 poor, Full time = 24 hrs/ day and 7days/week

Compliance of health care providers to national guideline

Document review: From a total of 296 patient folders/cards diagnosed and treated for malaria, 80(27%) at Dibdibo health center, 92(31%) at Enticho primary hospital and 124(42%) at Gerhusernay health center were reviewed. About 199 (67.2%) of them were males. History of fever was recorded for 202(68%) of patients and only 76(24%) of patients` body temperature were recorded. Similarly almost all 294(99.3%) of patients body weight were not recorded. All (100%) of patients diagnosis were confirmed using parasitological investigation and the identified parasite species were recorded. Nearly 69.9% of them were diagnosed for *P.falciparum*, 27.7% for *P.vivax* and 2.4% for mixed (*P.falciparum* and *P.vivax*). Right dose of Coartem and right dose of Chloroquine were prescribed/recorded for 228(77%) and 66(22.3%) patients respectively according to their age distribution. However, there was a record for two

patients (0.7%) which showed absence of drug prescription.

Provider-patient interaction: There was no barrier of communication concerning the language, all patients and health care providers were speaking local language, but no one of the health care providers had greeted the patients. At outpatient departments, 235 consultations with chief complaint of fever were observed; 74(31.5%) at Dibdibo health center,

48(20.4%) at Enticho primary hospital and 113(48.1%) at Gerhusernay health center. Among those who had history of fever, only 105(44.9%) were checked for their body temperature and almost all 230(97.9%) were not measured their body weight. Other malaria related signs and symptoms were also checked and recorded; 79(33.6%) for chills, 42(17.9%) for shivering, 139(59.1%) for head ache, nausea and vomiting. But signs and symptoms of joint/back pain, loss of appetite and history of treatment before coming to the health facility were

not checked and recorded. All (100%) of the observed patients who had history of fever were requested and sent for parasitological investigation and 47(20%) of them have diagnosed for malaria. Of these 31(66%) and 16(34%) were diagnosed for *P.alciparum* and *P.vivax* respectively. Regarding treatment, all (100%) of patients have been advised and provided the right drug, dose and duration of time as recommended by the national guideline. Regarding health education and patient information, all patients diagnosed for malaria were informed about their infection with plasmodium and to come back if no relief or conditions worsen while consuming anti-malaria. But none of the patients were advised about malaria is transmitted through mosquito bite, prevention methods (ITNs, IRS, eliminating breeding site), early treatment prevents

sever illness and death and to take enough food and fluid.

Laboratory practice observation: From a total of 47, 13(27.7%) at Dibdibo health center, 15(31.9%) at Enticho primary hospital and 19(40.4%) at Gerhusenay health center laboratory practices observation was conducted. In all health facilities, the laboratory technicians were responsible for specimen collection and new slides were used for smearing of Blood Film. Both thick and thin blood film were prepared for only 7(14.9%) of the patients and only thin smear was fixed with methanol for 2-3 minutes. For all cases, staining procedures were carried out using recommended Blood Film staining procedure and the identified parasites were reported and recorded. Hence, over all compliance of health care providers with national guideline were judged fair (60%). (Table 3)

Table 3: Matrix of Judgment of compliance of health care providers during malaria diagnosis and treatment at Ahferom district, 2016

S.no	Indicators / Proportion of malaria patients	Expected	Observed	Weight	Weighted	Observed %	Judgment
1	With history of fever is recorded	296	202	15	10.2	68	Fair
2	Who measured their temperature	296	71	15	3.6	24	Poor
3	Who measured their weight	296	2	15	0.1	0.7	Poor
4	With fever and lab requested	296	296	15	15	100	Excellent
5	Positive for malaria and species identified	296	296	10	10	100	Excellent
6	Lab with both thick and thin blood films	47	7	10	1.5	14.9	Poor
7	Treated with right drug and dose	296	294	10	9.9	99	Excellent
8	With the right advice during dispensary	47	47	10	10	100	Excellent
Over all compliance dimension				100	60	60	Fair

Accommodation of the service: A total of 47 patients of exit interview were conducted, 26(55.3%) of them were males. All participants were convenient with items which indicate waiting time, waiting room, diagnosed in separate room and working hours of the health facilities. All (100%) of patients were diagnosed in separate room, 45(95.7%) were

convenient to the working hours and 44(93.6%) were convenient to the waiting room of the health facilities. The mean waiting time of patients was 154.31min (SD +/-63.56). As a result, over all accommodation was judged excellent (96%) (Table 4).

