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Systematic Review: Risk Factor Analysis for Malaria Incidence in Indonesia

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Abstract
Introduction: *Malaria remains one of the public health issues in Indonesia, caused by the mosquito vector Anopheles spp., with a fairly high morbidity and mortality rate and a strong potential to trigger extraordinary events (outbreaks) in Indonesia. One of the ways to control malaria is by controlling the risk factors. The control of risk factors will be successful if its implementation is based on accurate data and information about the vector, the environment, its breeding, as well as the behaviour of the local community.* ***Objective:*** *The aim of this study is to analyse the risk factors for malaria incidence in Indonesia.* ***Method:*** *This study used a systematic review of five journal articles on malaria incidence in Indonesia, each using a case-control research method.* ***Results and Discussion:*** *Based on the similarity of variables between researchers, there are several statistically significant risk factors, namely the use of wire mesh on ventilation, using mosquito nets, tight wall conditions, the presence of breeding places, the presence of resting places and being outside the house at night. Meanwhile, the protective factor for malaria incidence in Indonesia based on the average Odds Ratio (OR) above was the presence of breeding sites (properly managed).* ***Conclusion:*** *There are thirteen variables that become risk factors and one protective factor of malaria, namely the presence of breeding sites.*

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Introduction

Malaria is one of the diseases transmitted through vectors and is still a public health problem in Indonesia with a fairly high rate of illness and death and the potential to cause extraordinary events (KLB) (Hidayati, Raharjo, Martini, Wahyuningsih, & Setiani, 2023). Malaria disease is generally influenced by environmental, physical, biological, and socio-cultural factors. These three factors will affect each other's incidence of malaria in the area where it spreads (Tahulending, Kawatu, & Joseph, 2024); (Yanti, 2024). The causes of the high rate of malaria illness include climate change, socio-economic, and community behavior. One way to control malaria can be done by controlling the risk factors. Risk factor control will be successful if its implementation is based on accurate data and information about the vector, the breeding environment, and the behavior of the local community (Compiler, 2022); (Ginting et al., 2025)

Malaria is an infectious disease caused by plasmodium transmitted through female Anopheles mosquitoes. Indonesia, which is an archipelagic country, has a heterogeneous climate and has the potential for regional and global climate change. The spread of malaria is caused by mosquito vectors that are affected by climate change. Malaria is classified as a disease that reappears as a result of natural phenomena, namely changes in climate, temperature and rainfall (Utami et al., 2022)

Malaria in Indonesia has spread in all regions such as areas outside Java and Bali and is mostly on Irian Jaya Island and the Maluku Islands, followed by Kalimantan, Sumatra, and Sulawesi. Some areas outside the island of Java are still often found in swamps where Anopheles mosquitoes live, especially the areas of Irian Jaya, Maluku and Kalimantan (Gotama & Anfa, 2023)

In addition, on the islands of Java and Bali with high population growth, many swamps in this area can be converted into rice fields and so on, on the other hand, the uneven distribution of the population in Irian Jaya, Maluku, and Kalimantan causes this area to be found in many swamps so that it becomes a source of breeding of anopheles mosquitoes.(Ministry of Health Indonesia, 2023)

In 2021, nearly 80% of malaria cases causing deaths were found in the African Region.("WHO-data malaria.pdf," n.d.) Most cases of malaria in the world affect children under the age of 5 or about 76% of all deaths and are the most in the African region.("WHO-data malaria.pdf," n.d.) Meanwhile, malaria cases in Indonesia based on global data from WHO in 2023 are estimated to be 263 million cases of malaria worldwide, an increase from 252 million cases in 2022. Of these cases, about 597,000 deaths due to malaria decreased by 600,000 deaths in the previous year. Meanwhile, malaria cases in Indonesia based on 2022 Ministry of Health data were found to be 418,546 positive cases of malaria, and there were 120 deaths caused by malaria.("Ministry of Health of the Republic of Indonesia-Malaria cases in Indonesia.pdf," n.d.)Meanwhile, in 2024, there will be an increase of 442,697 malaria cases, an increase of 24,151 cases.

