

## **SURVEILLANCE DATA ANALYSES OF MALARIA IN SEBETA DISTRICT, ETHIOPIA FROM 2012-2021**

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### **Abstract**

#### **Background**

Malaria is a mosquito-borne disease caused by protozoan parasites of the genus *Plasmodium*. Human malaria is endemic in 75% of the total area of Ethiopia, where the transmission is seasonal and more than 54 million people are under epidemiological risk. The severity of the disease, particularly of falciparum malaria, implies high rates of morbidity and mortality. In addition, malaria frequently affects people of the productive age and therefore has a great impact on the economy, but costs of treatment and interference with the course of educating among children are also significant.

#### **Methods**

In Sebeta Health Center, data were collected from blood smear-confirmed, previously documented malaria cases during 2012-2021. Data analyses were performed in Excel and epi.info 7.1 software. Prevalence rates were compared with Fisher exact test.

#### **Result**

During 2012-2021, from an overall examined 53,205 patients, 32,990 (62%) were female and 20,215 (38%) were male. Out of these patients, 4883 (9%) were diagnosed with malaria, and the majority (66%) of cases affected females. With regards to species distribution, 2998 (62%) were confirmed as caused by *P. vivax* and 1838 (38%) by *P. falciparum*. The highest rate of positivity was observed in year 2016, followed by 2017 while the lowest prevalence was reported in 2013.

#### **Conclusion**

In the examined period, the prevalence of malaria cases has been increasing from year to year, but showed decline in 2019 and 2020, probably due to Covid-19 pandemic because the medical work focused on the Covid-19 campaign and less patients visited health facilities. The altitude and ecology of the study area are not considered as low land. The most prevalent species was *P. vivax* and the occurrence of *P. falciparum* was in part related to immigrants from other malaria endemic areas.

## 1. Introduction

Malaria is one of the most severe public health problems worldwide, with 300 to 500 million annual cases and about one million deaths, 90% of which are reported from Sub Saharan African countries. It is the fourth leading cause of death of children under the age of five in developing countries (1).

It is mostly a diseases of poor people in developing countries and one of the leading causes of avoidable death, especially in children and pregnant women. Sub-Saharan Africa carries the bulk of the global malaria burden, with 71% of all cases and 86% of global deaths. A person in Africa dies of malaria every 10 seconds. (2)

It is estimated that three quarters of the land below 2000 meters is malaria endemic, with two-thirds of the country's population at risk in Ethiopia (3). This makes malaria the number one health problem in this country with an average of 5 million cases a year (4) and 9.5 million cases per year between 2001 and 2005. The disease causes 70,000 deaths each year and accountant for 17% of outpatient visits to health institutions. It also accounts for 15% of admissions and 29% of inpatient deaths, a figure considered to be too low given that more than a third of the country's population does not have access to health services (5).

The main objective of this study was to determine the trend and magnitude of the distribution of malaria in selected study area. The findings can also be used to influence decision makings of malaria prevention strategies. Moreover, the status of malaria is not yet determined in the present study area. This may attest missing study gaps which may open an opportunity for any intervention based on the status of the malaria in the study area of Sebeta district, Oromia Region, Ethiopia.

## 4. Methodology

#### 4.1. Study area

The study was conducted in Sebeta district, Oromia special zone or Oromia regional National state. An area is located in south western part of Addis Ababa which is 27 km distant from the capital city of the country. The district has four governmental health centers, Daleti, Alemgena, Wolette and Sebeta. The data source of the positive confirmed cases were those patients diagnosed in all health facilities, both governmental and private, which were all included in Sebeta town health center Public Health Emergency Management (PHEM) district data.