Table 4: Matrix of Judgment of accommodation for malaria diagnosis and treatment at Ahferom district, 2016

S. no	Indicators (Proportion of patients')	Expected	Observed	Weight	Weighted	Observed (%)	Judgment
1	Diagnosed in separate room	47	47	25	25	100	Excellent
2	Convenience to the working hours	47	45	25	24	95.7	Excellent
3	Convenience to waiting time	47	45	25	23.9	95.6	Excellent
4	Convenience to the waiting room during	47	44	25	23.4	93.6	Excellent
Over all accommodation dimension				100	96	96	Excellent

Summary of evaluation dimensions: The quality of diagnosis and treatment of malaria was assessed through availability, compliance and accommodation

dimensions. The overall quality of the service pertaining pre-set criteria was judged good (75.2%) (Table 5).

Table 5: Result Judgment matrix of diagnosis and treatment of malaria at Ahferom district, 2016

Dimension	Expected	Indicators	Weight (%)	Weighted	Observed (%)	Judgment
Availability	100	9	40	32	80	Good
Compliance	100	8	40	24	60	Fair
Accommodation	100	4	20	19.2	96	Excellent
Overall quality of the service		21	100	75.2	75.2	Good

Discussion

An effort was made to assess process of malaria diagnosis and treatment service delivery using three dimensions: availability of resources, compliance of health care providers to national guideline and accommodation of the service. Based on the findings, the overall service delivery was judged good. One component of ensuring quality malaria diagnosis and treatment is availability of skilled health care providers, regular and continuous supply of all vital medical equipment, anti-malaria drugs and laboratory reagents (Peter 2001; Salam et al. 2014). Findings of this study show that there were trained health care providers in the two health facilities but lack of on job training in one of the health facilities. Although there were no stock out of medical equipment, nearly 50% of the anti-malaria drugs had exhibited stock out which could contribute for poor quality of service delivery. The study also showed that even though national guide line was present in the health facilities, it was not available at OPD in three of the health facilities. The absence of national guide line at outpatient departments could contribute to non-compliance of health care providers in their day to day activities. This is consistent with the study conducted in Angola (Fenny et al. 2014). Similarly, qualitative study conducted in Oromia and Amhara regional states showed shortage of anti-malaria drugs in some of the government health facilities (FMOH 2004).

Regarding compliance of health care providers, history of fever was documented for 68.2%, of which 24% measured body temperature of the patients treated for malaria which is lower than recommended with the national guide line (FMOH 2012); all patients suspected to malaria should be documented for history of fever and measure their body temperature. Similarly, 99.3% of patients were not measured their body weight, though weighing scale were available, which showed that non-compliance of health care providers to the national guide line. Health care providers' response why weight and body temperature were not measured was due to workload. All malaria diagnosed and treated patients were confirmed with parasitological investigation and drug prescribed for two patients were not recorded. Untreated patients diagnosed for malaria is unethical and could result in development of sever malaria, death, increase transmission rate and great social and economic burdens. Smearing a good quality blood film is essential for the diagnosis of malaria species.

In this assessment, only 14.9% of the blood film was prepared both thin and thick films which were lower compared to the national guide line and study conducted as malaria diagnostic capacity in health facilities of Ethiopia (36%) (FMOH 2012; WHO 2011). In the rest (83.7%) of observed procedures, only thick blood film was smeared. This could result in difficulty to species differentiation and to count parasite density, which is vital for treatment and follow up (FMOH 2012).

This evaluation study showed good achievement in service convenience to the patients but a significant number of patients were moderately satisfied for all accommodation dimensions which indicated that the patients still have negative feeling about the service which can results in reducing their usage of services. Availability of resources was judged good; compliance of health care providers was fair, accommodation of the service was excellent and the final judgment was good. This finding was against the national guideline. However, the structure-process-outcome model is only a servant, not a master. It should be remembered that the relations postulated to exist among input-process-outcome model is not certain. The general assumptions behind this model (Structure-process-outcome) of health care quality measurement were (Guili et al. 2015).

- If appropriate resources are available, the likelihood of their appropriate use and then achieving attainable outcomes is high.
- Resources availability doesn't guarantee quality of service. However, processes of care cannot be implemented in the absence of adequate resources.
- If healthcare is provided in compliance with standard guideline, potentially attainable outcomes will be achieved.
- If clients are convenient with the service provided, then they tend to be loyal.
- And if they are loyal, they not only utilize the service more, but also refer other clients. However client convenience doesn't guarantee the quality of service.

Conclusions and Recommendations

Based on the agreement planned with stakeholders for the 21 indicators for the process evaluation, the overall quality of the service was judged good. However, there were certain constraints in the provision of quality service. Lack of trained health care provider, interruption of laboratory reagents and anti-malaria drugs were some of the constraints from input aspects of quality. Likewise, compliance of health care providers to the national guideline was fair. All patients were convenient with majority of accommodation items. Based on these findings, training on supply management system to pharmacy technicians, avail national guide line at outpatient departments, malaria case management in-service training and laboratory quality control system.

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