397 Krismahardi

by Susy Saadah

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The Relationship of Behavior, and Home Conditions to The Incidence of Malaria in Indonesia: Meta Analysis 2013-2022

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ABSTRACT

Malaria is an acute febrile disease caused by the parasite Plasmodium, which spreads to people through the bite of an infected female Anopheles mosquito. The number of malaria cases in Indonesia decreased from 2009, with 418,439 cases, to 2021, with 304,607 cases. Environmental and behavioral variables influence the incidence of malaria. This study aimed to determine the relationship between the behavior and home conditions to malaria incidence in Indonesia. This research method is a meta-analysis using data sourced from Google Scholar. The results of the study found that the variables that are the highest risk factors were obtained, namely Use of Gauze wire variable that is the highest risk factor with a pooled value OR=3.234. Variable Night-out Behavior pooled values OR=2,829. And the lowest risk factor is Presence of Standing Water Around the House variable with values pooled OR=1,757. The *sensitivity test* results obtained relatively unstable meta-analysis results. The variable that occurs increases is Night Out Behavior and Presence of Standing Water Around the House. Meanwhile, the variables that occur decrease in value are use of gauze wire. In this study, it can be concluded that variable behavior and home conditions can increase the risk of malaria. Prevention and control efforts can be carried out with health counseling, PSN and changes in community behavior towards healthier by keeping home conditions healthy and reducing breeding place of *Anopheles sp*.

Keywords: *Behavior; Home Conditions; Malaria*

Hubungan perilaku, dan Kondisi rumah terhadap kejadian malaria di Indonesia: Meta Analisis 2013-2022

ABSTRAK

Malaria adalah penyakit demam akut yang disebabkan oleh parasit *Plasmodium*, yang menyebar ke orang-orang melalui gigitan nyamuk *Anopheles* betina yang terinfeksi. Jumlah kasus malaria di Indonesia menurun dari tahun 2009, dengan 418.439 kasus, hingga tahun 2021, dengan 304.607 kasus. Variabel lingkungan dan perilaku mempengaruhi kejadian malaria. Penelitian ini bertujuan untuk mengetahui hubungan antara perilaku dan kondisi rumah terhadap kejadian malaria di Indonesia. Metode penelitian ini adalah meta analisis menggunakan data yang bersumber dari Google Scholar. Hasil penelitian menemukan bahwa variabel yang merupakan faktor risiko tertinggi diperoleh yaitu Variabel penggunaan kawat Kasa dengan nilai gabungan OR=3,234. Variabel perilaku keluar malam OR=2.829. Dan faktor risiko terendah adalah Adanya variabel Genangan air dengan nilai OR=1.757. Hasil uji sensitivitas diperoleh hasil meta analisis yang relatif tidak stabil. Variabel yang terjadi meningkat adalah Perilaku Keluar Malam dan Adanya Genangan Air di Sekitar Rumah. Sedangkan variabel yang terjadi penurunan nilai adalah penggunaan kawat kasa. Dalam penelitian ini dapat disimpulkan bahwa variabel perilaku dan kondisi rumah dapat meningkatkan risiko malaria. Upaya pencegahan dan pengendalian dapat dilakukan dengan penyuluhan kesehatan, PSN dan perubahan perilaku masyarakat menuju lebih sehat dengan menjaga kondisi rumah tetap sehat dan mengurangi tempat perkembangbiakan *Anopheles sp*.

Kata Kunci: *Perilaku; Kondisi Rumah; Malaria*

INTRODUCTION

Malaria is an acute febrile disease caused by the parasite Plasmodium, which spreads to people through the bite of an infected female Anopheles mosquito. The life cycle of the malaria parasite is shown in figure 1. Four parasite species are often found in humans, including P. vivax, P. ovale, P. malariae, and P. falciparum. Of these four species, P. falciparum and P. vivax pose the greatest threat. P. falciparum is the deadliest and most common malaria parasite on the African continent. P. vivax is the dominant malaria parasite in most countries outside sub-Saharan Africa(1).