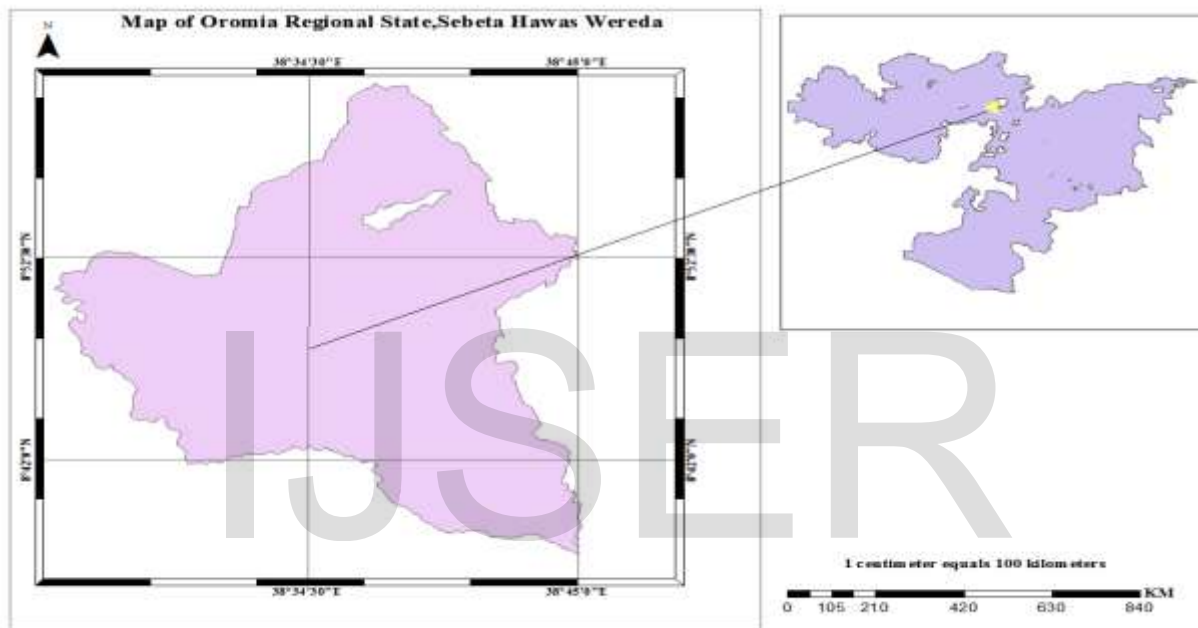


Figure 1: Map of Sebeta district, North West Shoa zone, Oromia regional state, Ethiopia, 2021.

#### 4.2. Study design

#### 4.3. The study design:

A retrospective study was conducted from previous data of malaria confirmed cases of Sebeta district.

#### 4.4. Sampling technique

Data sampling was conducted from weekly malaria surveillance of Public Health Emergency Management (PHEM) from 2012-2021.

#### 4.5 Data entry and analysis

Data collection, entry and analysis was carried out in Epi info 7.1 and Excel software application and presented in tables and figures.

## 5. Results

During the study period (2012 -2021), the incidence of malaria in Sebeta District Health Center was the highest in 2016. Out of examined 8276 patients 914 (11%) was confirmed positive to plasmodium followed by the year 2017 with 737 (10 %) out of 7186 patients. The lowest number of cases was observed in 2013 with 224 (7 %) confirmed positive cases (Figure 2).

