ISSN. 2338-7475
E-ISSN. 2620-7869
Hearty
Jurnal Kesehatan Masyarakat
Beriman, Tulus, Sepenuh Hati,Berbesar Hati, Jujur, Sehat dan Kuat
Vol. 12 No. 1, Februari 2024, Hal. 9-15

LITERATURE REVIEW: RISK FACTORS FOR MALARIA INCIDENCE IN COASTAL AREAS

Najla Febrinka [1], Dita Shabrina [2], Mei Thalia Sembiring [3], Winda Syahfitri [4], Winni R.E. Tumanggor [5], Evi Naria [6]
Fakultas Kesehatan Masyarakat, Universitas Sumatera Utara
Jalan Dr. T. Mansur No.9, Padang Bulan, Kec. Medan Baru, Kota Medan, Sumatera Utara 20222.
Email: [1] *najlafebrinka17@gmail.com*

Abstract

Malaria is one of the vulnerable health problems experienced by residents in coastal areas. Therefore, this study attempted to examine malaria in coastal areas based on the epidemiological science approach and appropriate control strategies. The analysis technique used was literature review with articles collected from Science and Technology Index (SINTA) accredited journals or reputable international journals. The results obtained show that the incidence of malaria is influenced by several factors, including the use of mosquito nets and wire mesh, low education, the number of poor people, the percentage of slum households, the presence of breeding places, the habit of leaving the house at night, and the type of house walls. Suggestions that the government can appeal and educate the public about malaria can be done through community outreach programs, both on a national and international scale.
Keywords: Malaria, Coastal, Anopheles, Epidemiology, Literature Review

Introduction

Malaria is an infectious disease caused by the bite of a female Anopheles mosquito infected with the Plasmodium parasite. It is a common health problem in tropical and subtropical regions. Malaria has a significant impact on population mortality in every age category. It can also hamper productivity and lead to economic decline in affected areas. In addition, malaria infection during pregnancy can also lead to miscarriage or the birth of low-weight babies[1]. There are five types of Plasmodium parasites that can cause malaria, namely vivax, ovale, falciparum, malariae, and knowlesi. Among the five types, Plasmodium falciparum and vivax are the most dangerous parasites.

Malaria has several stages of symptoms. In the cold stage, the patient will experience chills even though the body temperature is still above normal temperature. This condition can occur within 15-60 minutes. After shivering, the next stage is the heat stage which occurs when the schizonts rupture. The rupture produces antigens that stimulate macrophages, monocytes and lymphocytes to release cytokines. The body's temperature regulation system will be stimulated by these drugs, causing the body temperature to rise. Dry skin, red face, tachycardia, dizziness, nausea, and vomiting are signs of the heat stage. Over the course of 2-4 hours, the body temperature may rise to 41°C. In the next stage, the patient sweats excessively and experiences a sharp drop in body temperature that lasts for 2-4 hours. In addition to the previous stages, malaria also has a latent period characterized by a condition without fever between stages[1].

In 2020, 85 countries with malaria endemic areas reported a total of 241 million cases of the disease. The number of malaria cases in 2019 increased by 6.16%. The increase was dominated by cases that occurred in the African region. Globally, there were more than 445,000 deaths in 2016, with 407,000 of them occurring in Africa. About 80% of the total malaria deaths that occurred in 2016 were

contributed by 15 countries in the African region. India, Burkina, Faso, Nigeria and the Democratic Republic of Congo account for 47% of all malaria deaths worldwide. In 2017, 435,000 people are predicted to die in these regions[1].

Anopheles sp. mosquitoes prefer the tropical and subtropical environments of Indonesia to develop as their habitat. When referring to Malaria Annual Parasite Incidence (API) data and Extraordinary Events in various endemic areas, there is an increase in the number of malaria cases in Indonesia. The number of malaria incidents dropped significantly from 465,764 cases in 2010 to 252,027 cases in 2014. This is consistent with the trend of positive malaria cases in Indonesia and the Annual Parasite Incidence (API), or positive malaria cases per thousand population. The number of malaria cases in Indonesia is likely to increase between 2014 and 2020, with 254,055 cases reported in those years. Papua Province is where 80% of malaria cases in Indonesia are found. The trend of malaria cases in Papua Province is stationary and tends to increase, so there is also a trend of cases that tend to stagnate.