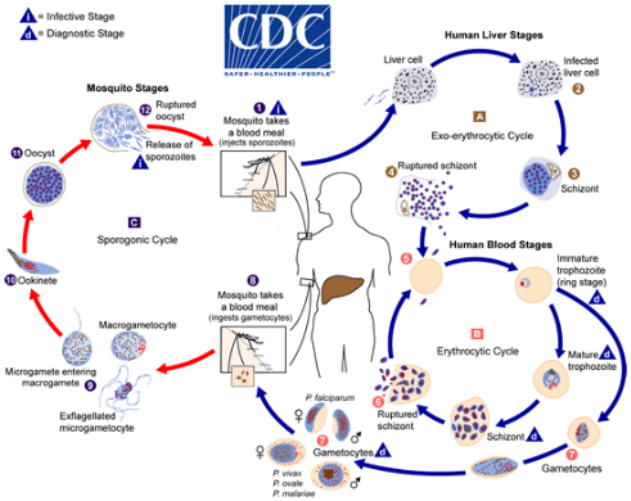


Figure 1. Life cycle of malaria parasites(2)

According to the World Malaria Report 2022, there were 247 million malaria cases in 2021 compared to 245 million in 2020. The estimated number of deaths from malaria reached 619,000 in 2021 compared to 625,000 in 2020. During the two peak years of the pandemic (2020–2021), COVID-related disruptions caused approximately 13 million more malaria cases and 63,000 deaths from malaria. Four African countries account for more than half of all malaria deaths worldwide: Nigeria (31.3%), the Democratic Republic of the Congo (12.6%), the United Republic of Tanzania (4.1%), and Niger (3.9%) (3).

In Indonesia, especially in the eastern region, Malaria is an infectious disease that is still a health problem. The number of malaria cases in Indonesia decreased from 2009, with

418,439 cases, to 2021, with 304,607 cases. The number of malaria cases is known based on the number of events indicated by the Annual Parasite Incidence (API) indication of 1.1 cases per 1000 people4. In 2021, 347 out of 514 districts/cities, or 68%, have declared malaria elimination(4).

Malaria risk factors in the Southeast Asian region are separated into environmental and behavioral variables. The incidence of Malaria is influenced by environmental variables such as rural areas, housing situations with many open accesses, housing near livestock pens, and houses near mosquito breeding grounds. Behavioral factors that influence Malaria's occurrence include mosquito nets, nighttime activities outside the home, male sex, and risky work(5).

The group most susceptible to Malaria is the people with little or no immunity to the disease. Vulnerable groups can be divided into several groups, including a) young children who have not developed partial immunity to Malaria, b) Pregnant women whose immunity decreases due to pregnancy, and c) Migrants from areas with little or no Malaria transmission(6).

The malaria prevention efforts recommended by the Ministry of Health of the Republic of Indonesia consist of several ways, such as cleaning mosquito nests (PSN), using mosquito nets when sleeping (to avoid mosquito bites), and giving chloroquine drugs. In addition, there are preventive measures that can be used to prevent Malaria and other mosquito vector infectious diseases, such as spraying the walls of the house with insecticides (Indoor Residual Spray); keeping the house clean, dry, and hygienic; not allowing there to be puddles around the house; wearing shirts and trousers(7).

This study aimed to determine the relationship between night-out behavior, the use of gauze wire, and the presence of puddles around the house to malaria incidence in Indonesia using literature studies. It is hoped that this research can educate about the influence of livestock drums around the house and increase mosquito nets' use to prevent malaria.

METHODS

This research is a study with the Meta-analysis method. The Meta-analysis method is one of the research methods that combine several similar existing studies with the same variables(8). This study utilizes secondary data from the Google Scholar electronic database with publication years from 2013 to 2022 (10 years). Keywords used in the secondary data search process include "Malaria risk factors," "Environmental factors and malaria," "Behavioral factors and malaria," "Incidence of malaria in Indonesia," and several relevant keywords.

This study assesses the suitability of research articles with inclusion and exclusion criteria. Journal articles and theses were written in Indonesian studies related to risk factors for cattle drums and the chronic use of mosquito nets with the prevalence of malaria incidence. After a Google Scholar database search for articles published between 2013 and 2022, abstracts and full text are filtered out. Articles that do not have a comprehensive abstract or body will be excluded. Furthermore, it is assessed if a case control research method is used. They will be accepted if they meet these final conditions.

