Sapporo Medical Journal
Volume 55, Issue 01, January, 2021

Overview of malaria cases in Pesawaran District in 2018: a description study

SUMIATI BEDAH[1], LUKMAN[2], SYAHRIZAL SYARIF[3], DEBRI RIZKI FAISAL[4], MARTINA[4], APRIZAL SATRIA HANAFI[4]

[1]Doctoral Program of Epidemiology, School of Public Health, Universitas Indonesia
[2]Universitas Sari Mutiara Medan
[3]Department of Epidemiology, School of Public Health, Universitas Indonesia
[4]Alumnus of Master of Epidemiology Program, School of Public Health, Universitas Indonesia

Abstract— Malaria is one of the public health problems that can cause death. In 2017 it was estimated that 219 million cases of malaria occurred worldwide with 435,000 deaths globally.This study was conducted to see an overview of malaria cases in Pesawaran District in 2018. This is a descriptive study by analyzing according to people, place, and time to see an overview of malaria cases. Data analysis uses Stata and Microsoft Excel applications, and it is presented in tables and graphs. Malaria cases in Pesawaran District in 2018 were more prevalent in males (65%), in adults (51%), in Labor/Farmers/Fishermen (40%) followed by Students (25%). Malaria cases increased in JulyNovember with peak cases in October (222 cases). Most malaria cases were in Hanura Public Health Center, 491 cases. Most malaria cases were from indigenous cases (932 cases). Examination of malaria cases in Pesawaran District used microscopy 334 cases and examination used RDT 601 cases. Based on the results of laboratory tests, the most common type of plasmodium was Plasmodium Vivax (72%). Malaria cases were more prevalent in males than females, in adults, in Labor/Farmer/Fisherman, and increasing in July-November.

Keywords: Malaria, Descriptive Study, Pesawaran, Plasmodium Vivax

Introduction

In 2017 an estimated 219 million cases of malaria occurred worldwide, up from 217 million in 2016.In 2017, there were an estimated 435,000 deaths from malaria in general (WHO, 2018).Malaria is one of the public health problems that can cause death, especially in high risk groups namely infants, toddlers, and pregnant women.In addition, malaria directly causes anemia and can decrease work productivity (Ministry of Health of Republic of Indonesia Kementerian Kesehatan RI, 2011).

Approximately 55% of regencies/cities in Indonesia fall into the endemic category, with endemicity varying from low to high, and about 26% of the population is domiciled in endemic areas. Of these, 81% came from Maluku, North Maluku, Papua, West Papua and NTT (Ministry of Health of Republic of Indonesia Kementerian Kesehatan RI, 2017c).

Nationally, malaria cases during 2011-2016 tend to decrease, namely in 2011 the API figure of 1.75 per 1000, in 2013 as much as 1.38 per 1000, in 2014 to 1 per 1000, in 2015 to 0.82 per 1000, until 2016 to 0.84 per 1000 inhabitants with the number of cases 218,450.It is targeted that by 2030 Indonesia can achieve malaria elimination.The condition of a malaria-free area is Annual Parasite Incidence (API) below one per 1,000 inhabitants and there have been no cases of malaria in the local population for 3 consecutive years (Ministry of Health of Republic of Indonesia Kementerian Kesehatan RI, 2017d).

Lampung province is one of the endemic areas of malaria. Api malaria per 1,000 inhabitants by province in 2013-2016 tends to decrease, although in 2013 it increased in the following year from 0.34% to 0.55% (Ritawati and Supranelfy, 2018). Pesawaran Regency is one of the regencies in Lampung Province with a high category of malaria cases in Indonesia because it has API >5% which is 7.5% in 2017.

Based on malaria endemicity data from the Health Office of Pesawaran Regency in 2015, it shows that most villages in pesawaran regency are villages without malaria casesOf the 144 villages there are 18 high case insidence villages, 10 medium case insidence villages, and 2 low case insidence villages, while the other 114 villages are villages without malaria cases (Pesawaran District Health Offices, 2017). Based on the background above, the author is interested in conducting a descriptive study on the picture of malaria cases in Pesawaran District in 2018.

Method

Sources of data in this study are secondary data obtained from the Malaria Patient Register, Lampung Province Health Profile, Pesawaran District Health Profile and Central Bureau of Statistics of Indonesia. The subjects of this study were all patients registered in the malaria patient register in Pesawaran District in 2018 with a total sample of 935 cases. The variables that can be seen in this study were age, sex, occupation, time of occurrence of malaria cases, and the place of occurrence of malaria cases.

Data were analyzed descriptively according to people, place and time to see the description of malaria cases in Pesawaran District in 2018. Data analysis using Stata and Microsoft Excel applications then the data is presented in tabular and graphical form.