In coastal areas, malaria is a common disease. There are beaches, lagoons, rivers, ponds or swamps, ditches, rice fields, and forests in the area around the coast. It is possible that Anopheles mosquitoes can nest here. The abundance of sunlight present throughout the year in coastal places supports this[2]. The likelihood of mosquito survival is high as the air humidity in coastal locations is higher than the mosquito's life requirement. In addition, mosquitoes are influenced by high humidity levels to seek moist areas outdoors where they can rest during the day.

There are several previous studies that also investigated the same issue. However, these studies found relatively mixed results. In addition, each study has its own weaknesses. Based on these gaps, this study seeks to present more complete findings than previous studies. This study aims to assess malaria in coastal areas based on an epidemiological science approach and appropriate management strategies.

Research Methodology

This research uses *literature review* techniques to examine malaria in coastal areas based on an epidemiological science approach. *Literature review* is a qualitative analysis technique conducted by combining findings from several related studies[3]. This research strategy involves searching for and critically analyzing several scientific articles from Science and Technology Index (SINTA) accredited journals or reputable international journals related to the topic of malaria research. The *literature review* approach used in this study includes thematic analysis, synthesis of information, and comparison between relevant studies to produce a deeper understanding of the topics discussed in this study. The criteria for scientific articles used as material for analysis in this study were limited to articles published within the last 5 years with topics around risk factors for malaria incidence.

Research Results

Table 1. Summary of articles related to malaria epidemiology and control strategies

Article title (year of publication)	Author	Methods	Variables	Results
Analisis Faktor Risiko Kejadian Malaria di Wilayah Puskesmas Arso Kota Kabupaten Keerom Provinsi Papua Tahun 2022 (2022)	Suriyani, Elen R.V. Purba, Frengky Apay	*Logistic regression*	habits outside the home, use of mosquito nets, drug use mosquitoes, close house rice fields, the presence of puddles, presence of shrubs scrub, use of ventilation, hygiene house, wall condition house, temperature.	Risk factors that related to incidence of malaria, namely house cleanliness (p=0.002), use of mosquito net (p=0.001), house temperature (p=0.000), close to home rice fields (p=0.008), presence of standing water (p=0.048), presence of shrubs (p=0.000) and out-of-home habits (p=0,006).
Pengaruh Pemakaian Kelambu, Kawat Kasa dan Kondisi Geodemografis Terhadap Kejadian Malaria di Kabupaten Batu Bara (2021)	Lubis, Junarman, Mutiara	*Matched case test control conditional logistics regression*	Use of mosquito nets and use of wire mesh.	Mosquito net use (p=0.006) and wire mesh effect on incidence of malaria (p= 0,006).
Faktor risiko malaria masyarakat pesisir di Kecamatan Pantai Cermin Kabupaten Serdang Bedagai (2021)	Apriadi, Dienillah	*Chi square and regression test logistics*	Gender, education, occupation, wire mesh ventilation, type of house wall, presence of cages livestock, exit activity home at night, use of mosquito nets insecticide-treated.	Research results shows that the type of house wall (p=0.035), activity to exit home at night (p=0.009), and use of mosquito nets insecticide while sleeping significantly related to malaria incidence (p=0,001).
Faktor-Faktor yang Berhubungan dengan Kejadian Malaria di Wilayah Kerja Puskesmas Wandai Distrik Wandai Kabupaten Intan Jaya Papua	Hamdani N, Kartini, Mira	*Chi square*	Cage presence livestock, place mosquito breeding grounds, habit of using mosquito nets, habits of going out at night..	There is a relationship that significant between existence of a place mosquito breeding (p = 0.005), habit using mosquito nets (p= 0.032), and habit respondents out of the house at night (p = 0.000) with malaria.
Faktor Perilaku dan Faktor Lingkungan yang Berhubungan dengan Kejadian Malaria di Wilayah Kerja Puskesmas Gebang	Isnaeni, Saraswati, Wuryanto, Udiyono	*Chi square*	Habit of going out at night, traveling to the region endemic, use of mosquito nets, use of mosquito repellent,	Some variables that significantly affects incidence of malaria between other outgoing habits home at night

