

**Assessment of Five Years Trend of Malaria in
Finote Selam Town, Northwest Ethiopia**

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Abstract.

Background: Malaria is mosquito-borne infectious disease of human being caused by parasitic protozoan which belongs to the genes plasmodium. It is transmitted by the bite of mosquitoes. An estimated 190–330 million malaria episodes and 1.5 million malaria deaths occur worldwide annually. Currently 90% of all malaria deaths occur in sub-Saharan Africa. It is the fourth leading cause of death in children under the age of five years in developing countries. Three fourth of the land of Ethiopian is assumed to be malarious. The epidemiological pattern of malaria transmission in the country is generally seasonal, and highly unstable due to variations in topography and rainfall patterns. The country is working by planning different malaria control and prevention programs in the past six years in the study area. However, there were no documented evidences showing malaria burden through time. Hence the current study would fill this gap which might use to scale up and to design effective communication strategies to combat malaria.

To assess the five years trend of malaria in Finote Selam town, northwest Ethiopia, a study was conducted from 2002 to 2006 E.C trough reviewing reported documents. All patients that were recorded as malaria cases from 2002 -2006 E.C were the study population. Data collection tool was developed from data recording system of Finote Selam town Health Office. Data quality assurance was done at field level, during and after data entry. Result of the study was presented using proportions, line and bar graphs.

This study examined records of 47,299 malaria cases registered over 5 years. The maximum (13,748) microscopically confirmed cases of malaria were reported in 2012/2013. The highest peak of malaria cases occur an observed in almost all years particularly during spring (September, October and November) and the minimum malaria cases were observed during the dry seasons (December, January and February.) Regarding the identification of the plasmodium species, both species were reported in each year with *Plasmodium falciparum* being the predominant species. The respective proportion of *Plasmodium falciparum* and *Plasmodium Vivax* morbidity were 40.2% and 33.9%. In the study area, the case was more prevalent on males, 25,460 (53.8%) than females, 21,839(46.2%). Malaria is still a major public health problem. The maximum number of malaria case occurred in 2012/2013 budget year, in the spring seasons and among males. Therefore, prevention and control activities should be continued in a strengthened manner.

Key Words: five years trend, malaria, Finote Selam Town

1. Introduction

Malaria is mosquito-borne infectious disease of human beings caused by parasitic protozoan that belongs to the genes plasmodium. Malaria causes symptoms that typically include fever, fatigue, vomiting, and head ache. In severe cases it can cause yellow skin seizure, comma or death. The disease is transmitted by the bite of mosquitoes. The symptoms usually begin ten to fifteen days after being bitten. In those who have not been appropriately treated the disease may recur months later. In those who have recently survived an infection, re – infection typically causes milder symptoms. This partial resistance disappears over months to years if there is no ongoing exposure. The global malaria burden is not evenly distributed with Sub-Saharan Africa. Its occurrence accounts for 90% of global malaria cases. Malaria is one of the major causes of disease for people living in tropical and sub-tropical areas. There are four malaria species that

infect and cause disease in humans, *plasmodium falciparum*, *plasmodium vivax*, and *plasmodium malaria* and *plasmodium ovule*. The first symptoms of malaria are non-specific; the lack of a sense of well being, headache, fatigue, abdominal discomfort, and muscle aches followed by fever are all similar to the symptoms of a minor viral illness.

In Ethiopia, malaria remains one of the most public health problems despite considerable effort made to control it. Approximately 75% of the land mass is malarious and 68% of the total population lives in these areas. The Federal democratic Republic of Ethiopia, Ministry of Health estimated that there are more than 5 million clinical cases and thousands of deaths due to malaria each year. However, the epidemiological pattern of the disease varies from place to place and even from time to time. About 1 million confirmed clinical cases and 1,581 deaths were officially reported due to malaria in 2010. *Plasmodium falciparum* and *plasmodium vivax* are the two predominant malaria parasites, distributed all over the country and accounting for 60% and 40% of malaria cases, respectively. The epidemiological pattern of malaria transmission in Ethiopia is generally seasonal, and highly unstable due to variations in topography and rainfall patterns. Marked variations in the level of transmission from place to place or seasonal fluctuations in the number of cases are the main features of malaria transmission in Ethiopia. As a result of the short peak transmission and the relatively long duration of low transmission during the dry season, people are highly vulnerable to malaria due to lack of acquired immunity that comes with frequent exposure to malaria infections, resulting in the occurrence of frequent epidemics. It is estimated that three-fourths of the land below 2000 meters is malarious with two thirds of the country's population at risk. The "Dega" zone of Ethiopia (altitude above 2,500 meters) with a mean annual temperature of 10- 15 degree Celsius is malaria-free. Much of the "Woyina Dega" region (Altitude 1500 – 2500 meters) is also malaria free, especially the zone in the 2000 – 2500 meters above sea level. Malaria in Ethiopia often occurs below 2000 meters, with short-lived transmission following the rains. However, malaria epidemics have been recorded up to 2400 meters above sea level during periods when increased temperature and adequate precipitation were conducive for both vector survival and parasite development within the vector. Vectors transmitting the disease are mainly *anopheles arabiensis*. Forty-two *anopheles* species have been recorded, with distribution varying by altitudinal zone and microhabitat. Most species are confined to relatively small geographic areas; the four malaria vectors (*anopheles arabiensis*, *anopheles pharoensis*, *anopheles funestus*, and *Anopheles nili*) are widely distributed. The host, insect vectors, the parasite and the physical condition under which the transmission occurs determine the distribution of malaria in different malaria endemic zones.