Research articles obtained from Google Scholar and have gone through a selection process with inclusion criteria will enter the meta-analysis stage. Meta-analysis involves data acquisition, analysis, publication bias assessment, and sensitivity testing(9). The collection of abstraction of data, the information obtained from each research article, and the data obtained, i.e., the year of publication, location, design, exposure, and research results, are converted into a 2 x 2 table. The data is then recorded in Comma Separated Values (CSV) format for classical meta-analysis using fixed effects or random effect models. Articles tabulated into 2 x 2 tables are continued in JASP Version 0.9.2 to generate a Forest Plot graph that illustrates each variable's cumulative effect size values using Funnel Plot with Egger's Test to identify substantial biases in research. To determine whether the meta-analysis results are stable, a sensitivity test is performed. This is different from the results of fixed effects and random effect models.

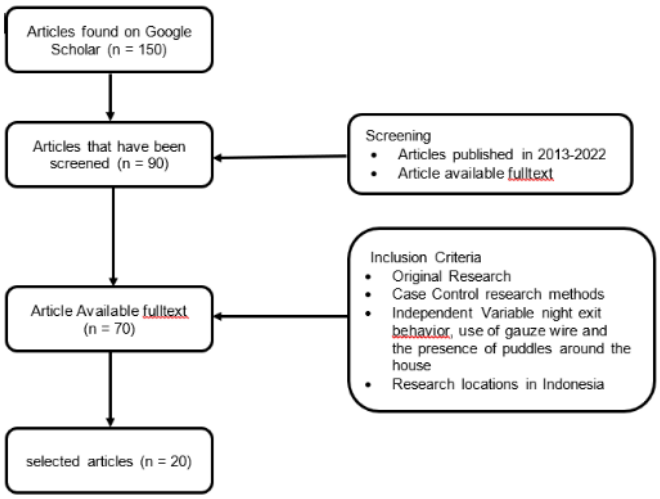


Figure 2 PRISMA flowchart The Relationship of Behavior, and Home Conditions to The Incidence of Malaria in Indonesia: Meta Analysis 2013-2022

RESULT AND DISCUSSION

A. Relationship between Night Out Behavior and Malaria Incidence in Indonesia

Table 1. Meta-Analysis *Heterogenitation Test* between Night Out Behavior and Malaria Incidence in Indonesia

Fixed and Random Effects ▼

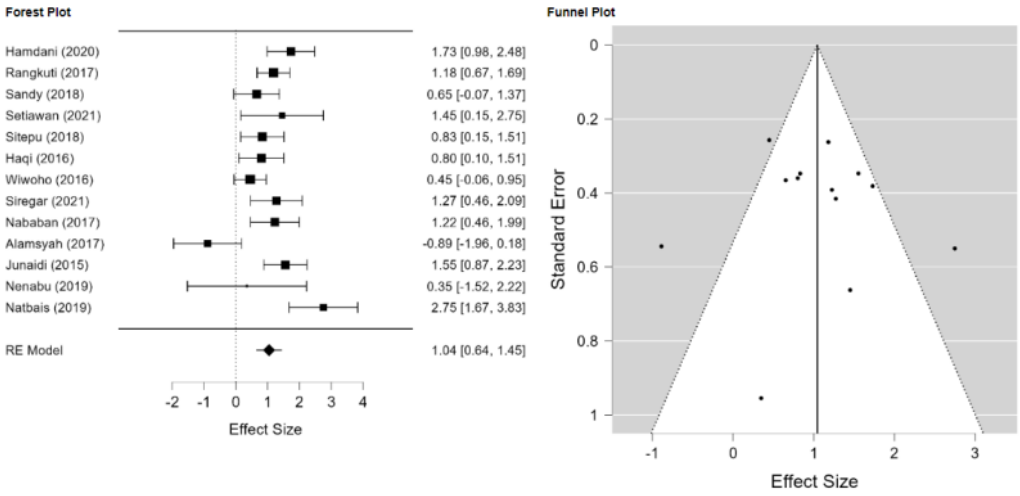
	Q	df	p
Omnibus test of Model Coefficients	25.212	1	< .001
Test of Residual Heterogeneity	36.575	12	< .001

Note. *p*-values are approximate.
Note. The model was estimated using Restricted ML method.

After the last playback, 13 featured articles published from 2013 to 2020 discussing night-out behavior and malaria incidence conducted meta-analysis tests using JASP. Results in **figure 3A.**

Table 1 shows the results of heterogeneity tests conducted on 13 selected articles that discuss night-out behavior and malaria incidence in Indonesia. The *heterogeneity test* results found that the p-value was smaller than 0.05 (p=<0.001). This suggests that

variables are heterogeneous. The model used to perform meta-analysis tests on heterogeneous variables using a *random effect model*.



