Measures of community practice and behavior to control immature stages malaria vectors in Gedarif state, eastern Sudan

قياس ممارسات وسلوكيات المجتمع تجاة مكافحة الاطوار المائية لناقل الملاريا في ولاية القضارف ,شرق السودان

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ABSTRACT

We conducted study to determine the densityof malaria vector by A Knowledge Attitude and Practice study was conducted to identify potential behavior in community for mosquito control in sites selected randomly. The abundance of larvae increases in July to august the, abundance of adult increase during august to September and high cases of malaria disease observed in August to October. .d a lack of awareness of The study showe control due of poor education and homes constructed from localmaterials. Children and pregnant women most exposed to malaria, although mosquito nets distributed to families by health authorities and most of them use nets at Night. Eighty-nine percent (89%) of participants used nets in the fall, good use was observed in Hawata. More than two person infected with malaria (31%) during sex month ago in any family participated in study. Evaluation of insecticide resistance should be carried out regularly, health authority arises awareness for modification and manipulation environmental to reduce breeding site.

Keywords: Abundance s, Attitude, Evaluation, knowledge, Practice and survey.

المستلخص

تم اجراء مسح لتحديد كثافة الباعوض الناقل للملاريا لمعرفة العادات والممارسات والسلوك المحتمل في المجتمع المحلي تجاة مكافحة الباعوض في المواقع التي تم اختيارها عشوائيا . تزداد كثافة الاطوار المائية او اليرقات في الفترة من يوليو الي اغسطس وتزداد كثافة الاطوار البالغه في الفترة من اغسطس الي سبتمبر وترتفع حالات الاصابة بمرض الملاريا في الفترة من اغسطس الي اكتوبر . واظهرت الدراسة عدم الوعي بطرق السيطرة علي الناقل بسبب فقر التعليم وطبيعة المباني التي تساعد في ايواء الناقل . اظهرت الدراسة ان الاطفال والنساء الحوامل هم الاكثر عرضة للملاريا رغم توزيع الناموسيات بواسطة السلطات الصحية ويتم استخدامها ليلا فقط. اوضحت الدراسة ان 89% يستخدمون الناموسية في فصل الخريف ,تم ملاحظة الاستخدام الجيد في منطقة الحواتة . واوضحت الدراسة ان اكثر من شخصين (31%)من الاسر المشاركة اصيبو بالملاريا خلال ستة اشهر الماضية. يجب اجراء تقييم دوري للمبيدات بصورة مستمرة للتاكد من فعاليتها , رفع الوعي الصحي للسيطرة علي البيئة من تصريف المياه وردم البرك لتقليل مصادر التوالد .

كلمات مفتاحية :تقييم ,عادات, مسح , معرفة,ممارسات و كثافة .

INTRODUCTION

In 2017, an estimated 219 million cases of malaria occurred worldwide (95% confidence interval [CI]: 203–262 million), compared with 239 million cases in 2010 (95% CI:219–285 million) and 217 million cases in 2016 (95% CI: 200–259 million). [1].

The main groups of malaria vectors in Africa are *A.gambiae,A.funestus, A.nili and A.vmoucheti*. Each of these comprise a complex or group of genetically distinct species that are similar in morphology, but vary in traits that affect their role in transmission of malaria [2]. In Sub Saharan Africa, where 90% of the world malaria cases occur, *A. gambiae* Giles, *A. arabiensis* Patton of the *A. gambiae* complex and *A. funestus* Giles from the *A. funestus* group are the most efficient malaria vectors [3].

There are four main reasons for the failure of health education in malaria control. The first reason is the type of populations that suffer from endemic malaria in poor countries or in depressed areas with low educational standard and poor housing, hygiene and general environmental conditions. Accessibility to these populations is often difficult, and the medical facilities available to them are, to say the least, scarce... A second reason is that malaria is part of a socioeconomic depression complex. A third difficulty is the nature of the disease itself, specifically the complexity of its epidemiology ...The fourth reason for failure of health education in malaria control is the methods currently employed [4].

In Gedarif State, eastern Sudan, malaria cases arise after rainfall season. The prevalence of malaria in Gedarif state is 49,812 in (2012), 25,143cases in (2013) and 50,978cases in (2014). During the Malaria Indicator Survey (2016), Gedarif state was considered as moderate incidence between other states (5.4%), carried predominantly by A. *arabiensis* mosquitoes [5].

Malaria intervention in Gedarif state relies only on controlling the adult stage of the vector (IRS, LLINs and space spray). Major challenges to mosquito adultciding include the emergence of pyrethroid resistance for the primary malaria vectors in diverse areas of the African continent [6].

