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Malaria Prevalence in Blue Nile State, Sudan, 2019-2022

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ABSTRACT

Background: Despite significant efforts to control and eradicate malaria, this deadly parasitic disease remains the most prevalent in the world.

Objectives: The purpose of this study is to investigate the malaria prevalence in Blue Nile State in 2019-2022.

Materials and methods: A descriptive epidemiological study was carried out in terms of malaria prevalence in Blue Nile State during the period from 2019 to 2022. Data was collected from all health facilities records during 2019 to 2022 in Blue Nile State. Data was analyzed using SPSS version 23.0.

Results: The overall mean prevalence of malaria during the period from 2019-2022 was 19.9%. There was no significant difference between mean prevalence of malaria cases during the studied years, p=.943. There was significance difference between mean of

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malaria cases during the months of the years, p=.000. The malaria prevalence was significantly increased during months of February, March as the first peak of malaria and also increased significantly during August and September months as the second peak.

Conclusion: Blue Nile State has a high prevalence of malaria during the period from 2019 to 2022. This prevalence indicated that malaria disease is still major public health problem. It is therefore necessary to maintain and support malaria control measures in the state to provide a better response to malaria infection.

Keywords: *Malaria Prevalence, Blue Nile state, Sudan, 2019-2022*

INTRODUCTION:

Malaria is a serious public health issue that continues to cause illness and death. According to data from 85 malaria endemic countries, the worldwide malaria burden increased from 227 million cases in 2019 to 241 million cases in 2020, with the majority of the rise coming from countries in the African Region (1). Due to service disruptions during the corona virus pandemic, these regions were responsible for about 95% of malaria cases, with 14 million more cases and 47 000 more deaths reported worldwide than the previous year (2). Malaria is one of the commonest diseases afflicting the impoverished in developing nations. Sub-Saharan Africa bears the brunt of the global malaria load, with the number of illnesses and deaths in the world being at an all-time high. It hurts people's health as well as economic development in many developing nations, especially in Sub-Saharan Africa (3, 4).

Malaria is spread by the Anopheles mosquito, which is the principal vector. *Anopheles arabiensis* is the primary vector, with secondary vectors such as *Anopheles phronesis*, *Anopheles funestus*, and *Anopheles nili* (5). Human infection with Plasmodium species begins with a bite from a malaria-infected female Anopheles mosquito as the insect collects its blood meal. The number and variety of mosquitoes present in a specific region, as well as the temperature, determine the risk of infection (6).

Malaria transmission is characterized by periodic outbreaks of unstable malaria occurring from unexpected climatic changes such as heavy rain or clouds in or temperate zone (46% of the land) between 1500 m and 2500 m altitude. The climatic area over 2500 m height, or chilly zone, accounts for 8% of the country and is malaria-free (7). Malaria infects about 75% of the country's territory, putting 68% of the population in danger of contracting the disease, which is estimated to kill 70,000 people each year (8). Malaria transmission in Ethiopia varies from season to season due to differences in altitude and the disease's longer duration of transmission in lowland areas, river basins, and valleys (9). There are two malaria transmission seasons when the vectors are most abundant: September to December (major transmission) and April to May (minor

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transmission), both of which coincide with the major harvesting seasons (9).

Malaria epidemics are widespread in highland or high_land fringe areas in Ethiopia, primarily 1,000 to 2,000 meters above sea level (10). Changes in one or more climate variables, such as temperature, precipitation, wind, and sunshine, are examples of climate changes (13). Malaria cases number 2.9 million per year, with 4,782,000 deaths, and the rate of morbidity and mortality increases considerably during outbreaks (8).

Malaria remains a major public health problem despite significant successes and advances in improving people health and lowering the disease's burden. It is one of the top ten major causes of sickness and mortality in a wide range of people, including children under the age of five and adults (11). Malaria is also the leading cause of hospitalization, outpatient visits, and death (11). To prevent further transmission, it is critical to screen and diagnose patients as soon as possible and treat them right away (11). The purpose of this study is to investigate the malaria prevalence in Blue Nile State in 2019-2022.

MATERIALS AND METHODS:

Study design:

A descriptive epidemiological study was carried out in terms of malaria prevalence in Blue Nile State during the period from 2019 to 2022.