A B

Figure 3 Plot meta-analysis of the relationship between night-out behavior and malaria incidence in Indonesia. A) *Forest Plot*; B) *Funnel Plot*

The *Random Effect Model* value represents the estimated *Odds Ratio* (OR) value, showing a 95% CI of 1.04 with a range value of 0.64 – 1.45. The result of the *forest plot* in figure 3A. is that the combined value of OR = $e^{1.04}$ = 2.829. So it can be concluded that night-out behavior has a 2,829 times greater risk of malaria incidence in Indonesia. Furthermore, publication bias on night-out behavior variables was identified using *funnel plots*, presented in Figure 3B. After measuring the plot distribution, we found the funnel plot asymmetrical. Thus the test proceeded with a regression test using Egger's test.

Table 2. Meta-Analysis *Egger's Test* between Night-Out Behavior and Malaria Incidence in Indonesia.

Regression test for Funnel plot asymmetry ("Egger's test")

	z	p
sei	−0.103	0.918

In table 2, it can be seen that the result of *Egger's test* 0.918 is more significant than 0.05. This shows no publication bias on the variables of night-out behavior and malaria incidence in Indonesia. The variable night-out behavior in this study was found to have an influence of 2,829 times for being infected with malaria compared to people who did not go out at night.

The results of this study are in line with the research conducted by Junaidi, obtained results p = 0.001 and OR = 4.724, which showed that respondents who had the habit of doing activities outside the home at night had a risk of developing malaria 4.7 times higher than respondents who did not do activities outside the house at night(10). Natbais also conducted a similar study and obtained values p = 0.000 and OR = 15.625, meaning that there was a significant relationship between night-out behavior and malaria incidence in his research area, namely the baun health center work area(11). However, the results of this study are not in line with the research from Nenabu, which showed no significant link between night-out behavior and malaria incidence in the work area of the nulle health center with p values = 0.111 and OR = 0.286(12).

Anopheles sp is a nocturnal mosquito. Active biting activities throughout the night from 18.00-04.00, and the peak of active biting is at 24.00-01.00, so the habit of going out of the house late at night, especially for endemic areas, can increase the risk of malaria transmission(13). This is also in line with the behavior of anopheles mosquitoes as the definitive host, significantly determining the process of malaria transmission, such as *exophilic* perching/resting places (happy to perch outside the house), and *endophilic* (happy to perch inside the house), echophagic (biting outside the house) and endophagic (prefer to bite inside the house), bitten objects, namely *anthropophilic* (human) and *zoophilic* (animal)(14).

B. Relationship between the use of gauze wire and the incidence of malaria in Indonesia

Table 3. Meta-Analysis *Heterogenitation Test* between the use of gauze wire and Malaria Incidence in Indonesia

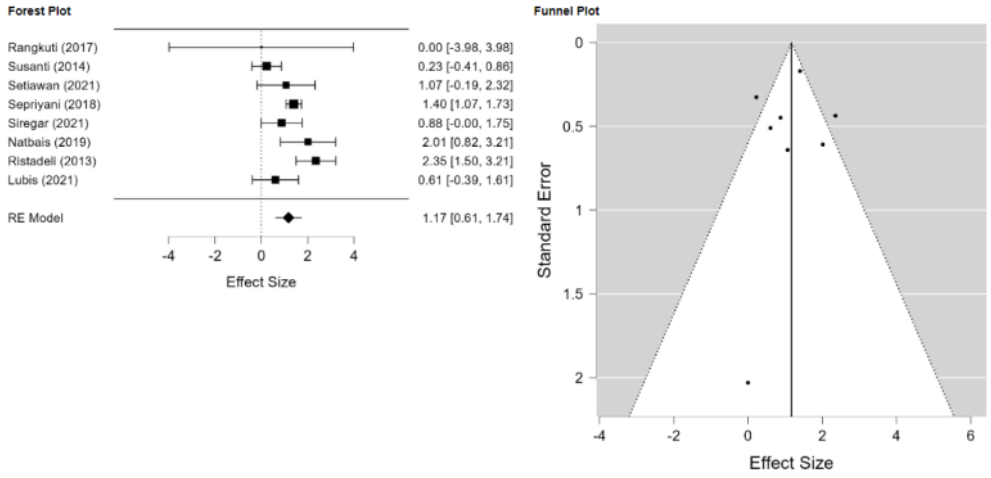
Fixed and Random Effects

	Q	df	p
Omnibus test of Model Coefficients	16.694	1	< .001
Test of Residual Heterogeneity	21.355	7	0.003

Note. *p*-values are approximate.
Note. The model was estimated using Restricted ML method.