Kabupaten Purworejo (2019)			Existence of breeding place, breeding distance place, existence resting place, presence of cages livestock.	(p=0.000), use of mosquito repellent (p=0.036), presence of breeding place (p=0.000), between breeding distances place (p=0.011), existence of resting place (p=0.003), and presence of cages livestock with incidence malaria (p = 0.000).
Gambaran Pengetahuan, Perilaku dan Pencegahan Malaria oleh Masyarakat di Kabupaten Maluku Tenggara Barat dan Maluku Barat Daya (2018)	Sandy, Ayomi	*Chi square*	Knowing about symptoms of malaria, get information, doing activities in morning-afternoon garden, do at night, there are puddles around the house, there is a pond around home, using mosquito nets when sleeping, using drugs mosquitoes and do Indoor Residual Spraying (IRS)	Community knowledge about the symptoms of the malaria disease (p=0.002), information about malaria from officers health (p=0.003), and community activities in morning garden (at 05.00) and afternoon (18.00) (p=0.007).
Determinan yang Berhubungan dengan Kejadian Malaria di Indonesia Tahun 2016 (2018)	Kalsum, Pertiwi, Veronica, Wulandari	*Correlation spearman*	Percentage of community have a low level of education, percentage of population poor, percentage slum households, population density, percentage of total sanitation community-based, percentage of sanitation access feasible, farm size palm oil, number of mining company, and the number of rubber farmers.	There is a positive correlation between proportions educated population low (p = 0.014), the number of poor population (p=0.005), and the percentage of slum households on the incidence of malaria (p= 0,000).

Discussion

Risk Factors

Malaria is a global health issue of concern and has a wide spread, including in Indonesia. The number of malaria cases inIndonesia is increasing due to several factors, such as cases imported from outside, resistance to treatment, the use of insecticides to control vectors, and the presence of vectors capable of transmitting and spreading malaria. In 2009, a total of 1,143,024 malaria cases were reported, with 199,577 cases testing positive through laboratory testing. Meanwhile, the estimated number of malaria cases in Indonesia each year reaches around 30 million, but only about 10% of these cases receive treatment at health facilities.

Several previous studies have revealed that certain factors can influence the incidence of malaria, such as the use of mosquito nets and wire mesh, the location and condition of the house[2], the presence of mosquito breeding sites[4], community activities and socioeconomic conditions of the community[6]. These factors are known to significantly increase the risk of malaria. In addition, the geographical location of an area also affects the increase in malaria cases, such as in coastal areas which are generally close to beaches, lagoons, rivers, ponds or swamps, sewers, rice fields, and forests[5]. The risk factors can be described as follows:

1. The use of mosquito nets and wire mesh
   Most people in coastal areas are reluctant to use mosquito nets and installwire screens because they are difficult and troublesome. Meanwhile, known to that the use ofmosquito nets can reduce the risk of developing malaria. People who do not use mosquito nets and wire mesh have a 2.8 times greater risk of getting malaria. Malaria compared to communities using mosquito nets and wire mesh[5].
2. Location and condition of the house
   Housing conditions on the coast are favored by mosquitoes as a breeding ground because they can enter and exit easily from between the wooden walls of the house and will increase the risk of being infected by *Anopheles Sp.* Semi-permanent housing conditions that are often found on the coast have a risk of 5.723 times being infected with malaria compared to community houses with permanent physical wall conditions[2].
3. Presence of mosquito breeding sites
   In coastal settlements, there are still many forests and vegetation that serve as breeding sites for mosquitoes. In addition, naturally there are many puddles that can also serve as breeding sites for *Anopheles Sp.* mosquitoes such as lagoons, river mouths, and small caves around mangrove forests[5].
4. Community activities
   Most people in coastal areas do their activities at night. This is because the majority of people in the coastal area of Pantai Cermin work from morning to evening, so they use the night time to gather with family around the house or gather with neighbors in coffee shops and neighboring houses. This habit increases the risk of being bitten by *Anopheles Sp* mosquitoes[3].
5. Socio-economic condition of the community
   Socio-economic condition of the community in the coastal area. Coastal areas are generally low-income and far from access to health services. People with low incometend to people with low income tend to pay less attention to the needs of clothing and shelter, due to the difficulty in fulfilling their daily food needs. Thus causing easy entry of mosquitoes into the house because the condition of the house is only made of inadequate materials. In addition, people with low income are less active in participating in malaria prevention programs[6].

Conclusion

Based on the discussion in the previous section, it was found that there are various factors that have an influence on the incidence of malaria, namely the use of mosquito nets and wire mesh, location and condition of the house, the presence of mosquito breeding sites, community activities and socio-economic conditions of the community. These findings can also be used as a strategy to overcome the incidence of malaria by taking various actions that can prevent and control the incidence of malaria, namely using insecticide-treated bed nets, cleaning mosquito breeding sites and limiting community activities at night.