Study area:

Blue Nile State lied in southern part of the country bordering from southeast Ethiopia, southwest of South Sudan and north is Sinner state. With an area of 38,000 km square and 1,250.00 populations. Blue Nile River is crossing the state from south to north fed by numbers of streams and tributes. This gives unique feature for agricultural and live stocks herding activities. Rainy season starts early in June and ends in late October. Elroseres High Dam famous hydro-electric project that supplies country with electricity and irrigation water sources, particularly Aljazeera agriculture scheme and it is rich of mechanized agriculture in Al Tadamon locality. BNS is served by number of (160) health facilities (HFs). The population at Blue Nile State depends on different water sources. Water from network, which covers approximately (25%) of the population; The other sources are out network e.g., Hand pumps, water yards, dug wells (open/closed), river, seasonal streams, open sources (shallow wells, hafeers).

Study population:

Blue Nile State Community.

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Inclusion criteria:

All patients during the period from 2019 to 2022 attending to health facilities and diagnosed as malaria was included in the study.

Exclusion criteria:

Patients with other fever not malaria.

Sample size and sampling technique:

All malaria cases reported during the period from 2019 to 2022.

Data collection:

Data was collected from all health facilities records.

Data analysis:

Data was analyzed using SPSS version 24.0. Descriptive statistics was used. P-value considered significant at less than 0.05 levels.

RESULTS:

Table 1 and figure 1 shows that the mean prevalence of malaria cases was high during the year 2020, 2021 and 2022 23.1% compared to the year 2019. The overall mean prevalence of malaria during the period from 2019-2022 was 19.9%. There was no significant difference between mean prevalence of malaria cases during the studied years, p=.943.

Table 2 and figure 2 indicates that there was significance difference between mean of malaria cases during the months of the years, p=.000. The malaria prevalence was significantly increased during months of February, March as the first peak of malaria and also increased significantly during August and September months as the second peak.

Table 1. Mean (mean±SD) of Malaria Prevalence by years in Blue Nile State, 2019-2022

| Year	Mean	SD
2019	22.6	.9
2020	23.1	.5
2021	23.1	.6
2022	23.1	.8
Total	**22.9**	**.3**

P-value = .943 (Not significant)

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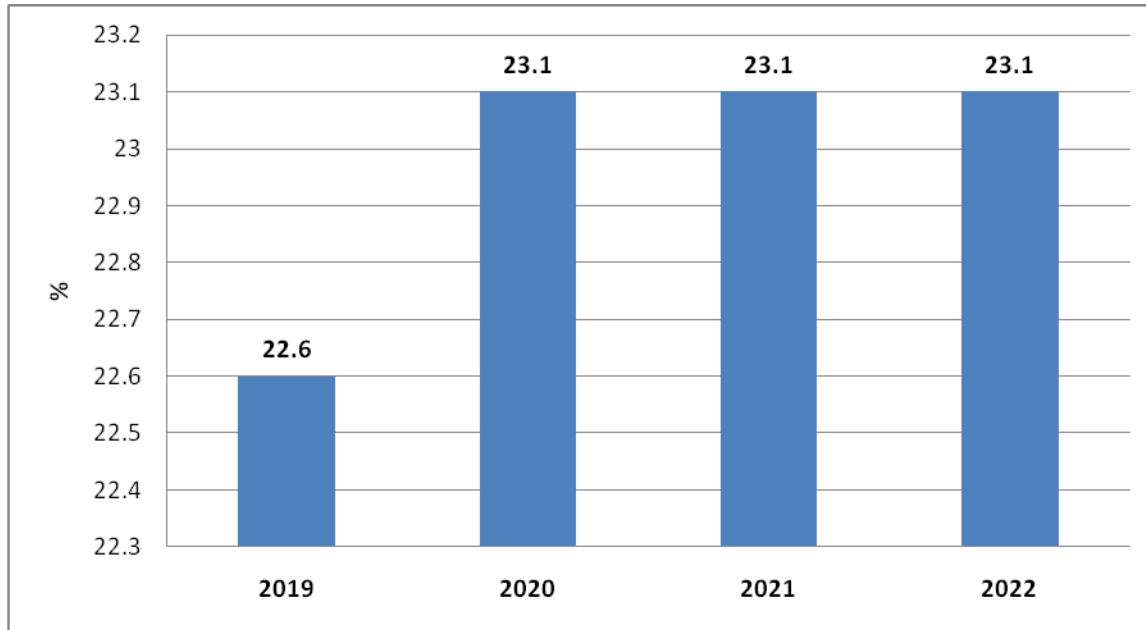
Fig.1. Mean of Malaria Prevalence by years in Blue Nile State, 2019-2022

Table 2. Mean (mean±SD) of Malaria Prevalence by months in Blue Nile State, 2019-2022

Months	Mean	SD
January	24.7	1.4
February	25.0	.84
March	25.1	.72
April	24.9	.55
May	19.9	.93
June	25.0	2.3
July	18.7	1.1
August	25.0	1.0
September	25.0	.61
October	20.0	.65
November	25.0	1.1
December	19.9	.69
Total	**22.9**	**.35**