The parasites develop optimally in the vector but, cease developing at temperatures 16°C or below. High humidity prolongs the life of the vector, and transmission is extended under these conditions. In the human intermediate host, the parasite must function at 37°C or higher, since the infection induces a significant rise in core temperature during the height of the infection.

1.2. Statement of the Problem

Malaria poses a tremendous public health problem across the globe. An estimated 40% of the world's population live in malaria risky areas. An estimated 190–330 million malaria episodes and at least 1.5 million malaria deaths occur worldwide annually. 90% of all malaria deaths currently occur in sub-Saharan Africa. It is the fourth leading cause of death of children under the age of five years in developing countries. According to Ethiopia's Federal Ministry of Health (FMOH), in 2008/2009; malaria was the first cause of outpatient visits, health facility admissions and in-patient deaths, accounting for 12% of out-patient visits and 9.9% of admissions. However, as 36% of the population does not have access to health care services, these figures probably under-represent the true burden of malaria in the country. Malaria transmission peaks bi-annually from September to December and April to May. Coinciding with major harvesting season it has serious consequences for the subsistence economy of Ethiopia's countryside and for the nation in

general. In addition, major epidemics occur every five to eight years with focal epidemics as the commonest form.

The overall trend is one of a gradual progression from around four-fifths of a million confirmed cases a year in 1990, to almost a million and a half in the year 2005-06 reporting period. This represents an increase of about 80 percent. The turn of the century (1999-00) marked the worst decade of malarial infections in recent history with the number of confirmed cases exceeding one and a half million a year.

Approximately 4-5 million cases of malaria are reported annually in Ethiopia. The disease is prevalent in 75 per cent of the country, putting over 50 million people at risk. Malaria accounts for seven per cent of outpatient visits and represents the largest single cause of morbidity. It is estimated that only 20 per cent of children less than five years of age that contract malaria are treated at existing health facilities.

The socioeconomic burden resulting from malaria is immense: 1) the high morbidity and mortality rate in the adult population significantly reduces production activities; 2) the prevalence of malaria in many productive parts of the country prevents the movement and settlement of people in resource-rich low-lying river valleys; exposing a large population of the country to repeated droughts, famine and overall abject poverty; 3) the increased school absenteeism during malaria epidemics significantly reduces learning capacity of students; 4) coping with malaria epidemics substantially increases public health expenditures.

Currently in Ethiopia, the national strategy to control malaria consists of three main strategies: early diagnosis and prompt treatment, selective vector control and epidemic prevention and control.

According to available reports in the study area, it is the first public health problem among the top ten diseases from 2005 -2006 E.C. And now almost more than half of the (65%) Finote Selam community is attacked by malaria .The level of community knowledge and belief about seriousness of the disease could be implicated for the observed morbidity and mortality in the Woreda. The understanding of the possible causes, modes of transmission, and individuals' preference and decision about adoption of preventive and control measures vary from community to community and among individual in the community.

1.3. Objectives

General Objective

To assess the prevalence and trend of malaria in Finote Selam town, West Gojjam, Amhara National Regional State, Ethiopia from 2002 to2006 E.C.

Specific Objectives

- d) To assess the prevalence of malaria in the Finote Selam town;
- e) To assess the trends of malaria in the Finote Selam town.