After screening using inclusion criteria, eight articles were found that could be used. The selected articles were meta-analyzed using JASP. Details of the article used are in figure 3A.

In table 3, you can find out the results of the *heterogeneity test* from the eight selected articles. Based on the *heterogeneity test* results, a p-value smaller than 0.05 (p = 0.003) was obtained, indicating that the data were heterogeneous. Therefore, the test is carried out using a *random effect model*



A B

Figure 4 Plot meta-analysis of the relationship between the use of gauze wire and malaria incidence in Indonesia. A) *Forest Plot*; B) *Funnel Plot*

The *Random Effect Model* value represents the estimated Odds Ratio (OR) value, showing a 95% CI of 1.174 with a range value of 0.611 – 1.737. The result of the *forest plot* in figure 4A. is that the combined value of OR = $e^{1.174}$ = 3.234. So Odds Ratio can conclude that the use of gauze wire has a 2.23 times greater risk of malaria incidence in Indonesia. Furthermore, publication bias on the variable use of gauze wire is identified using *funnel plots*, presented in Figure 4B. After measuring the plot distribution, we find the asymmetric *funnel plot*. Thus the test is continued with a regression test using the *Egger's test*.

Table 4. Meta-Analysis *Egger's Test* between the use of gauze wire and Malaria Incidence in Indonesia

Regression test for Funnel plot asymmetry ("Egger's test")

	z	p
sei	−0.286	0.775

Table 4 shows the results of *Egger's test* between the use of gauze wire and the incidence of malaria in Indonesia. Based on the results of *Egger's test*, the result p is more significant than 0.005 (p=0.775). Results of p greater than 0.005 indicate no publication bias in this study. The results of the meta-analysis test showed that respondents who did not use gauze wire had a 3.23 times risk of developing malaria compared to respondents who used gauze wire in their homes.

The results of the research obtained related to the relationship between the use of gauze wire. The incidence of malaria in Indonesia is in line with the study by Lubis, which was conducted in Batubara Regency, which obtained values p = 0.006 and OR = 2.5, which means that there is a significant relationship between the use of gauze wire and the incidence of malaria(15). Rangkuti also conducted a similar study; in the study conducted in Panyabungan Mandailing Natal District, it was said that there was no significant relationship between the use of gauze wire and the incidence of malaria with p = 1,000(16). In the research conducted by Susanti, similar results were also obtained.

There was no significant connection between the use of a wire and the incidence of malaria in the raja basa health center working area, with a value of p=0.813(17).

One of the requirements for a healthy house is the ventilation of the house, which functions as air circulation. However, ventilation can also be a way for mosquitoes to enter if it is not organized correctly. A standard method used by the public is to install gauze wire. The installation of gauze wire on the vents will reduce the contact of mosquitoes that were initially outside the house with the inhabitants. This is because the entry of mosquitoes into the home, namely ventilation, has been blocked by gauze wire. The number of holes in the gauze wire that is considered optimal is 1416 per inch(18). The condition of the house that is not attached to gauze wire will make residents have a higher risk of being infected with malaria. At this time, there are still many people who still need to install gauze wire in their homes. This is because installing gauze wire is considered difficult, troublesome, and unimportant for the community(19).

C. Relationship between the presence of standing water around the house and the incidence of malaria in Indonesia

Table 5. Meta-Analysis *Heterogenitation Test* between the presence of standing water around the house and Malaria Incidence in Indonesia