Results and Discussions

Pesawaran District is a lowland and highland area, partly from hilly to mountainous areas with altitude from sea level that varies between 0 m to 1,682 m. The altitude is a good place for breeding Anopheles mosquitoes (Rosada, 2014). Low lying areas were mostly found in lakes and swamps. Lagun and marshes were potential breeding places for malaria vectors to form naturally.

In this area vector breeding sites were also formed due to human activities such as abandoned ponds, gutters (Pesawaran District Health Offices, 2017 Dinas Kesehatan Kabupaten Pesawaran, 2017).In Indonesia vector confirmation has been carried out from 1919 to 2009, and during that period there were 25 species found positive carrying malaria parasites.

According to the breeding place, malaria vectors can be grouped into 3 types, namely breeding in rice fields, hills/forests and beaches/streams (Ministry of Health of Republic of Indonesia Kementerian Kesehatan RI, 2011). Based on several methods of catching mosquitoes in Pesawaran District, 16 species of Anopheles were found, namely An. barbumbrosus, An. nigerrimus, An.nitidus, An. peditaeniatus, An. sundaicus, An. barbirostris, An. annularis, An. Minimus An. kochi, An. aconitus, An. tessellatus, An. vagus, An. subpictus, An. indefinitus, An. maculatus and An. hyrcanus group (Ritawati and Supranelfy, 2018).

Overview of Malaria Cases

Annual Parasite Incidence (API) in the Pesawaran Regency location over a span of 10 years (2008-2017) is quite volatile. Annual Parasite Incidence (API) in Pesawaran Regency over a span of 5 years (2013-2017) including areas with high case incidence (HCI) because it has an API> 5% (Ritawati and Supranelfy, 2018).

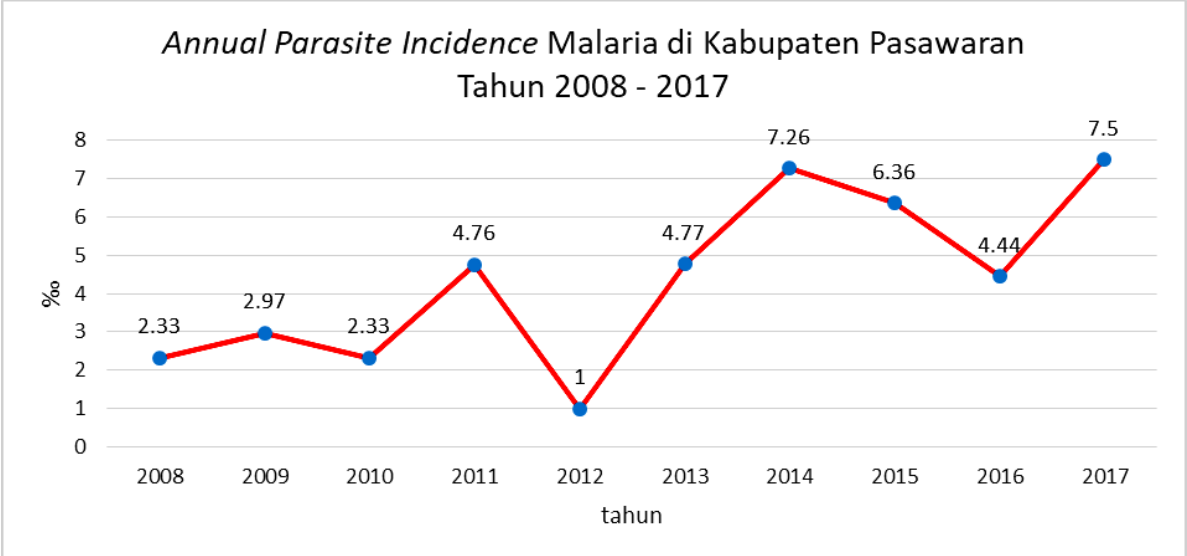

Figure. 1 Annual Parasite Incidence of Malaria in Pesawaran District in 2008-2017

Annual Parasite Incidence (API) per 1,000 population is the number of malaria positive sufferers in an area compared to the population at risk of malaria in that region. In 2012 1 per 1,000 population, in 2013 it increased to 4.77 per 1000 population, in 2014 to 7.26 per 1000 population, in 2015 to 6.36 per 1000 population, and in 2016 it decreased to 4.44 per 1000 population .

The results show that the highest Pesawaran District API in 2017 is 7.5 per 1000 population during the 10 year period (2008-2017) (Dinas Kesehatan Kabupaten Pesawaran, 2017). Based on monthly reports on malaria discovery and treatment, there were 3,037 cases and 3 malaria deaths in 2014 (CFR 0.10%). In 2015 there were 2,712 cases and 2 deaths due to malaria (CFR of 0.07%). In 2016 there were 1,915 cases but no deaths from malaria were found (Ritawati and Supranelfy, 2018).

Person Characteristics

The following is a description of malaria cases according to people by sex, age group and occupation.