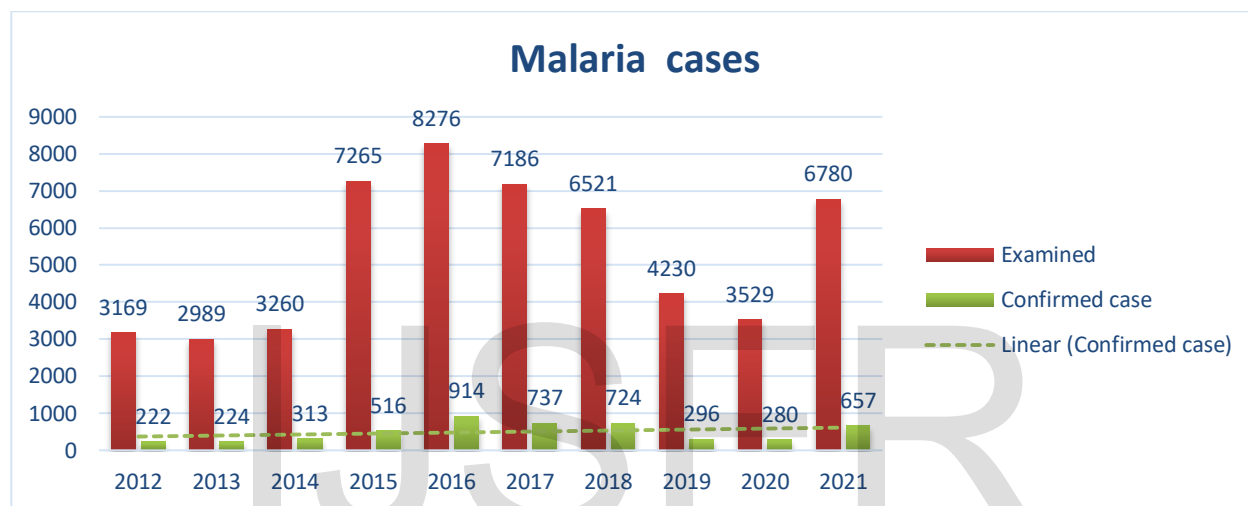


Figure 2: Distribution of malaria cases during 2012-2021 at Sebeta District Health Centers Oromia special zone, Ethiopia, 2021.

Regarding the causative agents, *P. vivax* was more frequent than *P. falciparum*, which is about 62% of the total confirmed case. In both species the most frequent case was in 2016 followed by 2017 while the lowest frequently identified and confirmed positive cases in the year 2012. As in Figure 3.

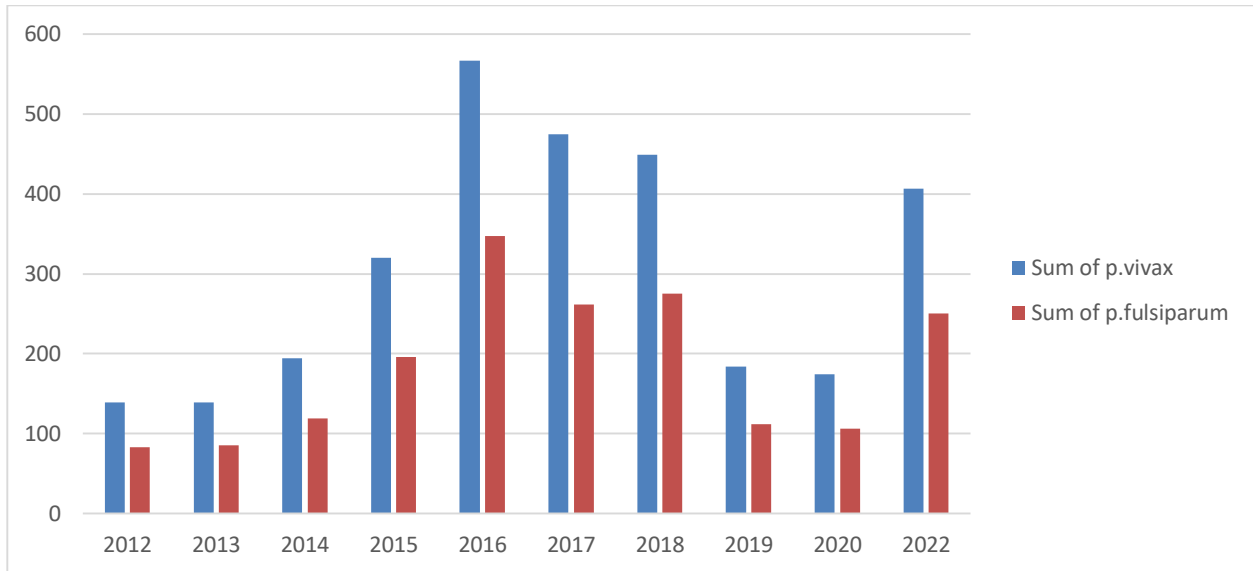


Figure 3: *Plasmodium* species distribution in Sebeta District, Oromia Region , Ethiopia2012-2021.