The Study objective are Measure malaria vectors abundance and breeding sites in 6 villages in Rahad area Gedarif state. Determine the impact of environmental management of immature stages of malaria vectors, through larvae source management. Identify role of human practices and behaviors that increase larvae source sites and their role in larval control.

Materials and Methods

Study Design

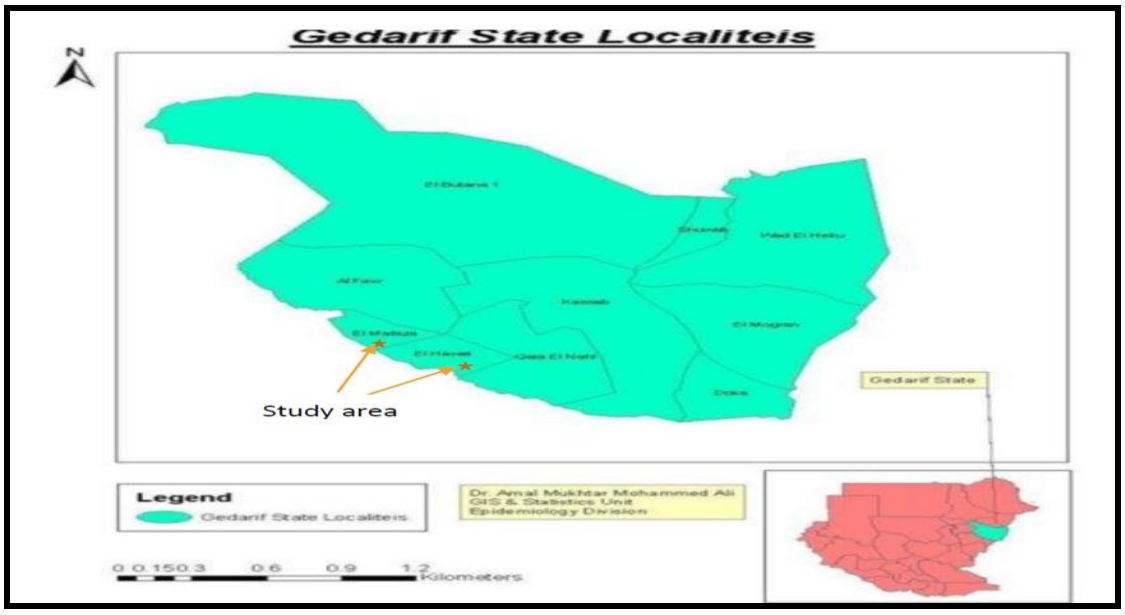
A cross sectional study was Conducted to determine the abundance of immature and adult stages of malaria vectors in study area and Conducted Knowledge, Attitude and Practice (KAP) study to identify potential behaviour in community for mosquito control through questionnaire.

The study was conducted in two localities**:** Mafaza locality (Mafaza, Abu Rakhm, Eltinadba, and Banat Sharg) and Rahad locality (Hawata, Ingas), Gedarif State. The Villages was selected randomly between all Mafaza and Rahad Villages in 2018 -2020.

Study area

Gedarif state is one of a most important states in the Sudan and play great role in economical and agricultural activities in the country. lies between latitude 14-16 north and 33-36 E longitude. It is a part of eastern region, border by Khartoum state in North, sinnar State in the South, Kassala State, Ethiopia in the East and Gezira State in the West. A population of state is estimated 1,827,181. Poor savannah, Clay and muddy soil, average of rainfall is 612 /ml. there are many mountains scattered through the State, many forests, there are many Rivers passes through the State (Atbra, Elrahad, Saitit and basalam)

Malaria transmission stared after rainy season during September to November cases rise, Plasmodium falciparum responsible for more than 90% of cases and the principal vectors involved in malaria transmission are *An. arabiensis* [7].



Map1, showed Gedarif localities

Sample size by:

$$n = \frac{N}{1 + N(e^2)}$$

n=sample size =population (households) e=level of precision

Materials required for study

Format of larvae and Adults collection and questionnaire to measure human practice and behavior

Larvae equipment

Dipper, larval net, large tray, pipette, specimen tubes (vials), alcohol solution (Ethanol 70%), cotton wool, a pencil, and safety match or lighter and a wide-mouthed vacuum bottle.

Adult equipment

Spray sheet: White cotton sheets (sizes 2m x 1m, 2m x 2m and 2m x 3m); hand sprayers; permethrins Iresol; small Petri dishes; paper cups; hand lens; forceps; a container (or preferably a picnic box) for transporting mosquitoes; cotton wool; filter paper; a torch **[8].**

Data collection: Data were collected by a team of four interviewer's public health officers, trained by the researcher for one day in how to fill the questionnaire according to the study objectives and methodology with practical and field training on data collection tools.