Method

This research is a systematic review and sThe data in this study comes from literature obtained from the Internet, Google Scholar, journals, scientific research, and current books related to malaria using the keywords, Risk Factors for the incidence of Malaria in Indonesia. In this case, the researcher selected 5 journal articles to be reviewed. Data collection is carried out by determining the necessary variables from the literature study of scientific journals.

Inclusion criteria are factors or characteristics that meet the conditions that must be met in order to be included in the research criteria. In this case, what is included in the Inclusion criteria is a national journal article that analyzes factors (environment, behavior, attitudes, community characteristics) on the incidence of malaria in Indonesia, in terms of literature studies using research design *Case Control* and in accordance with the focus to be reviewed. The journal article is fully accessible and published in 2020-2024. Meanwhile, exclusion criteria are characteristics that can cause research to be rejected or cannot be researched/reviewed. ("Asrul, A. (2023, August 16). Examples of inclusion and exclusion criteria along with their definitions and how to determine them. Mammals. httpsmamikos.cominfocontoh-kriteria-inklusi-dan-eksklusi-mhs.pdf.. pdf," n.d.) and also the exclusion criteria in this study are research articles that are published not in Indonesia and the topic is not directly relevant to the focus of the research.

Result and Discussion

1. Result

Table1
Research Results

No	Writer	Purpose	Method	Sample	Variable	Result
1	Sitti Madayanti, Mursid Raharjo, Hary Purwanto (2022)(Madayanti, Raharjo, & Purwanto, 2022)	This study aims to analyze the relationship between physical environmental factors and community behavior with the incidence of malaria in the South Jayapura District area, Jayapura City	The research used an observational method with a case control approach which was carried out from May to August 2022	The sample amounted to 120 respondents with details of 60 cases and 60 controls using a formula from Lemeshow's theory. Data analysis with chi square and odds ratio tests to determine the magnitude of the risk	The variables of this study are the density of the walls of the house, the existence of the ceiling/ceiling of the house, the presence of the greenhouse in the ventilation of the house, the existence of breeding place, the existence of resting place, the level of knowledge, attitude, action	The results showed that n there was a relationship between the density of the walls of the house (p = 0.018; OR = 3.872), the presence of the ceiling/ceiling of the house (p = 0.010; OR = 3.250), the presence of cash in the ventilation of the house (p = 0.000; OR = 5.182), the presence of b reeding place (p = 0.037; OR = 2.753), the presence of resting place (p = 0.001; OR = 3.512), action (p = 0.000; OR = 6.909), the variable that shows no relationship is knowledge (p = 0.345; OR = 0.638) and attitude (p = 0.697; OR = 1.357
2	Apriadi Siregar's Son, Izzah Dienillah Saragih(2021) (Siregar & Saragih, 2021)	The purpose of this study is to determine the influence of risk factors (sociodemographics, physical environment of the house, existence of livestock cages, health behavior) on	This study uses a case control design that was carried out in Pantai Cermin District, Serdang Bedagai	The case group in this study was 36 people with malaria at the Pantai Cermin Health Center and	The variables in this study were ventilation wire mesh, Type of house wall, Activities outside the	The results showed that the type of wall of the house (p=0.035), individual activity to leave the house at night (p=0.009), and the use of insecticide mosquito nets while sleeping (p<0.001, OR) were significantly related to the incidence of malaria disease. The risk factor that