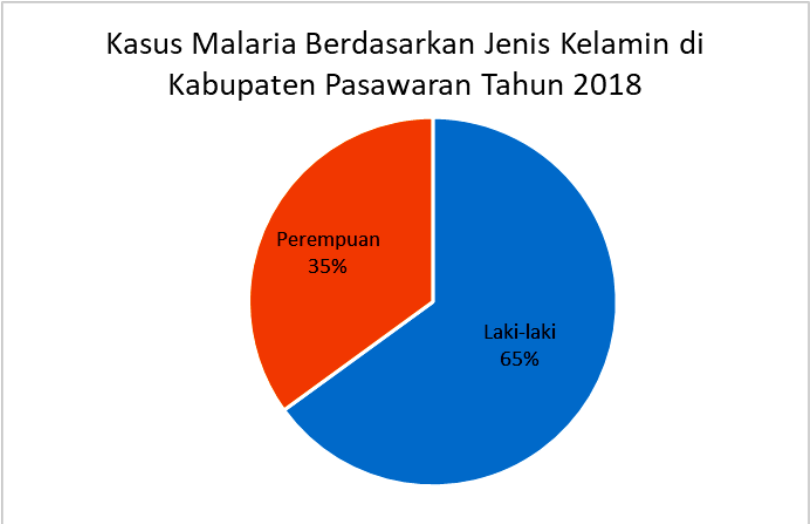

Figure. 2 Malaria Cases by Gender in Pesawaran District in 2018

Malaria cases in Pesawaran District in 2018 were more in men than women. Malaria cases in men were 607 cases (65%) and 328 cases were in women (35%). This is in line with study by Susanti and Wantini in South Lampung where malaria cases were more prevalent in males (71.1%) than in females (28.9%) (Susanti and Wantini, 2014).Basically everyone is at risk of getting malaria, it's just that men are at higher risk of getting malaria than women because they do a lot of activities related to the environment such as farming, raising livestock, managing ponds. This is a habitat for vector mosquitoes (Mayasari et al, 2016). This makes it easier for men to be infected with malaria because of activities outside the home until late at night (Susanti and Wantini, 2014). Based on age groups, the most cases of malaria were in adults, which is 478 cases (51%). Malaria cases are also found in the toddler age group 33 cases and the elderly 25 cases (Table 1).

Table 1. Cases of Malaria by Age Group in Pesawaran District in 2018

Age Category (Year)	**n**	**%**
Toddlers (0-5)	33	4
Children (6-12)	219	22
Teenagers (13-25)	180	20
Adilts (26-55)	478	51
Elderly (>55)	25	3
Total	**935**	**100**

Analysis of 2013 Basic Health Research data shows that ages 25-34 are the most at risk of contracting malaria (Mayasari et al, 2016). In addition, toddlers under 5 years old are also the groups most vulnerable to malaria.In 2017, they accounted for 61% (266,000) of all deaths from malaria worldwide (WHO, 2018). Increasing the prevalence of malaria until the age of 20-30 years, shows the activity out of the house at this age is quite large, so that exposure to vectors also becomes greater.The clinical pattern of malaria is significantly dependent on the age factor of the patient and the immunological experience of the patient in the past, thus the dynamics of transmission and age of the individual are important to be considered as the host's immunologic response (Rosada, 2014).

Table. 2 Cases of Malaria by Job in Pesawaran Regency in 2018

Job	**n**	**%**
Labor/Farmers/Sailors	365	40
Students	231	25
Housewives	171	18
Trader/Enterpreuneur	59	7
Government employee/Police	58	6
Not working	37	4
Total	**935**	**100**

Based on the type of work, the most malaria cases occurred in Labor / Farmers / Fishermen namely 365 cases (40%) and in Students 231 cases (25%). The occurrence of malaria in people who work as fishermen has a greater risk probability. This is consistent with the results of the 2007 Basic Health Research data analysis, where the field of work of farmers or fishermen has a significant relationship with the incidence of malaria. This is supported by the results of studies in Thailand and the Philippines which show that work that is suitable for mosquito vector bite activities, such as going to the forest at night or staying there during the rainy season for logging activities will increase the risk of transmission (Mayasari et al, 2016).

Time Characteristics

The number of malaria cases in January-July was relatively stable, but in July-November there was a significant increase in cases with a peak in October of 222 cases.