Data analysis: The collected data was interred to excel sheet software and analyzed using suitable inferential statistics in addition to descriptive statistic (mean, median, percentage).

Results

Pre survey to determine the abundance of immature and adult to undertaken to measure the abundance of malaria vectors adult, the number increase during august and September (Fig. 4.1, 4.2), breeding sites abundance of larvae increase in July to august (Fig 4.3 and 4.4) in study area.

The results of the present study reveal that high cases of malaria disease observed in August and October 2018 in the study site due to the rainy season presented in figure (4.5), the rain been stopped during August and start again in September that provide new source of breeding site larvae in study area.

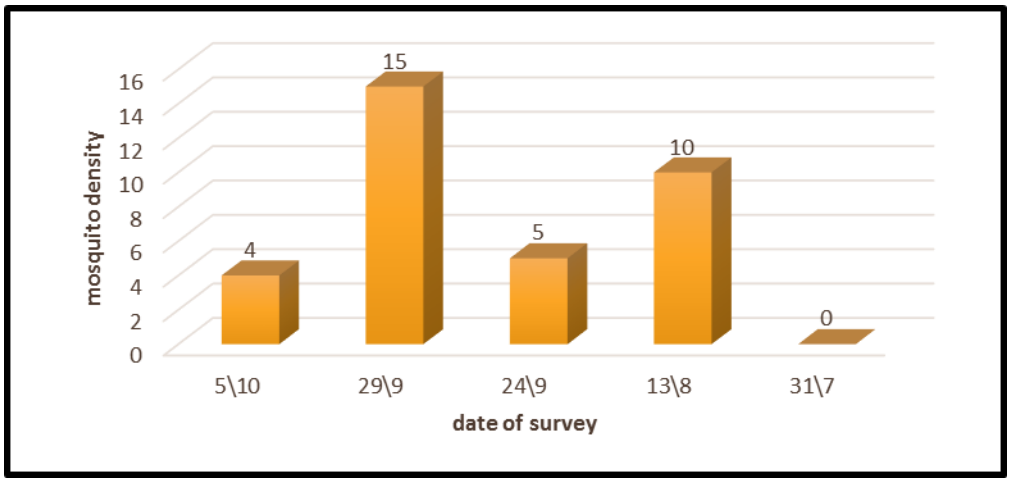


Fig (4.1) **mosquito collection of adult mosquito in Hawata, 2018**

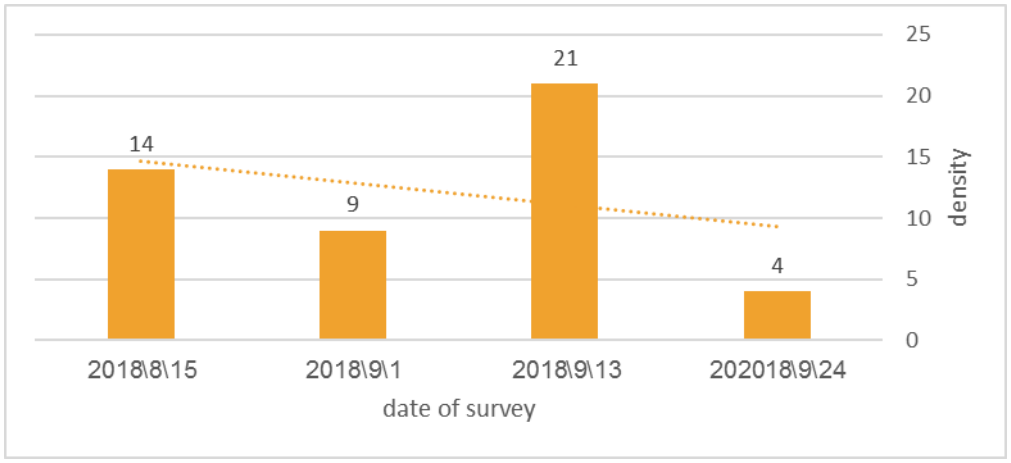


Fig (4.2) **adult mosquito collection in Mafaza city**

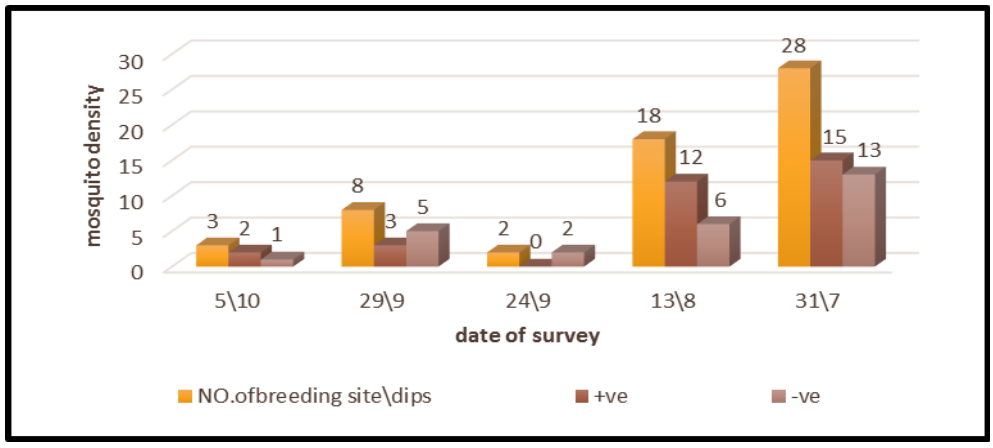


Fig (4.3) **mosquito larvae in Hawata city, 2018**.

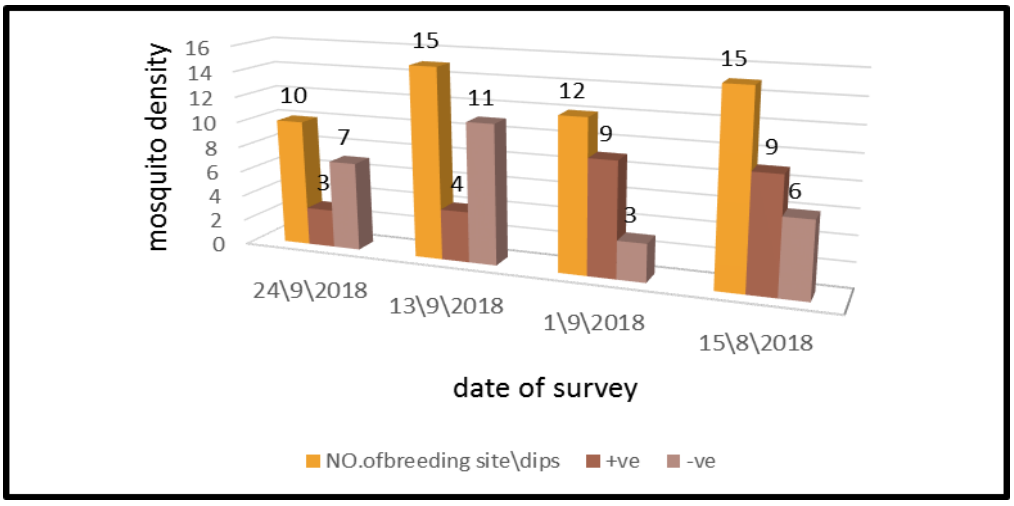


Fig (4.4) **Mosquito larvae collection in Mafaza city,2018.**

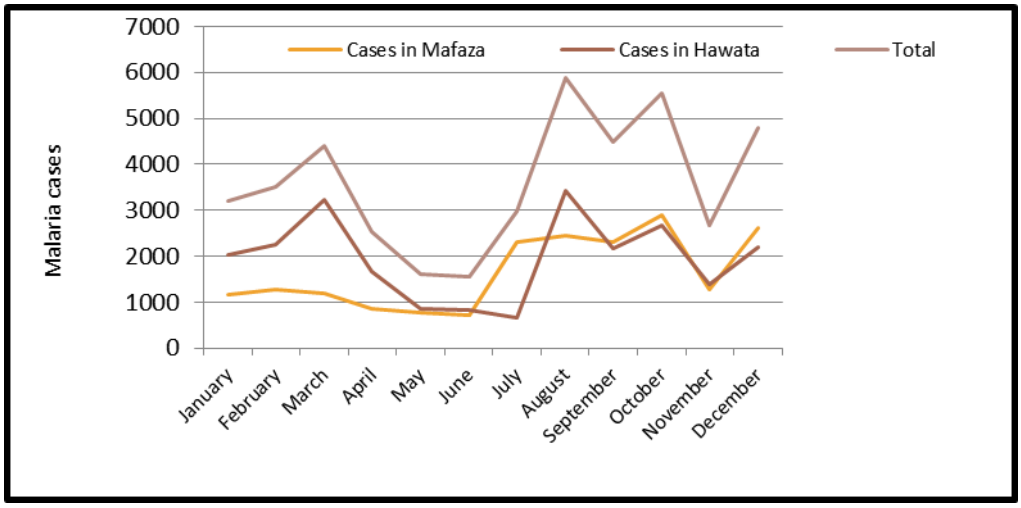


Fig (4.5) **high cases of malaria observed in Rahad and Mafaza localities August and October,2018**