Fixed and Random Effects

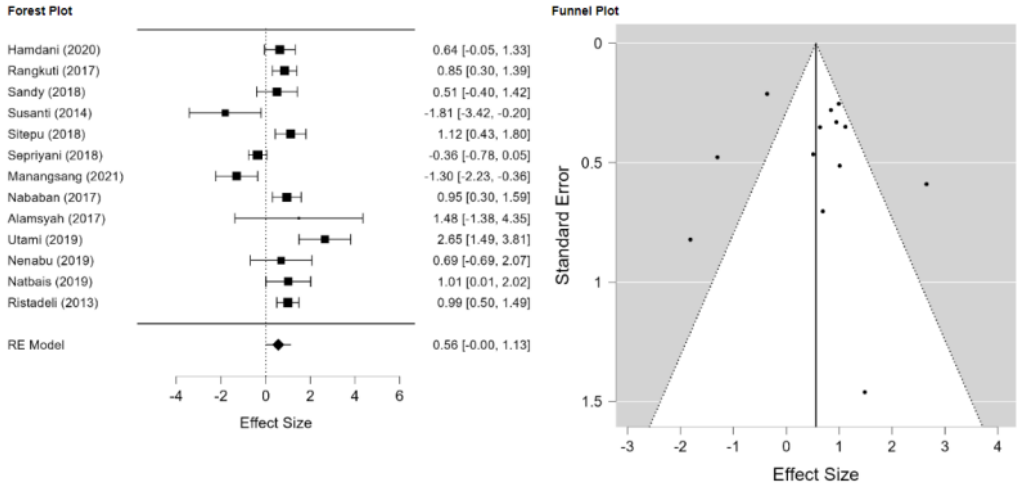
	Q	df	p
Omnibus test of Model Coefficients	3.804	1	0.051
Test of Residual Heterogeneity	63.912	12	< .001

Note. *p*-values are approximate.
Note. The model was estimated using Restricted ML method.

After screening, 13 articles were obtained that met the criteria. Selected articles continued the process of tabulation and data management using the meta-analysis method with the JASP application. Details of the selected article are in figure 5.

Table 5 shows the results of the *heterogeneity test* on the variable presence of standing water around the house against malaria incidence in Indonesia. The result of

the heterogeneity test obtained a p-value = <0.001 or less than 0.05. The meta-analysis test was carried out using a *random effect model* based on these results.



A B

Figure 5 Plot meta-analysis of the relationship between presence of standing water around the house and malaria incidence in Indonesia. A) *Forest Plot*; B) *Funnel Plot*

The *Random Effect Model* value represents the estimated *Odds Ratio* (OR) value, showing a 95% CI of 0.564 with a range value of -0,003 – 1.131. The result of the *forest plot* in figure 3A. is that the combined value of OR = $e^{0,564}$ = 1.757. So it can be concluded that presence of standing water around the house has a 1,757 times greater risk of malaria incidence in Indonesia. Furthermore, publication bias on presence of standing water around the house variables was identified using *funnel plots*, presented in Figure 5B. After measuring the plot distribution, we found the funnel plot asymmetrical. Thus the test proceeded with a regression test using Egger's test.

Table 6. Meta-Analysis *Egger's Test* between presence of standing water around the house and Malaria Incidence in Indonesia

Regression test for Funnel plot asymmetry ("Egger's test")

	z	p
sei	−0.035	0.972

In table 6, the results of Egger's test can be seen between the presence of puddles around the house against the incidence of malaria in Indonesia. The result of *Egger's test* found that the p-value was more significant than 0.05 (p=0.972). Based on a p-value greater than 0.05, there is no publication bias in this study. The results of the meta-analysis found that the variable presence of standing water around the house affected the incidence of malaria by 1,757 times greater than that of homes where there was no standing water.

This study, in line with research conducted by Sitepu, obtained results of P = 0.011 and OR 3.063, which means that there is a relationship between the presence of puddles around the house and the incidence of malaria(20). Sandy also conducted a similar study, and it was found that the value of p = 0.239 means that there is no relationship between the presence of standing water around the house and the incidence of malaria in the study area, namely in West Maluku and Southwest Maluku Regencies(21).

Waterlogging directly related to the soil can be a place for anopheles sp mosquitoes. If waterlogging is sufficient in the house, it can increase the risk of malaria transmission. This is because the flight distance of anopheles mosquitoes is between 300-500 meters(22).

Table 7. Meta-Analysis Results of Night-out behavior, use of Gauze wire, and Presence of standing water around the house on the Incidence of Malaria in Indonesia

No	Research Variable	N	*Fixed/Random effect Models*	
			OR	**95% CI**
1.	Night Out Behavior	13	2,829	0,64-1,45
2.	Use of Gauze wire	18	**3,234**	**0,51-1,73**
3.	Presence of Standing Water Around the House	13	1,757	-0,003-1,13

Based on table , Use of Gauze wire variable that is the highest risk factor with a pooled value OR = $e^{1.174}$ = 3.234. (95% CI 0.51 – 1.73) So it can be concluded that respondents who do not use asa wire have a 3.234 times greater risk of experiencing malaria incidence. Furthermore, Presence of standing water around the house variable

is the lowest risk factor with a pooled value OR = $e^{0,564}$ = 1.757 (95% CI -0,003-1,13). So that respondents with standing water around the house have a 1,7 times greater risk of experiencing malaria incidence compared to respondents who do not have standing water around their homes.