P-value = .000 (Significant)
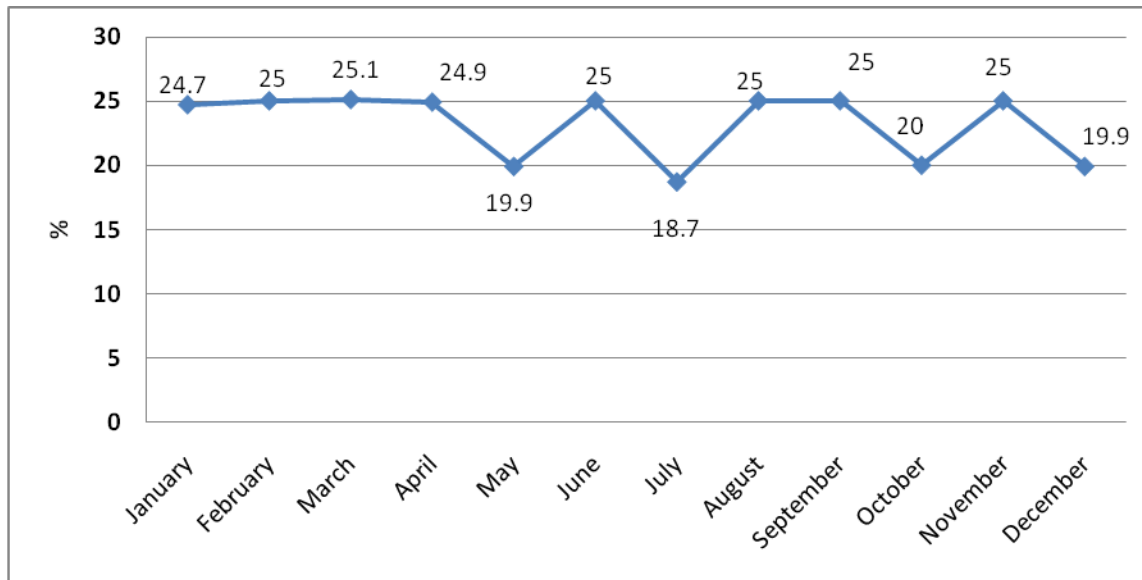
Fig. 2. Mean of Malaria Prevalence by months in Blue Nile State, 2019-2022

DISCUSSION:

This study aimed to investigate the malaria prevalence in Blue Nile State during the eriod from 2019 to the year 2022. This study indicated that the overall mean prevalence of malaria during the period from 2019-2022 was 19.9%. This high prevalence of malaria could be explained by the lack of awareness campaigns and the interrupted vector control methods during that time due to lak of finance and also due to consequence of Covid -19 pandemic till 2020. The malaria prevalence in our study was greater than that reported by, Ethiopia's south-central region, found a *Plasmodium falciparum* prevalence of 12.4%, which was similar to the current study (12). This prevalence of malaria infection is higher than those described in 2010 (17.9%) by Lekana-Douki *et al*., and in 2013 (21.2%) and lower than that conducted by Maghendji-Nzondo *et al*. (13, 14). These results are in accordance with global data that showed an increase in malaria cases during the COVID-19 pandemic (15). The implementation of pandemic's restrictive measures has led to the disruption of healthcare infrastructure, to a decrease in the finance of households (lack of financial resources to buy anti-malaria in drug stores) and consequently to a decrease in the malaria control. In this study there was significance difference between mean of malaria cases during the months of the years, p=.000. The malaria prevalence was significantly increased during months of February, March as the first peak of malaria and also increased

significantly during August and September months as the second peak. This may be returned to the availability of anopheles mosquitoes breeding habitats during winter season due to the leakage of water nets pipes during winter season, also the increased of anopheles mosquito breeding during rainy season in August and September due to more abundant of rainy ponds, rainy sewers in the Blue Nile State. This result is also consistent with those of Maghendji-Nzondo which showed a higher prevalence of malaria cases during the short rainy season, with prevalence of 26.4% in 2011 and 29.8% in 2012 (16, 17). Similarly, other studies conducted in Gabon and other areas have shown that malaria infection prevalence is higher during the short rainy season (18, 19).

CONCLUSION:

It can be concluded that Blue Nile State has a high prevalence of malaria during the period from 2019 to 2022. This prevalence indicated that malaria disease is still major public health problem. It is therefore necessary to maintain and support malaria control measures in the state to provide a better response to malaria infection.

DECLARATION OF COMPETING INTEREST:

The authors declared that there is no conflict of interest.

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