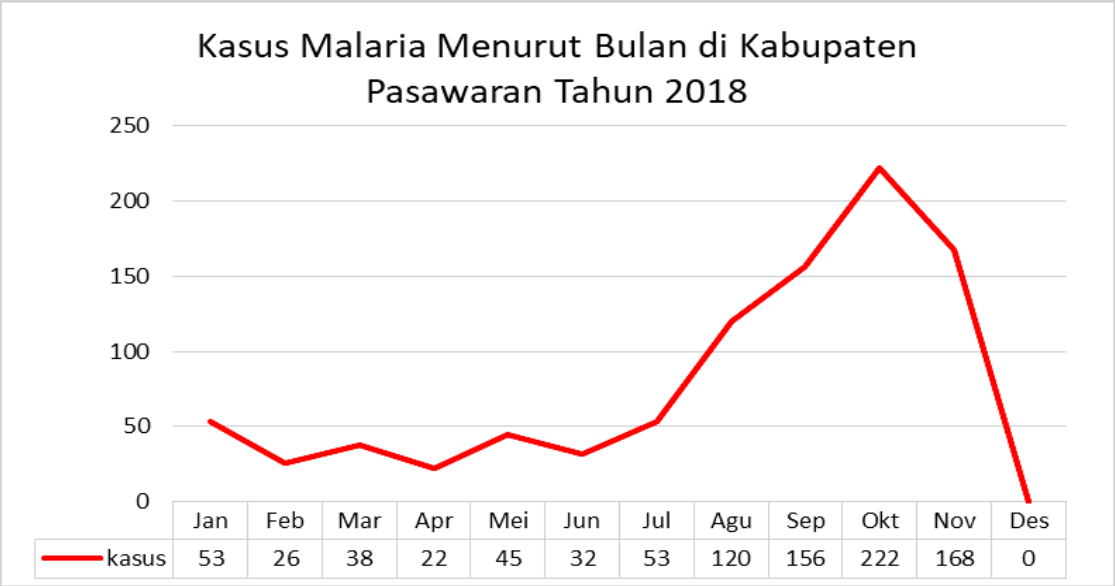

Figure 3.Cases of Malaria by Time Per Month in Pesawaran District in 2018

Significant increase in cases in August, September, October and November is strongly influenced by climatic conditions where the season is the rainy season.The presence of rain will increase the number and types of puddles that were previously little or no in the dry season, thus increasing the likelihood of an aquatic cycle in the mosquito's life cycle. According to research conducted in the District of Rajabasa there are many other factors that influence the incidence of malaria such as the density of Anopheles mosquitoes such as rainfall, water temperature, water depth, water flow, humidity, wind, altitude, sunlight, pH, water salinity, dissolved oxygen, aquatic plants and animals (Pratama, 2015).

Place Characteristics

The description of malaria cases according to puskesmas where the most malaria cases are found in Hanura Public Health Center (PHC) is 491 cases.

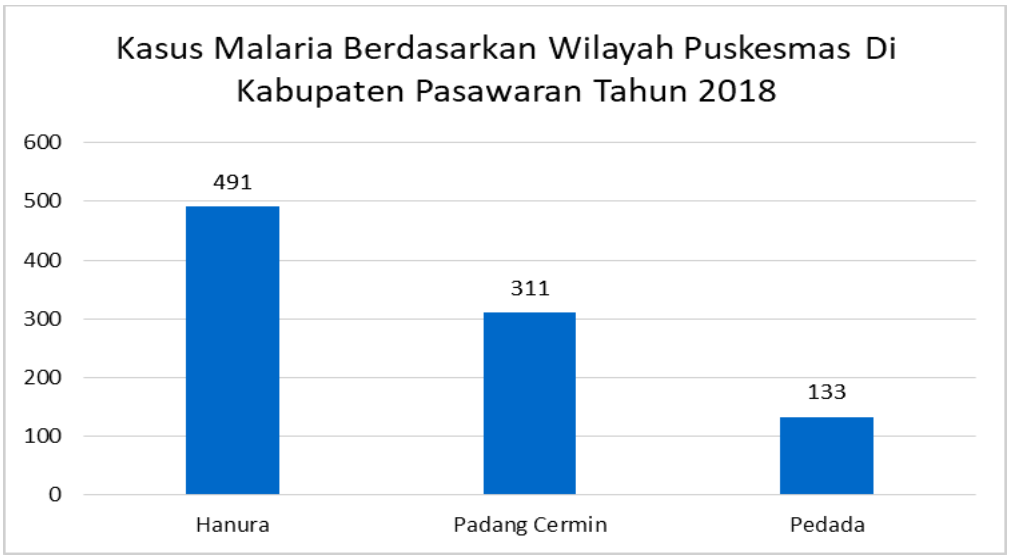

Figure.4Cases of Malaria by Region of PHC in Pesawaran District in 2018

In 2016, positive malaria cases only occurred in 4 working areas of puskesmas, namely Hanura PHC (with the highest number of cases, 1,738 cases), Padang Cermin PHC (91 cases), and Pedada PHC (82 cases). While 9 other PHC were not malaria-endemic areas, but at Gedong Tataan PHC there were 4 cases of malaria. Total cases of malaria were 1915 (31.21%) of 6135 suspects (Dinas Kesehatan Kabupaten Pesawaran, 2017).