The study results of community behaviour (Knowledge Attitude and Practice), presented in figure (4.6). Low income of the participant was observed in Aborakham (75%), Regarding the education in Alangas area a majority of the participants have khalwa education only (Fig. 4.7) however, most of families have more than three children under five in Altnidba. The results of the present study reveal that the majority of house (78%) build with local material

The results of the present study show that most of families were utilized LLINs and Know how to protect family member against mosquito bite (fig 4.8). The present study confirmed that most of the participant people believe malaria is a fatal disease, must protect themselves and families, 94% of the participants used mosquito net for night sleep. and 89% of participate utilize bed net in autumn season, good utilization observed in Hawata (Fig. 4.9), Participants families'

response that health authority explains and encourage member families how to prevent themselves from malaria by utilizing mosquito net, 38% Participants families' utilization LLINS in early rainy season and sources of LLINs they owned by health authority (Fig. 4.10). The results of the study showed that the most of vector breeding site is temporary site, 69% of larvae sources site is rainfalls water, the most of breeding site were ditch in Aborakham and majority of breeding site were puddles Altnidba, 17% of characteristic of breeding in clear water and 54% turbid water (Fig.4.11). More than 41% of family member infected with malaria during last six months, at least one person that showed in (Fig 4.12), in Altnidba 91% of cases were infected in autumn season, but in Hawata malaria cases occur during all season.

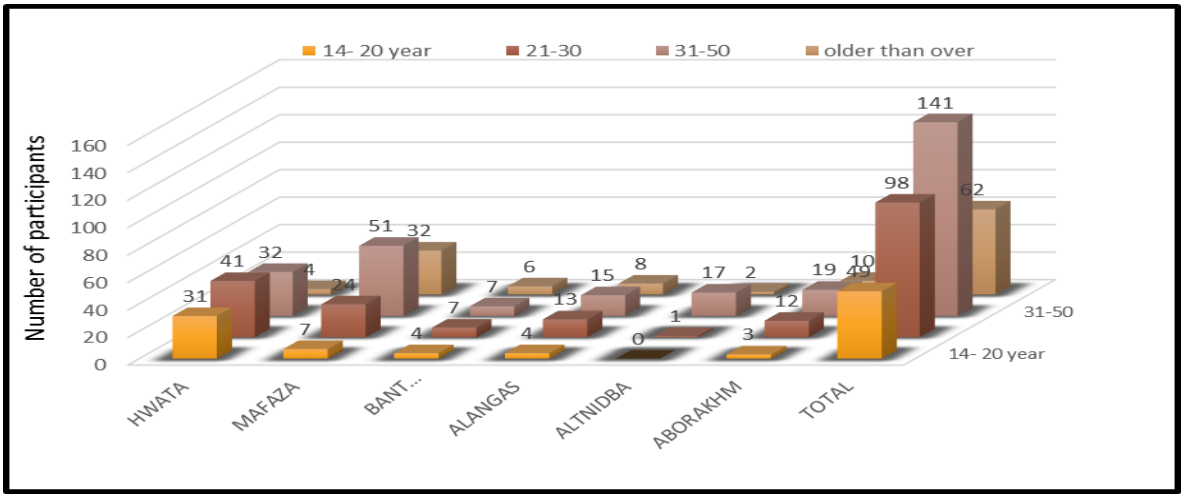


Fig. (4.6**) Age of participation in Rahad and Mafaza localities, Gedarif State**,2018.