D. Sensitivity Test of Behavior and Home Conditions in Affecting the Incidence of Malaria in Indonesia

Sensitivity Test is a test used to determine heterogenesis, interpret the effects of research quality and prove the results of meta-analysis are relatively stable to changes. The *sensitivity test* that can be used is to compare the *pooled odds ratio fixed effect model* and *random effect model*. *Sensitivity tests* are carried out according to the least number of meta-analysis studies.

Table 8. Comparative *Sensitivity Test* Pooled Prevalence Ratio *Fixed Model* And *Random Model*

No	Research Variable	N	*Heterogeneity (p-value)*	*Fixed effect Models*		*Random Effect Model*	
				OR	95% CI	OR	95% CI
1.	Night Out Behavior	13	< 0,001	2,751	0,806-1,217	2,829	0,64-1,45
2.	Use of Gauze wire	8	0,003	3,397	0,977-1,469	3,234	0,51-1,73
3.	Presence of Standing Water Around the House	13	< 0,001	1,663	0,309-0,710	1,757	-0,003-1,13

Based on table 8, it can be seen that in independent variables, there are variations between studies, with the appearance of a increase in the value of pooled OR from the *fixed effect model* to the *random effext Model* and the widening of the Confident Interval. In the Presence of Standing Water Around the House variable, there is a significant increase in the pooled OR value from *Fixed effect model* to *Random effect model* and the widening of the *Confident Interval* range by 95%. In the variable

use of gauze wire there is a decrease in the value of OR from *fixed effect* to random effect model and the widening of the *Confident Interval* range by 95%.

CONCLUSION

Based on the results of the meta-analysis, the variables that are the highest risk factors were obtained, namely Use of Gauze wire variable that is the highest risk factor with a pooled value OR = $e^{1.174}$ = 3.234. (95% CI 0.51 – 1.73). Variable Night-out Behavior pooled values OR 2,829 and CI 95% 0,64-1,45. And the lowest risk factor is Presence of Standing Water Around the House variable with values pooled OR 1,757 and CI 95% -0,003-1,13.

The *sensitivity test* results by comparing pooled OR *fixed effect* and r*andom effect* obtained relatively unstable meta-analysis results, namely an increase and decrease in values. The variable that occurs increases is Night Out Behavior and Presence of Standing Water Around the House. Meanwhile, the variables that occur decrease in value are use of gauze wire.

In this study, it can be concluded that variable behavior and home conditions can increase the risk of malaria. Homeowners and health workers should plan efforts to prevent and control the risk factors of malaria so that the pain rate caused by malaria does not increase. Prevention and control efforts can be carried out with health counseling, PSN and changes in community behavior towards healthier by keeping home conditions healthy and reducing breeding place of *Anopheles sp*.