		the incidence of malaria disease) in Pantai Cermin District, Serdang Bedagai Regency	Regency in January-August 2019. Data were collected by conducting interviews through structured questionnaire instruments, then bivariate analysis using chi square test and multivariate analysis using multiple logistic regression test	the control group was 36 people who were not malaria sufferers	house at night, Use of mosquito nets Insecticide while sleeping	most affects the incidence of malaria is the use of insecticide mosquito nets (p=0.001, OR=12.98) which means that the risk of developing malaria is 12.98 times greater in people who do not install insecticide mosquito nets while sleeping compared to people who install insecticide mosquito nets while sleeping
3	Siti Humaira, Nurjazuli, Mursid Raharjo(2024) (Humaira, Nurjazuli, & Raharjo, 2024)	The purpose of this study is to find out the influence of factors in the environment around the house and the behavior of the local community with the incidence of malaria in Aceh Province, especially in Aceh Jaya, Aceh Besar, Nagan Raya, Bener Meriah, South Aceh, Banda Aceh City, and Sabang City.	The type of research used is observational analysis using *a case control research design*	The sample used in this study amounted to 180 people consisting of 90 cases and 90 controls	The variables of this study are the existence of breeding places, resting places, livestock cages, house conditions, the use of mosquito nets, PPE used in the form of long-sleeved clothes, going out at night, and the use of nyamu lotion	The results of the study obtained from this study were the existence of breeding places obtained a p value of 0.655, resting places 0.053, livestock cages, 0.073, house conditions 0.229, use of mosquito nets 0.763, use of PPE 0.371, night activities 0.765, use of mosquito lotion 0.051. The results of the study showed that of the 8 variables tested, the most influential variable in the incidence of malaria in Aceh was the existence of *resting places*.
4	Sulistyawati, Rokhmayanti and Maririn Devi Pradita (2020)(Sulistyawati, Rokhmayanti, & Pradita, 2020)	The purpose of this study is to identify potential risk factors from socioeconomic and human behavioral aspects that contribute to the incidence of malaria in Banjarnegara Regency, Indonesia.	This study uses case control. Logistic regression is used to look for relationships between variables	The sample of this study was 34 cases and 34 control subjects for both groups based on	The variables of this study are the installation of mosquito wire on ventilation, the use of mosquito	The study found that installing mosquito nets, not sleeping under mosquito nets, and incurring higher transportation costs were significant protective factors against malaria cases. Having a lower family income was significant as a potential risk factor for

				the routine report of the Banjarmangi Health Center from July 2017 to March 2018	nets while sleeping, transportation costs, family income	malaria cases (OR=10.68, CI=1.01-112.59).
5	Ismi Nur Fajria Safarina, Tri Joko, Budiyono16 (2023)(Nur, Safarina, Joko, Info, & Factors, 2023)	To understand the factors that influence malaria transmission	This type of research uses a case-control study. Data were collected through questionnaires, interviews, and observations, then analyzed using the Chi-square test	The case group consisted of 33 individuals who had malaria in 2022, while the control group consisted of 33 individuals without malaria, matched by sex and age	The variables studied were standing water, wire mesh on house ventilation, using mosquito nets while sleeping, using mosquito repellent, wearing closed clothes at night	Presence of association with the presence of standing water around the house (OR 4,808; 95% CI: 1,667–13,862)Absence of gauze on home ventilation (OR 4,713; 95% CI: 1,341–16,566)Not using mosquito nets while sleeping (OR 7,429; 95% CI: 2,461–22,422)Not using mosquito repellent (OR 6,042; 95% CI: 1,731–21,086)while Not wearing closed clothes at night (OR 5,714; 95% CI: 1,925–16,965), the absence of the ceiling of the house, the absence of livestock around the house, and the absence of shrubs do not indicate a significant association with the incidence of malaria.

2. Discussion

Based on 5 journals included in the inclusion criteria, 13 statistically significant variables were found with the incidence of malaria in Indonesia. Variables found significant by the authors of the review in this journal include the density of the walls of the house, the presence of ceilings/ceilings of the house, the presence of screens in the ventilation of the house, the existence of breeding places, the existence of resting places, actions, not using insecticide mosquito nets when sleeping, activities outside the house at night, types of house walls, the use of mosquito repellent lotions, low family income, higher transportation costs, do not use mosquito repellent, do not wear closed clothing.