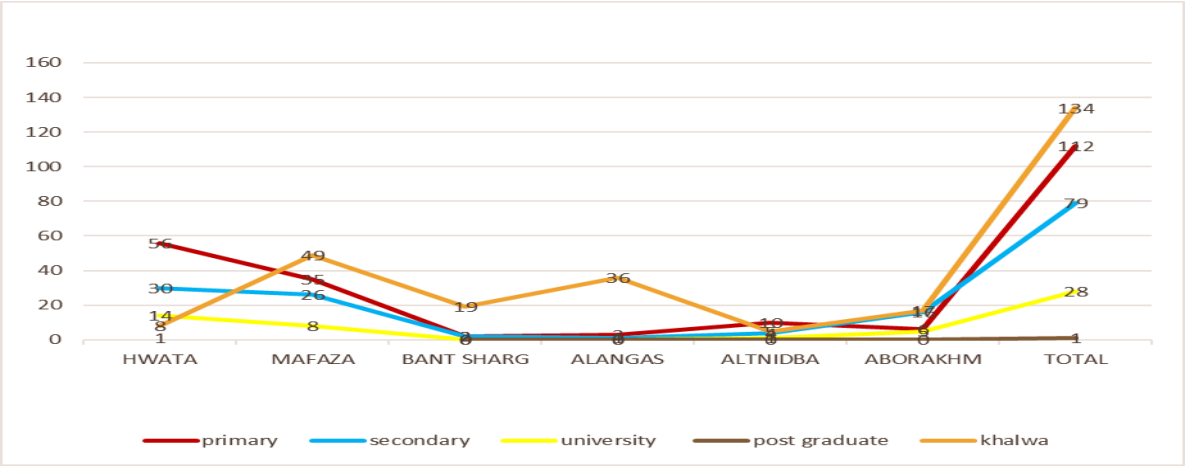


Fig. (4.7) Explain The education level in study, Rahad and Mafaza localities, Gedarif State

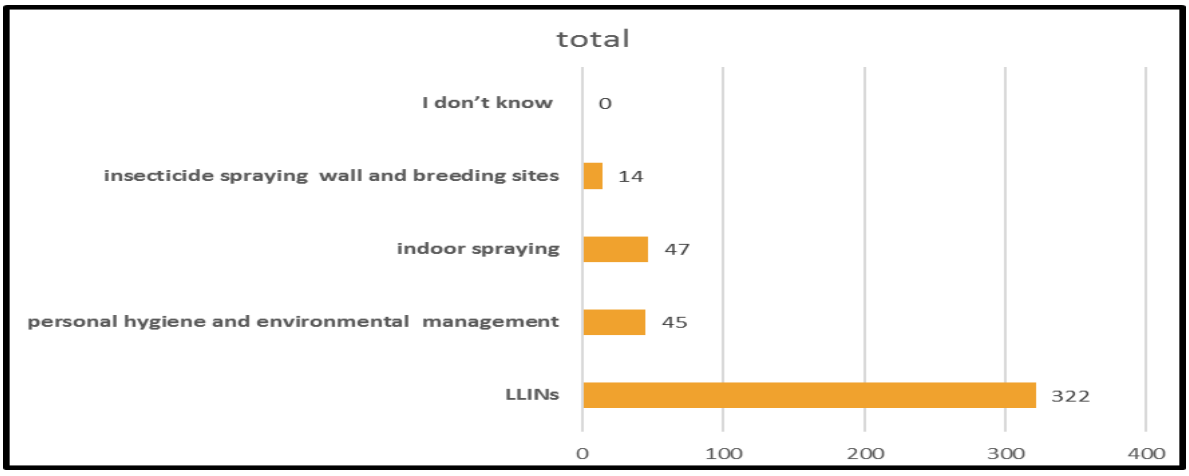


Fig. (4.8) Personal and family protection from mosquito bite, Rahad and Mafaza localities, Gedarif State

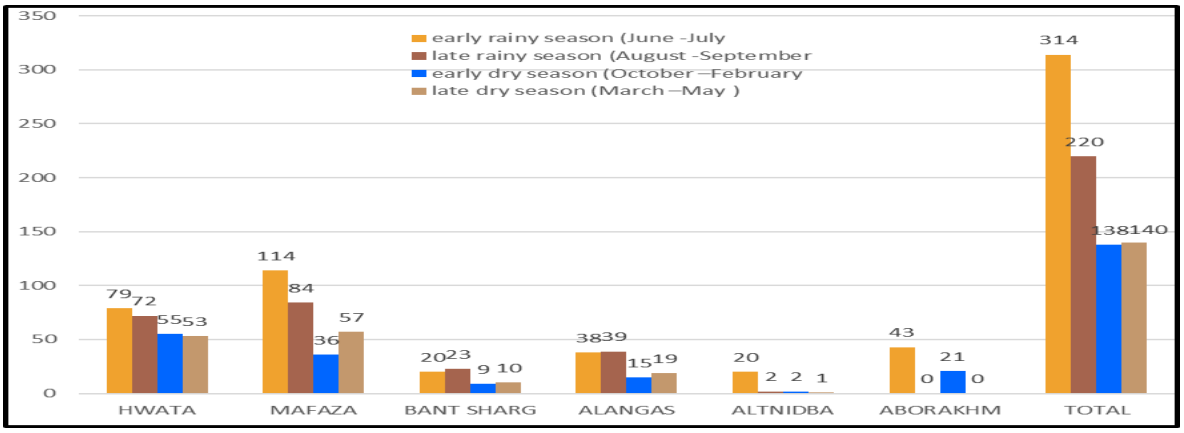


Fig. (4.9) Participant's response seasonal utilization of LLINS, Rahad and Mafaza localities, Gedarif State,