References

[1] Elbands, Erwan, F., Jhons & Suharmanto. 2022. Faktor-Faktor yang Berhubungan dengan Kejadian Malaria Vivax. Jurnal Penelitian Perawat Profesional, Vol. 4 No. 2: 655 - 662.

[2] Saragih, Izzah, et al. 2021. Faktor risiko malaria masyarakat pesisir di Kecamatan Pantai Cermin Kabupaten Serdang Bedagai. TROPHICO, USU (2021): 50 – 57.

[3] Peterson, P., Baker, E., & McGaw, B. (2010). International Encyclopedia of Education (3rd ed.). Elsevier. ISBN: 978-0-08-044894-7

[4] Isnaeni, L., Saraswati, L., Wuryanto, M. & Udiyono, Ari. 2019. Faktor Perilaku dan Lingkungan yang Berhubungan dengan Kejadian Malaria di Wilayah Kerja Puskesmas Gebang Kabupaten Purworejo. Jurnal Kesehatan Masyarakat, Vol. 7 No. 2, 2019 : 31 -39.

[5] Lubis, R., Sinaga, B. J., & Mutiara, E. (2021). Pengaruh Pemakaian Kelambu, Kawat Kasa dan Kondisi Geodemografis. Jurnal Kesehatan Lingkungan Indonesia, 20(1), 53-58.

[6] Kalsum, U., Pertiwi, D. R., Veronica, A. L., & Wulandari, A. (2018, Maret). Determinan yang Berhubungan dengan Kejadian Malaria. Jurnal Kesmas Jambi (JKMJ), 2(1).

[7] Lewinsca, M., et al. 2021. Faktor Risiko yang Mempengaruhi Kejadian Malaria di Indonesia : Review Literatur 2016 – 2020. Jurnal Kesehatan Lingkungan, Vol. 11 No. 1 : 16 –28.

[8] Ningsi & Nurjana, M., et al. 2018. Malaria pada Kelompok Rentan di Indonesia: (Analisis Data Riskesdas 2018). Pusat Riset Kesehatan Masyarakat dan Gizi : Bogor.

[9] Dimi, Benyamin, et al. 2020. "Prevalensi Malaria Berdasarkan Karakteristik Sosio Demografi", *Jurnal Ilmiah Kesehatan, Vol.19 No.1 : 04 – 09*

[10] Sari, Ni & Fernatubun, J., et al. "Literature Review: Intervensi Keperawatan Terkini Untuk Meningkatkan Pengetahuan Dalam Pencegahan/Pengendalian Malaria", *Jurnal Hesti Wira Sakti, Vol. 4 No. 1 : 73 – 93.*

[11] Sepriyani, Andoko & Perdana, Agung. 2018. Analisis Faktor Risiko Kejadian Malaria di Wilayah Kerja Puskesmas Biha Kabupaten Pesisir Barat. *Jurnal Kesehatan Masyarakat Khatulistiwa : 77 – 87.*

[12] Marhaban, Ferasyi, T. & Abdullah. 2019. "Eksplorasi Penerapan Strategi Pengendalian Malaria Berbasis Konsep One Health antara Dua Wilayah yang Sudah Berstatus Eliminasi dan Belum Eliminasi di Propinsi Aceh". Jurnal Kesehatan Cehadum, Vol. 1 No. 2 : 1 – 10.

[13] Fitriany, J., & Sabiq, A. (2018). Malaria. Jurnal Averrous, 4(2). https://ojs.unimal.ac.id/index.php/averrous/article/download/1039/558.

[14] Suriyani, Purba, Elen & Apay, Frengky. 2022. Analisis Faktor Risiko Kejadian Malaria di Wilayah Puskesmas Arso. Indonesian Journal of Hospital Administration, Vol. 5 No. 2 : 63 - 70.

[15] Sandy, S. & Ayomi, Ivon. 2019. Gambaran pengetahuan, perilaku dan pencegahan malaria oleh malaria di Kabupaten Maluku Tenggara Barat dan Maluku Barat Daya. Journal of Health Epidemiology and Communicable Diseases, 4 (1), 2018 : 7 - 14.

[16] N. Nur, Kartini & Mira, Misrykordiati. 2020. Faktor - Faktor yang Berhubungan dengan Kejadian Malaria di Wilayah Kerja Puskesmas Wandai Distrik Wandai Kabupaten Intan Jaya Papua. Jurnal Promotif Preventif, Vol. 2 No. 2, 2020 : 1 - 7