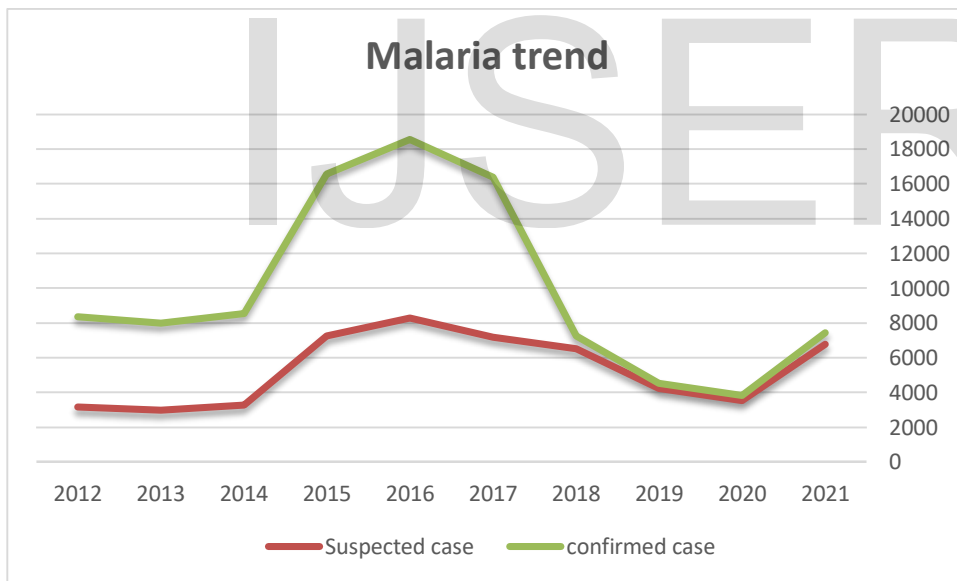


Figure 4: Trend of malaria cases from 2012-2021 in Sebeta District, Oromia Region, Ethiopia,2021

The surveillance data showed that the prevalence of the malaria confirmed cases during 2012-2021 was higher in females 3241 (66%) than in males 1642 (34%).

Regarding the seasonal trend of malaria distribution in 2016, with the highest prevalence among the years of 2012-2021, the case number increased until September, peaked in October and

declined from November. The lowest number of cases were detected in June, at the beginning of the rainy season (Figure 5).

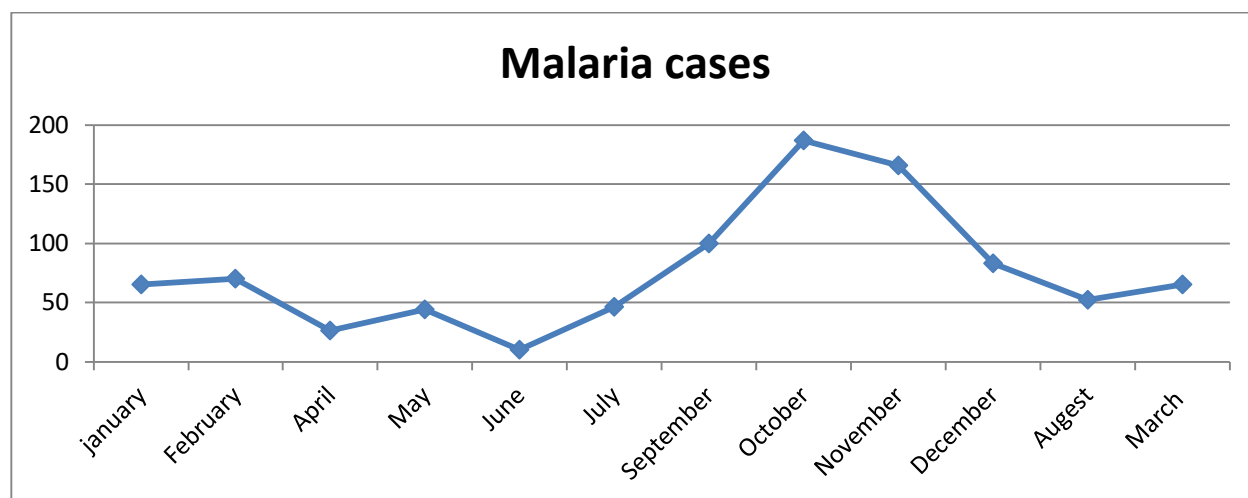


Figure 5: Trend of seasonal pattern in Sebeta district, Oromia region, Ethiopia, 2021