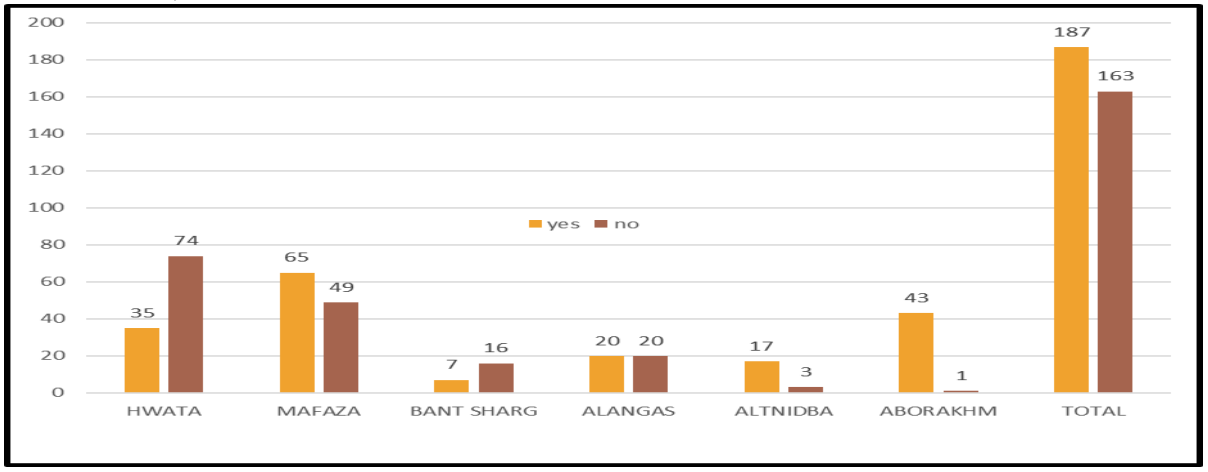


Fig. (4.10) Participants family's response that health authority explains and encourage member families how to prevent themselves from malaria by utilizing mosquito net, Rahad and Mafaza localities, Gedarif State.

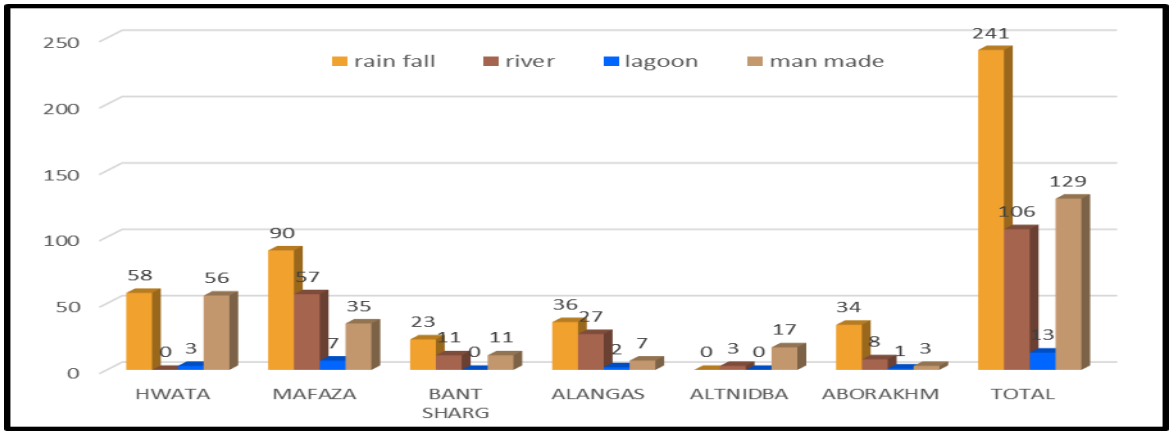


Fig. (4.11) Source of breeding site in Rahad and Mafaza localities, Gedarif State