2. Materials and Methods

2.1. Study Area and Period

Finote Selam town [formerly (before 1939 E.C) called “Wojet”] is one of the five town administrations in West Gojjam zone, ANRS. It is found at a distance of 376 Km NW from Addis Ababa, the capital of Ethiopia, and 176 Km SE from Bahir Dar, the capital of Amhara Region, lying between 10.041’ N latitude and 37.016’ E longitude. The town has an altitude of

1860m above sea-level. It covers a total surface area of 4,247.9 hectares and most of the land is a plane area. The average annual temperature and rainfall is 24°C and 1,250mm respectively. It is bordered with seven kebeles of Jabitehinan woreda, i.e. Mebesh and Fetegem-Yesheret in the North, Hodansh-gatagon and Fetegem-yesheret in the North East, Arbaitu-Ensisa and Abasem-Zaguay in the South-West, Woga-tebeta in the West, Mebesh and Woga-tebeta in the North West. Consisting five kebeles (two rural, three urban), Finote Selam town administration has been established to be the main town of West Gojjam zone since 2004 E.C. Currently, Finote Selam town administration has a total population of 42,063 (21,287 males and 20,776 females) of which 1,123 are < 1 year of age, 3,813 are children under five, 9,334 are women in reproductive age, and 129 are pregnant women. It has 17 health related institutions, i.e. one governmental district hospital, one health center, two health posts, five private clinics, two pharmacies and six drug stores. There are a total of 109 health workers.

The study was conducted in the area from December 06 to June 14, 2007 E.C.

2.2. Study Design

Cross sectional study design were conducted

2.3. Variables of the Study

2.3.1. Dependent Variables.

Malaria

2.3.2. Independent variables

Sex

Season

2.4. Data Collection Method and Quality Assurance

2.4.1. Data Collection Method

The data was collected from secondary data according to the data recording system of Finote Selam town Health Office five years report.

2.4.2. Data Quality Assurance

To assure the quality of the collected data, the following measure was taken. The appropriately designed data collection instrument was used. The group members were informed that how they collect the data from the log book of the health office record. Every day the collected data were reviewed and checked for completeness and consistency.

2.5. Data Processing and Analysis

The collected data were analyzed manually after the data was collected. The result might be presented using graphs, and texts based on type of data.

2.6. Ethical Consideration

Ethical clearance letter was requested from Debre Markos University College of Medicine and Health Science Department of Public Health. This official letter was submitted to Finote Selam town Administration Office. Then, the Finote Selam governmental health institution workers were informed about the aim of the study. The employees were asked for their verbal and written consent after which we preceded our study.

2.7. Plans for Dissemination of the Result

The finding of this study might be disseminated to the college of Medicine And Health Science Department of Public Health, Finote Selam town administrator office, governmental health institutions and another concerned body, like governmental and nongovernmental bodies.

2.8. Limitations of the Study

Technicians' ability to diagnose the disease, health seeking behavior of an individual, lack of availability of some factors that may contribute to the malaria case occurrence in the study area may affect the result of the study.

3. Results

3.1 Annual Trends of Malaria Prevalence in Finote Selam

This cross sectional study examined records of 47,299 malaria cases registered over 5 years (September 2002 to August 2006 E.C). These 42,407 (90%) microscopically confirmed malaria cases were reported in the town with mean malaria cases of 3,533. There was a fluctuating trend of malaria within the last five years, with the minimum (3,595) number of microscopically confirmed malaria cases being reported in 2002, and the maximum (13,748) microscopically confirmed cases of malaria reported in 2005 E.C.

Regarding the identified plasmodium species, both species of plasmodium were reported in each year with *Plasmodium falciparum* being the predominant species in the study area and *plasmodium falciparum* and *plasmodium Vivax* accounted for 40.2% and 33.9 % of malaria morbidity respectively. From 2002 and 2004 and *plasmodium falciparum* was increasing but starting from 2005-August, 30, 2006 E.C it was decreasing.

3.2 Prevalence of Malaria Parasites in Relation to Sex in Finote Selam Town

According to our record review in the last five years in the study area, the cases were more prevalent in males than females but vary year to year. The infection rates among males were 25,460 (53.8) and females were 21,839(46.2%).

3.3 Seasonal Variation of Malaria Prevalence in Finote Selam Town

Despite the apparent fluctuation of malaria trends in the study area, malaria cases occurred in almost every month and season of the year. The highest peak of malaria cases in almost all years was observed during spring (September, October and November) and the minimum malaria cases were observed during winter (December, January and February) seasons.

4. Discussion

Malaria is a huge public health problem in terms of morbidity and burden on health care facilities, accounting for the increasing percentage of outpatient consultations in most health facilities in different regions in Ethiopia. The present study revealed that the burden of malaria was high in the study area where the most deadly species, *plasmodium falciparum*, accounted for 40.2 %. This is lower than other studies reported from Ethiopia (70%) (28); but it is higher compared to a retrospective study done in Malaysia. This difference may be due to the type of study design used, climatologically differences, altitude variations, malaria diagnosis technique variations, skill of the laboratory personnel to detect and identify malaria parasites and other factors that affect malaria case occurrences in different study areas.