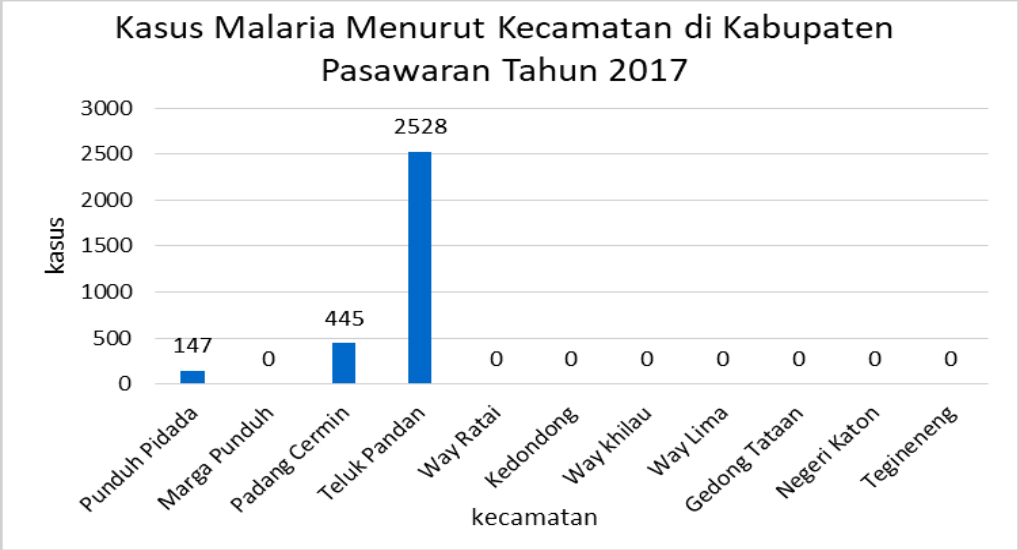

Figure.5Cases of Malaria by Subdistrict in Pesawaran District in 2017

In 2017, malaria cases in Pesawaran Regency were found in 3 districts namely Pidada District, Padang Cermin District and Teluk Pandan District. The district with the most malaria cases was Teluk Pandan District (Hanura PHC), which was 2528 cases.

In 2016 positive malaria cases only occurred in 4 PHC working areas where Hanura PHC had the highest number of cases, 1,738 cases (Pesawaran District Health Office, 2017). This shows that Teluk Pandan

Subdistrict is an endemic area with the most cases of malaria each year, although it has decreased every year. The topographical condition of the Hanura PHC working area is part of the coast and paddy fields, so that there are many ponds, lakes and rice fields suitable for mosquitoes. (Hermawan, 2016).

Malaria often forms a limited cluster / group, a very limited flight distance of mosquitoes in the range of 400 meters does not allow transmission of transmission to develop into a wider area except for some variables that affect for example there is human mobility between regions, the spread is still epidemiological areas.

Malaria endemic areas are usually remote areas (Rosada, 2014).

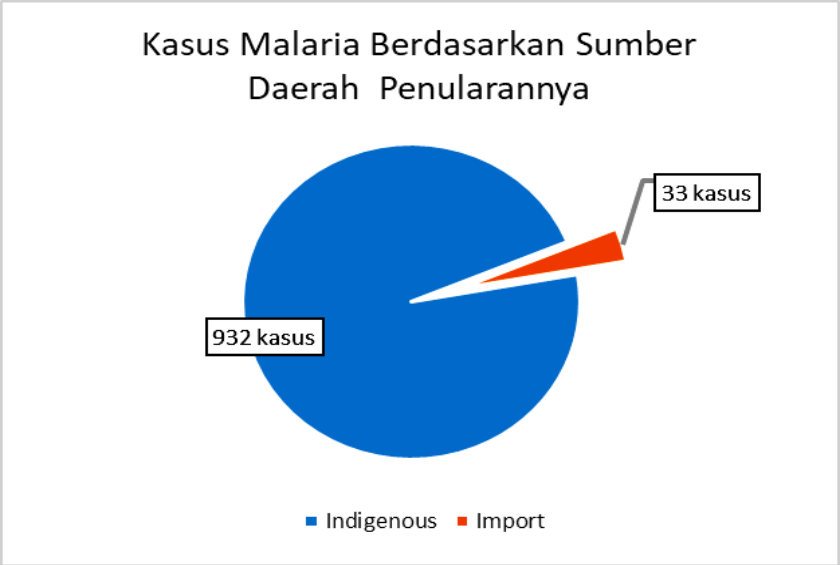

Figure.6Cases of Malaria Based on the Source of Transmission Area

Based on the graph of malaria cases in Pesawaran District in 2018 most of them came from indigenous cases, only a small proportion of imported malaria cases were 33 cases. This shows the high rate of malaria transmission locally in Pesawaran District, which means that Pesawaran District is an endemic area with High Case Incidence. The occurrence of this indigenous case shows efforts to eradicate malaria through two main programs namely vector elimination and ineffective treatment (Setiadi and Santjaka, 2016).