Based on the table above, there are several variables that are meaningful and affect the incidence of malaria, including using gauze wire on ventilation discussed in 4 articles, not using mosquito nets while sleeping in 3 articles, the existence of breeding places found in 2 articles, the existence of resting places was in 2 articles and being outdoors at night was found in 2 articles. As for the average Odds Ratio (OR), the incidence of malaria in Indonesia is statistically significant based on the systematics of the literature above, including the use of wire mesh in ventilation, the use of mosquito nets, the condition of tight walls, the existence of breeding places, the existence of resting places and being outside the house at night. Meanwhile, the protective factor for the incidence of malaria in Indonesia based on the average Odds Ratio (OR) above is the existence of breeding places.

In this case, the risk factor in the study is clearly illustrated from the highest average odds ratio (OR) of several variables such as not using mosquito nets while sleeping, the average odds ratio (OR) is 9.40, which means that the exposure factor is very high. People who sleep without mosquito nets have a 9.40 times greater risk compared to people who sleep with mosquito nets. The use of mosquito nets while sleeping can reduce the incidence of malaria because it can reduce the risk of getting bites from anopheles mosquitoes. Mosquito nets, especially those with insecticides, are one of the effective preventive measures and are highly recommended in terms of reducing the transmission of malaria. In the research of Apriadi Siregar's son, Izzah Dienillah Saragih in Pantai Cermin District, Serdang Bedagai Regency, it was known that OR = 12.98. This shows that the risk of people who do not use mosquito nets while sleeping at home is 12.98 times greater than people who use mosquito nets while sleeping.(Siregar & Saragih, 2021) The mosquito nets recommended by the Ministry of Health are mosquito nets that are insecticide. These mosquito nets can kill mosquitoes if touched. In this case, the use of insecticide mosquito nets in communities with potential malaria endemic areas can reduce the incidence of malaria.

Meanwhile, the existence of breeding places has an average Odds Ratio (OR) of 1.773, meaning that this factor is included as a protective factor for malaria. This is related to interventions that reduce the risk of malaria transmission by limiting or eliminating mosquito habitats / vectors by managing the surrounding environment by maintaining cleanliness, keeping it away from standing water, improving drainage channels, and locating houses away from mosquito nesting sites. The proximity of the house to the place where malaria mosquitoes nest can increase anopheles mosquitoes so that the transmission of malaria is increasingly difficult to prevent. In addition, preventive measures by carrying out 3M (draining, closing, and recycling recyclable containers), not allowing clogged water channels and ensuring that water flows smoothly again and ensuring that no containers are wasted so that there is no rainwater reservoir so that it becomes a breeding ground for malaria mosquitoes.

Conclusion

This study analyzes what are the risk factors related to the incidence of Malaria in Indonesia. Of the 5 articles that were used as a literature study in this study, there are several dominant factors based on factors (environment, behavior, attitude, characteristics of society), including significant variables when the author reviews this journal, including the density of the walls of the house, the existence of ceilings/ceilings of the house, the existence of screens in the ventilation of the house, the existence of *breeding places*, the existence *of resting places*, action, not using insecticide mosquito nets while sleeping, activities outside the house at night, type of wall of the house, use of mosquito repellent lotion, low family income, higher transportation costs, not using mosquito repellent, not wearing closed clothing.

To reduce the risk of malaria transmission, the public should be encouraged to install gauze wire on the ventilation of the house, use insecticide mosquito nets when sleeping at night, clean puddles around the house, away from *breeding places*, use mosquito repellent / mosquito repellent lotion, do not leave the house at night when there is no need, and use closed clothes and long sleeves when leaving the house at night.

Reference

Asrul, A. (2023, Agustus 16). Contoh kriteria inklusi dan eksklusi beserta pengertian dan cara menentukannya. Mamikos. httpsmamikos.cominfocontoh-kriteria-inklusi-dan-eksklusi-mhs.pdf..pdf. (n.d.).