The trend of malaria in Sebeta district from 2012-2021 indicated that the pattern was similar for three consecutive years (2012-2014). Case number started to rise from 2014 and doubled by 2016, with similar situation and slight difference in 2017.

The overall attack rate of the malaria cases in relation to the population under risk of the health center catchment area shows 2.39-5.67%.

## 6. Discussion

The government of Ethiopia has established strategies related to human resource development, monitoring, and evaluation to control malaria and reduce the adversities it causes. However, the key goals and targets set by the government are aimed at making those areas with historically low malaria transmission, malaria free and a near zero malaria transmission in the remaining malarious areas of the country (6).

Malaria remains one of the most important causes of morbidity and mortality with enormous medical, economic and emotional impact in the world. In Ethiopia, it is a major public health

significance, and it has been consistently reported as the first leading cause of outpatient visits, hospitalization and death in health facilities across the country (7)

Our study revealed that the overall slide positive rate of malaria was (11%). This result was lower than similar studies conducted in North Ethiopia (8). Both *P. vivax* and *P. falciparum* were identified in the area and *P. vivax* (62 %) was the predominant species across all health centers followed by *P. falciparum* (38%). This goes in line with other previous study which predominantly *p.vivax* species was found in several other studies (9, 10)

Human malaria is endemic in 75% of the total area of Ethiopia, where the transmission is seasonal and more than 54 million people are under epidemiological risk. *Plasmodium falciparum* and *P. vivax* are commonly known species in Ethiopia and accounting for 60% and 40% malaria cases, respectively. (11). However, in our study, 60% of the cases were caused by *P.vivax*. Since Sebeta district is highland area, there might be relapsing cases. In addition, the occurrence of *P. falciparum* was probably in part due to immigrants from other malaria endemic areas (e.g., Gambella region) while they visited the healthy facility of the town.

Approximately 52 million people (68% of the population) live in malaria risk areas in Ethiopia, primarily at altitudes below 2,000 meters. Malaria is mainly seasonal with unstable transmission in the highland fringe areas and of relatively longer transmission duration in lowland areas, river basins and valleys. Historically, there have been an estimated 10 million clinical malaria cases annually. Since 2006, however, case numbers have declined substantially. On average, 60%-70% of malaria cases have been due to *P. falciparum*, with the remainder caused by *P. vivax*. *Anopheles arabiensis* is the main malaria vector but *An. pharoensis*, *An. funestus* and *An. nili* also play a role as secondary vectors (12).

Approximately 4-5 million cases of malaria are reported annually in Ethiopia and the disease is prevalent in 75 per cent of the country. 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 under five years of age that contract malaria are treated at existing health facilities. Below are feature stories related to malaria (13).

Due to the unstable and seasonal pattern of malaria transmission, the protective immunity of the population is generally low and all age groups are at risk of infection and disease. Some small-

scale studies have documented on malaria parasite prevalence between 10.4–13.5% in Gambella; 7.6–14.1% in Tigray; 4.6% in Amhara, 0.9% in Oromia and 5.4% in Southern Nations, Nationalities and People's Region in all age groups (14)

In the examined period, the prevalence of malaria cases has been increasing from the year 2012 until 2016-2017, but showed decline in 2019 and 2020, probably due to Covid-19 pandemic, most likely because the medical work focused on the Covid-19 campaign and less patients visited health facilities. Based on the result of the study we strongly recommend to Sebeta Health Center to pay attention the trend of malaria from year to year, and also to take an action by improving surveillance system to detect and report each cases to determine the attack rate in comparison with population at risk which helps to design the control strategy plan.

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