Plasmodium falciparum and Plasmodium vivax wethe highest causes of malaria. Clinical manifestations of Plasmodium falciparum are gastrointestinal symptoms; hemolysis; anemia; icterus; hemoglobinuria; shock; malaria allergies; cerebral symptoms; pulmonary edema; hypoglycemia; kidney failure; disorders of pregnancy; retinal abnormalities; and death. Plasmodium vivax, which also causes malaria, has different clinical manifestations from Plasmodium falciparum, including chronic anemia; splenomegaly; and splenic rupture (Setiadi and Santjaka, 2016).

Malaria Parasite examination is a blood test for patients suspected of malaria, both microscopic and rapid examinations with the Rapid Diagnostic Test (RDT).Patients tested positive for malaria if the microscopic examination found Plasmodium sp. in his blood or if the RDT test is positive (Ministry of Health Republic of Indonesia, 2017b). The following types of examinations were carried out in malaria cases in Pesawaran District in 2018.

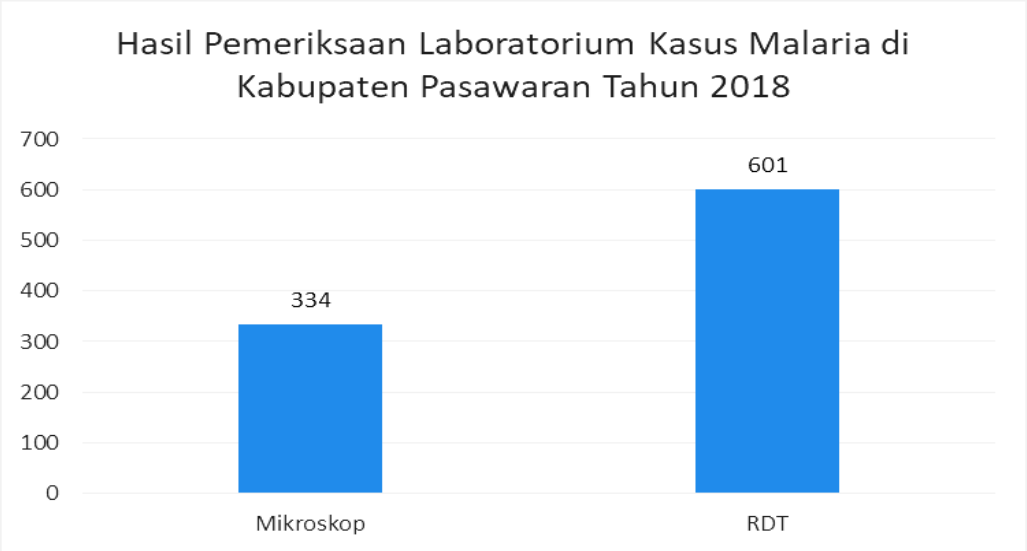

Figure.7Types of Laboratory Examinations for Malaria Cases in Pesawaran District in 2018

Examination of malaria cases in Pesawaran District using 334 microscopy cases and examination using RDT 601 cases. Patients with clinical symptoms of malaria need laboratory examination/confirmation so that the results are accurate so that treatment can be given quickly and accurately. Indicator percentage of confirmed malaria suspected cases (with microscopy / RDT) with a target of 95% and indicators of positive malaria cases treated according to the standard (ACT) with a target of 85% is part of the priority program for the 2016 President's Promise (Kementerian Kesehatan RI, 2016).

Microscopic examination of suspected malaria blood preparations is a benchmark (gold standard) for establishing malaria diagnoses and by macroscopic examination can determine with certainty its Plasmodium species. Besides examination of malaria parasites can be done with RDT in certain conditions (Kementerian Kesehatan RI, 2017c).One of the malaria control program policies to achieve elimination in Indonesia is that all clinical malaria sufferers found and searched by health service facilities must be diagnosed or confirmed microscopically. For health service facilities that do not yet have microscopic abilities, it is carried out with a rapid diagnosis (RDT), so there is no more patient treatment without laboratory confirmation to prevent malaria drug resistance (Kementerian Kesehatan RI, 2017c).