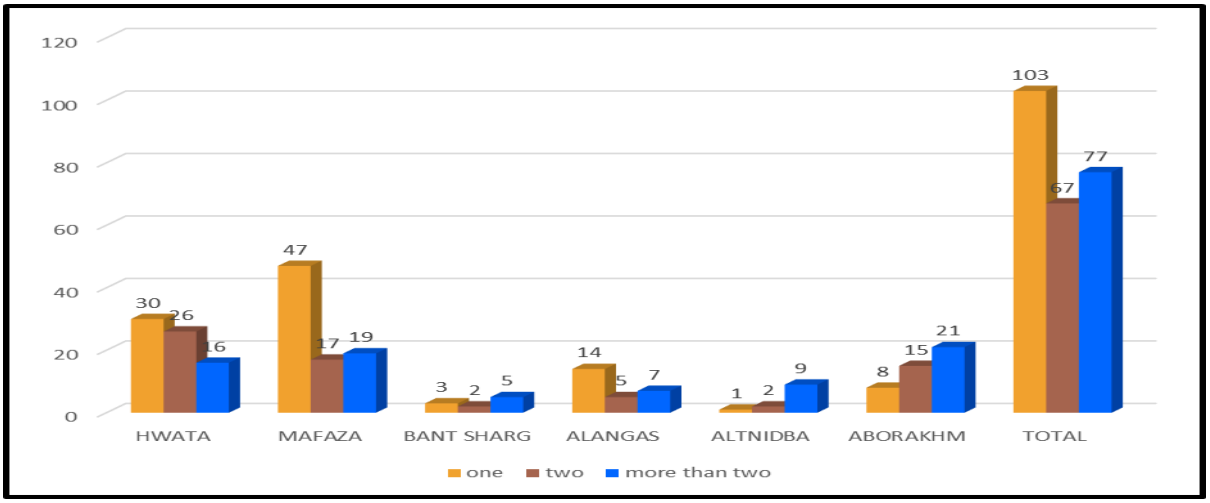


Fig. (4.12) Family member infected with malaria late six months of the year 2018 in Rahad and Mafaza localities, Gedarif State,

Discussion

The study result was observed a malaria vectors, adult abundance increase during august and September in Rahad area Gedarif state, breeding sites and abundance of larvae increase in July to august and high cases of malaria disease observed in August and October2018, the rainy season patterns separate during august and continue in September that led to new larvae source in study area in the season, that agree of malaria transmission depend on climatic condition that may affect the number and survival of mosquitos, such as rainy season patterns [9].

we conducted knowledge, Attitude and practice, that obtain the age of participation (40%) between 31-50 year and 50% of participate them female, the majority of people complete Khalwa education level, that lead to weakness in awareness of community for vector control knowledge and practice, that agree study conducted in Nyabondo, Western Kenya that obtain more than half (53.8%) reported to have attained primary education [10]. majority of house structure (78%) build with local material that corresponds conducted in bariango, kenya obtained poorly constructed house had higher malaria cases [11]. Most of families get LLINs by health authority. these similar to result in rural communities of Benue state, Nigeria [12]. Most of people believe the malaria it serious disease must be protecting yourself and family, these agree world malaria report obtain more than 229 million clinical cases of malaria occurred and 409000people died of malaria in2019 [13]. More than89% of participate utilize bed net in autumn season, good utilization observed in Hwata, that agree study conducted in same area it obtained the most of people (94%) used mosquito net for night sleep and 61% of the households used bed nets after sunset directly [14]. the most of breeding site in study area is temporary site and the majority (69%) of larvae sources site due to rainwater, that agree physical environmental factor such as temperature, humidity and rainfall were support the existence of anopheles' mosquito breeding place [15].

Malaria cases in participated families obtained more than two people were infected with malaria infectious (31%)during sex month ago, in Altnidba 91% of cases occurred in the last rainy season, but in Hawata malaria cases occur during all season. in Mafaza 78% of participate didn't know the causative factor of malaria disease, but in Aborakham 68%they realize the causative factor of malaria disease and 53% of participate realize the control method of malaria disease .in Mafaza and Banat (79%,63%) of participate used traditional fumigation method for control malaria vector; all over was agreed, malaria knowledge was poor and only 48%associated malaria with mosquito bite. other measure used by villagers to prevent mosquito bite were smoke and coils [16].

Conclusions

- The age of participation (40%) between 31-50 year and 50% of participation was female. the majority of people complete Khalwa education level, it leads to weakness in community for awareness vector control practice and knowledge.
- Most of families (71%) had one women in productive age and majority of house structure (78%) build with local material.

- Most of families get LLINs by health authority, more than89% of participate utilize bed net in autumn season.
- Most breeding site in study area is temporary site and the majority (69%) of larvae sources site as result of the rainwater.
- People infected with malaria (31%)during sex month ago, in Altnidba 91% of cases occurred in the rainy season, but in Hawata malaria cases occur during all season.

Recommendations

- A malaria vectors adult abundance increase during august and September, breeding sites increase in July to august in Rahad area Gedarif State, temephos should be used to reduce breeding sites.
- Intensive Health education to change the practice of utilizing LLINs in all season for protect against mosquito and other insects

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