Ginting, H. A. B., Ulya, Z., Lubis, S., Purba, S. K. B., Nasution, F. S. A., & Gurusinga, R. A. E. (2025). Analisis Faktor Risiko dan Upaya Pencegahan Malaria di Kecamatan Medan Labuhan. *Jurnal Kolaboratif Sains*, *8*(3), 1428–1436.

Gotama, A., & Anfa, S. (2023). Systematic Review: Dampak Perubahan Iklim terhadap Mosquito-borne Diseases Dengue dan Malaria. *Researchgate.NetA Gotama, S Anfaresearchgate.Net*, (December).

Hidayati, F., Raharjo, M., Martini, M., Wahyuningsih, N. E., & Setiani, O. (2023). Hubungan Kualitas Lingkungan dengan Kejadian Malaria (Wilayah Endemis Malaria, Lingkup Kerja Puskesmas Kaligesing, Kabupaten Purworejo Tahun 2022). *Jurnal Kesehatan Lingkungan Indonesia*, *22*(1), 21–27.

Humaira, S., Nurjazuli, N., & Raharjo, M. (2024). Hubungan Lingkungan Dan Perilaku Terhadp Kejadian Malaria Di Provinsi Aceh. *Jurnal Kesehatan Lingkungan Indonesia*, *23*(2), 241–248. https://doi.org/10.14710/jkli.23.2.241-248

Kemenkes Ri-Kasus malaria di Indonesia.pdf. (n.d.).

Kementrian Kesehatan Indonesia. (2023). Buku Saku Tatalaksana Kasus Malaria SUBDIT MALARIA DIREKTORAT P2PTVZ KEMENTERIAN KESEHATAN REPUBLIK INDONESIA 2023, 4–6.

Madayanti, S., Raharjo, M., & Purwanto, H. (2022). Faktor Risiko Yang Mempengaruhi Kejadian Malaria di Wilayah Distrik Jayapura Selatan Kota Jayapura. *Jurnal Kesehatan Lingkungan Indonesia*, *21*(3), 358–365. https://doi.org/10.14710/jkli.21.3.358-365

Nur, I., Safarina, F., Joko, T., Info, A., & Factors, R. (2023). Environmental risk factors and behaviors towards malaria in the working area of Banyuasin Purworejo Health Center, *20*(2), 287–298.

Penyusun, T. I. M. (2022). PENGENDALIAN FAKTOR RISIKO MALARIA i.

Siregar, P. A., & Saragih, I. D. (2021). Faktor Risiko Malaria Masyarakat Pesisir di Kecamatan Pantai Cermin Kabupaten Serdang Bedagai. *Tropical Public Health Journal*, *1*(2), 50–57. https://doi.org/10.32734/trophico.v1i2.7261

Sulistyawati, S., Rokhmayanti, R., & Pradita, M. D. (2020). Potential Risk Factor for Malaria Infection in Banjarnegara, Indonesia: A Matched Case-control Study. *International Journal of TROPICAL DISEASE & Health*, *41*(March 2018), 28–35. https://doi.org/10.9734/ijtdh/2020/v41i530276

Tahulending, J., Kawatu, P., & Joseph, W. (2024). Perilaku Nyamuk Anopheles sp., Vektor Penyakit Malaria di Pulau Lembeh, Kota Bitung, Sulawesi Utara. *Jurnal Bios Logos*, *14*(2), 1–11.

Utami, T. P., Hasyim, H., Kaltsum, U., Dwifitri, U., Meriwati, Y., Yuniwarti, Y., … Zulaiha, Z. (2022). Faktor Risiko Penyebab Terjadinya Malaria di Indonesia : Literature Review. *Jurnal Surya Medika*, *7*(2), 96–107. https://doi.org/10.33084/jsm.v7i2.3211

WHO-data malaria.pdf. (n.d.).

Yanti, R. F. (2024). Faktor Dominan Kondisi Lingkungan Fisik Yang Mempengaruhi Kejadian Malaria (Studi Di Desa Tuafanu, Timor Tengah Selatan, Nusa Tenggara Timur). Universitas Muhammadiyah Gresik.