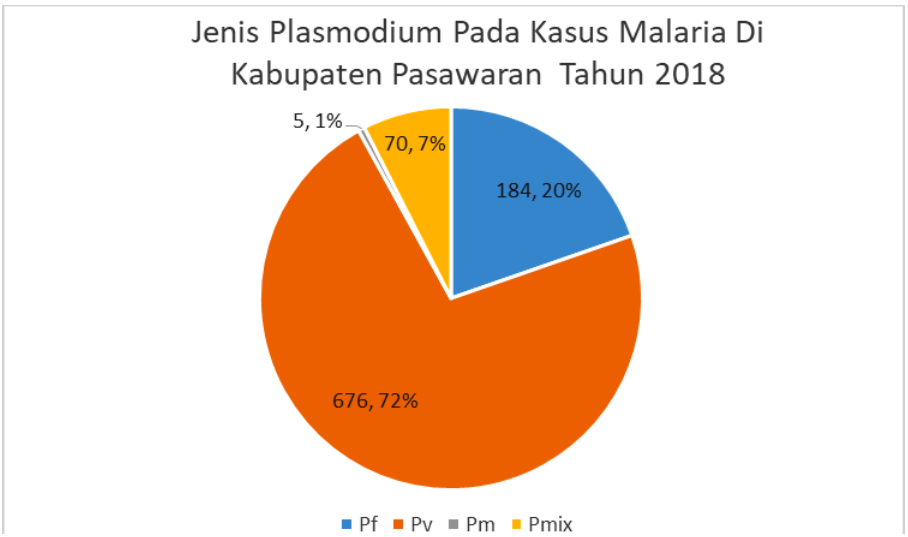

Figure.8Types of Plasmodium Malaria Cases in Pesawaran District in 2018

Based on the results of laboratory tests, the most common type of plasmodium is Plasmodium Vivaxs, which is 676 cases (72%). Plasmodium vivax causes high morbidity due to the presence of hypnozoite stages in the liver which could one day develop and cause relapses. The prevalence of plasmodium vivax in Indonesia is around 40% -70% (Handayani et al, 2008).

Different things in malaria cases in Purworejo have 2642 cases of malaria with parasites of Plasmodium falcipharum 84% or 2050 cases, Plasmodium vivax 16% or 377 cases, for Plasmodium malariae and Plasmodium ovale (Rosada, 2014). Malaria cases in 2018 in Pesawaran District also found plasmodium malariae, namely 5 cases. The cause of malaria is the Plasmodium parasite which is transmitted through the bite of a female Anopheles mosquito. There are 5 (five) species known, namely: Plasmodium falciparum, Plasmodium vivax, Plasmodium ovale, Plasmodium malariae and Plasmodium knowlesi. This latter parasite has not been widely reported in Indonesia (Kementerian Kesehatan RI, 2017a).

Malaria control is always experiencing development, one of which is in terms of treatment. Once malaria was treated with chloroquine, after there were reports of resistance, now a new treatment has been developed using not a single drug but with a combination of ACT (Artemisinin-based Combination Therapy). In 2007 this policy requires that every case of malaria must be proven by the results of a blood supply examination and all positive cases must be treated with artemisinin-based combination therapy or ACT (Artemisinin-based Combination Therapies) (Kementerian Kesehatan RI, 2011).

The use of ACT as an anti-malaria drug, especially Falciparum in Pesawaran Regency is still adequate. The highest failure prevalence is 11.59% and the lowest is at 2.1% (Ritawati and Supranelfy, 2018).Efforts to reduce morbidity and mortality rates are carried out through malaria eradication programs whose activities include early diagnosis, prompt and appropriate treatment, surveillance and vector control, all of which are aimed at breaking the chain of malaria transmission (Kementerian Kesehatan RI, 2011).

Efforts to early diagnosis, Lampung Provincial Health Office in 2018 has conducted a Mass Blood Survey (MBS) in 4 districts including Pesawaran District. The activity was carried out from May to November 2018 in 21 villages with Global Fund assistance. The total population examined was 52,205 people. Of 935 malaria cases in Pesawaran District in 2018 where all patients (100%) had received standardized treatment.

Literature study conducted by Ritawati and Supranelfy (2018) states that malaria risk factors in Pesawaran District include community behavior related to malaria events such as the habit of going out at night, installing wire nets, the density of house walls, the use of mosquito nets at night, the use of drugs anti-mosquito and body cover. The same thing was found in the research of Handayani et al (2008) in South Bengkulu that the habit of going out at night and sleeping habits not using mosquito nets had a significant relationship to someone at risk of malaria.

Physical environmental factors related to malaria include breeding places and other physical environmental factors such as salt content, temperature, humidity, rainfall, wind and so on related to mosquito life as a vector of malaria and to the life of parasites in the mosquito's body itself.

Altitude, humidity, rainfall, animal and plant conditions play a role in environmental factors related to malaria.
The results showed that 70-90% of the risk of malaria is an environmental factor. The variation and magnitude of the influence of the environment on the malaria vector is very large (Susanti and Wantini, 2014).

Research conducted in the village of Sukajaya lempasing Hanura PHC working area where 73.6% of malaria case respondents included mosquito shelters near their homes. The high number of malaria cases in the Hanura PHC work area is also influenced by the level of community knowledge, which is as much as 86% of the level of community knowledge that is still lacking in malaria. The low level of education and lack of community knowledge will influence the attitudes and behavior of the community to make efforts to control and prevent malaria in the Pesawaran District, especially areas with high endemicity (Hermawan, 2016).