The results of our study revealed that during the last five years, a fluctuating trend occurrence of malaria cases was observed in the study area. A decrease in the number of malaria cases occurred

from 2005-2006 E.C with a minimum number of malaria cases reported in 2002. However, the peak number of malaria cases being reported most recently in 2005. In every year studied the remarkable increase of total malaria cases was mainly due to an increase of *plasmodium falciparium*, which indicates that the deadly plasmodium species is common in the study area.

The reduction of malaria cases from 2005 -2006 coincides with the increased availability of the new effective drug Coartem for the treatment of *plasmodium falciparium* malaria at national and local levels. Other possible reasons for malaria reduction during this period (2005-2006) might be due to the increased attention to malaria control and preventive activities by different responsible bodies, increased awareness of the community on use of ITNs, increment of budget for malaria control and prevention activities (personal communication), and climate change at national and international levels.

Because the year 2005 was the peak period of malaria case occurrence, which seems to be epidemic and used to occur in a cyclic nature over a three to four year time period. Although the observed decline in malaria could be strongly attributed to the interventions in the subsequent years, under normal conditions the malaria situation could decline independently. There should be a mechanism whereby we can determine that the decline is due to the intervention or other factors such as climate. For example, if the epidemic does not occur over a longer time than the normal epidemic cycle. Observed results in 2005 of increased malaria case reports in the study area coincides with other reports in Ethiopia, which indicated that the usual 5 to 7 year cyclic period has currently changed and we see malaria epidemics every three to four years and also in different places.

Plasmodium falciparium was the predominant species in the study area, and accounted for 40.2% of malaria morbidity. This finding coincides with the malaria parasite distribution in Ethiopia which indicates that *Plasmodium falciparium* and *Plasmodium vivax* are the two predominant malaria parasites, distributed all over the country and accounting for 60% and 40% of malaria cases, respectively. This study also shows that currently since 2005 *Plasmodium falciparium* is decreasing and also *Plasmodium vivax* is slightly decreasing. This trend shift is similar to other recent study reports in Ethiopia carried out in Jimma. The possible reason for this trend shift since 2005 might be due to the public health importance of both species (*Plasmodium Vivax and Plasmodium falciparium*) that is frequently overlooked.

In addition, the prevention and control activities of malaria as guided by the National Strategic Plan (2006–2010) mainly focus on *Plasmodium falciparium* because it is assumed to be more prevalent and fatal malaria in Ethiopia. Other possible reasons might be climate variability.

The prevalence of malaria parasites among males (53.8%) was higher than females (46.2%). The reason seems that more males might be staying outside the home during the night time for different purpose. And Due to the fact that Finote Selam area is hot and suitable for the breeding of mosquito vector which is very essential for the transmission of the diseases. Due to these and other different reasons males are more exposed to anopheles mosquito bites, which can transmit malaria parasites.

Seasonality and year played a role in the transmission of malaria in the study area. The highest peak of malaria cases in almost all year groups was observed during spring (September, October and November). This seasonal occurrence indicates the real time for malaria transmission in the

country. In Ethiopia, the major transmission of malaria occurs between Septembers to December, while the minor transmission season occurs between April and May. Some localities also experience perennial malaria, because the environmental and climatological situations permit the continual breeding of vectors in permanent breeding sites.

In general, there was a fluctuation in malaria cases during the last five years. Many factors might be dependable for seasonal changes, e.g., climatic variables, ecological and environmental factors, host and vector characteristics, and social and economic determinants such as change in health care infrastructures. Social, biological and economic factors such as mosquito control measures, population immunity, local ecological environment, governmental policy, availability of health facilitates and drug resistances also have an impact on malaria prevalence. Although there were different malaria control activities in each year, such as insecticide spraying, elimination of mosquito breeding sites, health education about malaria, distribution of ITNs and some malaria drugs and other activities to decrease mortality and morbidity of malaria, the prevalence is still sustained. The limitation of this study was lack of availability of some factors that may contribute to the malaria case occurrence in the study area.

5. Conclusions and Recommendations

5.1 Conclusions

Malaria is still a major health problem and the deadly species *Plasmodium falciparum* was most predominant. The highest peak of malaria cases in almost all year groups was observed during the spring seasons and males are more affected than females in the study area. Therefore, control activities should be continued in a strengthened manner in the study area considering both *Plasmodium falciparum* and *Plasmodium vivax* and the seasonal occurrence of malaria.

5.2 Recommendation

To the town health administrator mayor office

- It should work on malaria prevention and control and bring down the observed disease burden in this particular community

To Health Care Providers and community health workers

- Monitoring habit of using available effective preventive and control measures by the individual households and the community could contribute much to the overall reduction of the malaria.

- Advice correct use of ITNs and promote integrated malaria vector control approaches. Health education regarding early diagnosis and prompt treatment should be given on a regular basis.

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