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BIBLIOGRAPHY

1. World Health Organization. Malaria. https://www.who.int/news-room/fact-sheets/detail/malaria. 2022.

2. Centers of Disease Control and Prevention. Biology Malaria [Internet]. 2020 [cited 2023 Jan 5]. Available from: https://www.cdc.gov/malaria/about/biology/index.html
3. World Health Organization. World malaria report 2022 [Internet]. 2022. Available from: https://www.who.int/teams/global-malaria-programme
4. Biro Komunikasi Kementerian Kesehatan Republik Indonesia. Kejar Target Bebas Malaria 2030, Kemenkes Tetapkan 5 Regional Target Eliminasi. 2022.
5. Rokhayati DA, Putri RC, Said NA, Rejeki DSS. Analisis Faktor Risiko Malaria di Asia Tenggara. BALABA: JURNAL LITBANG PENGENDALIAN PENYAKIT BERSUMBER BINATANG BANJARNEGARA. 2022 Jul 31;79–86.
6. Centers of Disease Control and Prevention. Malaria's Impact Worldwide [Internet]. 2021 [cited 2023 Jan 5]. Available from: https://www.cdc.gov/malaria/malaria_worldwide/impact.html
7. Direktorat Jenderal Pelayanan Kesehatan Kementerian Kesehatan Republik Indonesia. Malaria. 2022.
8. Emma Suganda. Studi Meta Analisis Pendekatan Science, technology, Engineering, Art and Mathematics (STEAM) [Internet]. 2021 [cited 2023 Jan 4]. Available from: http://repository.radenintan.ac.id/15171/
9. Santosa AD, Raharjo DS. Aplikasi JASP dan SPSS dalam Penelitian Kuantitatif. Vol. 1. 2022.
10. Junaidi H, Raharjo M, Setiani O. Analisis Faktor Risiko Kejadian Malaria di Wilayah Kerja Puskesmas Kuala Bhee Kecamatan Woyla Kabupaten Aceh Barat. Jurnal Kesehatan Lingkungan Indonesia. 2015;14(2):40–4.
11. Natbais TF. Faktor RIsiko Kejadian Malaria pada Remaja di Wilayah Kerja Puskesmas Baun. 2019.
12. Nenabu JM. Faktor Resiko Kejadian Malaria Falciparum pada Masyarakat di Wilayah Kerja Puskesmas Nulle. 2019.
13. N NH, Kartini, Mira Mi. Faktor - Faktor yang Berhubungan dengan Kejadian Malaria di Wilayah Kerja Puskesmas Wandai Distrik Wandai Kabupaten Intan Jaya Papua. Jurnal Promotif Preventif. 2020;2(2):1–7.

14. Setiawan HF, Hamisah I, Fahdhienie F. Faktor Risiko Kejadian Malaria pada Masyarakat di Wilayah Kerja Puskesmas Krueng Sabee Kabupaten Aceh Jaya. Jurnal Bahana Kesehatan Masyarakat (Bahana of Journal Public Health). 2021 Nov 30;5(2):65–71.
15. Lubis R, Sinaga BJ, Mutiara E. Pengaruh Pemakaian Kelambu, Kawat Kasa dan Kondisi Geodemografis Terhadap Kejadian Malaria di Kabupaten Batu Bara. Jurnal Kesehatan Lingkungan Indonesia. 2021 Feb 2;20(1):53–8.
16. Rangkuti AF, Sulistyani S, Endah W N. Faktor Lingkungan dan Perilaku yang Berhubungan dengan Kejadian Malaria di Kecamatan Panyabungan Mandailing Natal Sumatera Utara. BALABA: Jurnal Litbang Pengendalian Penyakit Bersumber Penyakit Banjarnegara. 2017 Aug 21;13(1):1–10.
17. Susanti F, Wantini S. Faktor-Faktor yang Berhubungan dengan Kejadian Malaria di Wilayah Kerja UPT Puskesmas Rajabasa Kecamatan Rajabasa Kabupaten Lampung Selatan. Jurnal Analis Kesehatan. 2014;3(1):327–38.
18. Sepriyani, Andoko, Perdana AA. Analisis Faktor RIsiko Kejadian Malaria di Wilayah Kerja Puskesmas Biha Kabupaten Pesisir Barat. Jurnal Kesmas (Kesehatan Masyarakat) Khatulistiwa [Internet]. 2018; Available from: http://openjurnal.unmuhpnk.ac.id/index.php/JKMK
19. Siregar PAp, Saragih ID. Faktor Risiko Malaria Masyarakat Pesisir di Kecamatan Pantai Cermin Kabupaten Serdang Bedagai. TROPHICO: Tropical Public Health Journal. 2021;
20. Sitepu R, Lukito A, Elaninanivi. Analisis Determinan Kejadian Penyakit Malaria di Kecamatan Kutambaru Tahun 2017. Jurnal Ilmu Kedokteran dan Kesehatan. 2018;5(3):165–73.
21. Sandy S, Ayomi I. Gambaran pengetahuan, perilaku dan pencegahan malaria oleh masyarakat di Kabupaten Maluku Tenggara Barat dan Maluku Barat Daya. JHECDs Journal of Health Epidemiology and Communicable Diseases. 2018;4(1):7–14.
22. Manangsang F, Ganing A, Purba ER, Rumaseb E, Sarwadhamana RJ. Analisis Faktor Risiko Lingkungan terhadap Kejadian Malaria di Kabupaten Kerom Provinsi Papua.

Indonesian Journal of Hospital Administration [Internet]. 2021;4(2):37–42. Available from: http://ejournal.almaata.ac.id/index.php/IJHAA

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