Conclusions

Malaria cases in Pesawaran District in 2018 were more in men than women. Malaria cases in 607 cases (65%) and 328 cases in women (35%). Based on age groups, the most cases of malaria are in adults, which is 478 cases (51%). Malaria cases are also found in high-risk age groups, namely in toddlers 33 cases and elderly in 25 cases. Based on the type of work, most malaria cases were in Labor / Farmers / Fishermen with 365 cases (40%) and in 231 cases for Students / Students (25%). Malaria cases occurred in January-July in a relatively fixed condition, but July-November experienced a significant increase in cases with the highest number of cases in October of 222 cases. Whereas if seen based on the place of the most malaria cases found in the Hanura Health Center that is 491 cases. Based on regional sources of transmission of malaria cases in Pesawaran Regency in 2018 most of them came fromindigenous cases (932 cases), only a small proportion of imported malaria cases were 33 cases. Examination of malaria cases in Pesawaran District using 334 microscopy cases and examination using RDT 601 cases. Based on the results of laboratory tests, the most common type of plasmodium is Plasmodium Vivax, which is 676 cases (72%).

Acknowledgement

Thank you to the Lampung Provincial Health Office, the Pesawaran District Health Office and the ATM Global Fund.

References

[1] BPS (2018) Kabupaten Pesawaran Dalam Angka 2018.
[2] Dinkes Pesawaran (2017) Profil Kesehatan Kabupaten Pesawaran Tahun 2016.
[3] Handayani, L., Pebrorizal and Soeyoko (2008) 'The Risk Factors of Malaria Vivax Transmition', Berita Kedokteran Masayrakat, 24(1), pp. 38–43.
[4] Hermawan, D. (2016) 'Hubungan Keberadaan Tempat Perindukan Nyamuk dan Tingkat Pengetahuan Masyarakat Terhadap Kejadian Malaria di Desa Sukajaya Lempasing

Kabupaten Pesawaran Provinsi Lampung Tahun 2015', Jurnal Medika Malahayati, 3(4), pp. 190–196.

[5] Kemenkes RI (2011) 'Epidemiologi Malaria di Indonesia', Buletin Jendela Data dan Informasi Kesehatan.

[6] Kemenkes RI (2016) Situasi Terkini Perkembangan Program Pengendalian Malaria di Indonesia Tahun 2016.

[7] Kemenkes RI (2017a) Buku Saku Penatalaksanaan Kasus Malaria. Jakarta: Direktorat Jenderal Pencegahan dan Pengendalian Penyakit.

[8] Kemenkes RI (2017b) Pedoman Teknis Pemeriksaan Parasit Malaria. Jakarta: Direktorat Jenderal Pencegahan dan Pengendalian Penyakit.

[9] Kemenkes RI (2017c) Petunjuk Teknis Jejaring dan Pemantapan Mutu Laboratorium Malaria. Jakarta: Direktorat Jenderal Pencegahan dan Pengendalian Penyakit.

[10] Kemenkes RI (2017d) Petunjuk Teknis Monitoring dan Evaluasi Efikasi Obat Anti Malaria di Indonesia.

[11] Mayasari, R., Andriani, D. and Sitorus, H. (2016) 'Faktor Risiko yang Berhubungan dengan Kejadian Malaria di Indonesia (Analisis Lanjut Riskesdas 2013)', Buletin Penelitian Kesehatan, (Riskesdas 2013), pp. 5–9.

[12] Pratama, G. Y. (2015) 'Nyamuk Anopheles sp dan Faktor Yang Mempengaruhi di Kecamatan Rajabasa, Lampung Selatan.', Majority, 4(2013), pp. 20–27.

[13] Ritawati and Supranelfy, Y. (2018) 'Berbagai Aspek Tentang Malaria di Kabupaten Pesawaran Provinsi Lampung', Spirakel, 10(1), pp. 41–53.

[14] Rosada, A. (2014) 'Deskripsi Kasus Malaria di Kabupaten Purworejo Tahun 2009 - 2013', Politeknik Kesehatan Lingkungan Purwokerto, pp. 35–45.

[15] Setiadi, D. and Santjaka, A. (2016) 'Deskripsi Mass Blood Survey (MBS) di Kabupaten Purworejo Tahun 2015', Kesehatan Lingkungan Masyarakat.

[16] Susanti, F. and Wantini, S. (2014) 'Factors Relationship With The Incidence Of Malaria In The Region Of UPT Puskesmas Rajabasa , District Of Rajabasa , South Lampung', Jurnal Analis Kesehatan, 3(1), pp. 327–338.

[17] WHO (2018) World Malaria Report 2018. Geneva.