

Research Article

Jumantik Education: Strategy Toward Malaria Elimination in the Resettlement Area of Osi Island, West Seram Regency

Melianus Salakory^{1*}, Stela Que², and Izak Jakobis Makulua³

¹Department of Geography Education, Faculty of Teacher Training and Education, Pattimura University Ambon-Indonesia

²Department of English Education, Faculty of Teacher Training and Education, Pattimura University Ambon - Indonesia

³Guidance and Counseling Study Program, Faculty of Teacher Training and Education, Pattimura University Ambon - Indonesia

ORCID

Melianus Salakory: <https://orcid.org/0009-0003-5759-249X>

Izak Jakobis Makulua: <https://orcid.org/0009-0003-1421-4827>

Abstract.

The Covid-19 pandemic, which has been global for 3 years, tends to have a domino effect in various aspects, such as individuals, groups, and countries. One of the causes of decreased immune system in the host is due to comorbid diseases suffered by the host (patients). Those at risk of Covid-19 may also be at risk of infectious diseases caused by viruses, parasites, and bacteria. In a pandemic situation like Covid-19, health behavior change education with a risk communication approach needs to be implemented in preventing, treating, and rehabilitating environmental stages of worm infection risk in the community of Osi Island hamlet. This education aims to increase public knowledge of potential health risks and threats. Thus, they can determine appropriate steps and actions to protect themselves from these issues. The method used is education with the project-based learning model, which combines lecture, discussion, and field practice methods. The target group is high school students of PGRI Pelita Jaya Seram Western Part. The achieved results are that the JUMANTIK cadres know about malaria-free health (cognitive), can collect trash (containers) from yards (psychomotor), do not allow stagnant water (affective), can drain water storage containers inside and around the house (psychomotor), can make simple mosquito traps using recycled materials, can sleep under mosquito nets (psychomotor), can observe larvae and pupae (psychomotor).

Keywords: Jumantik education, malaria elimination, Osi Island

Corresponding Author: Melianus Salakory; email: melianussalakory64@gmail.com

Published: 11 November 2024

Publishing services provided by Knowledge E

© Melianus Salakory et al. This article is distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use and redistribution provided that the original author and source are credited.

Selection and Peer-review under the responsibility of the 8th Isedu Conference Committee.



1. Introduction

New Covid-19 cases as of the update on April 6, 2022, amounted to 2,400 on average over 7 days, and are decreasing or inversely related to the increase in the host's (human) immune system. One of the causes of the decline in the host's immune system is due to comorbid diseases suffered by the host (patients). Those at risk of Covid-19 may

be those who are at risk of infectious diseases caused by viruses, parasites, bacteria, resulting in a decrease in the host's immune system [1].

One parasitic disease in Indonesia that still remains a public health problem is malaria, which is still a public health problem in Indonesia. Malaria control efforts make environmental factors receive proportional attention. The Annual Parasite Incidence (API) nationally tends to decrease although in some years it also tends to stagnate in 2014 - 2019. Nationally in 2010 it reached 1.96 and in 2020 it reached 0.87 [1].

Based on endemicity data, it can be seen that several areas have successfully eliminated malaria until 2022. For Java - Bali, out of 128 Districts - Cities, 121 achieved malaria elimination at 95%. The Maluku and East Nusa Tenggara region recorded 3 out of 33 Districts-Cities with an elimination rate of 9%. Papua, out of 42 Districts-Cities, had 0% elimination. In Kalimantan and North Maluku, 29 out of 60 Districts - Cities achieved elimination at 44%. Sumatra, Sulawesi, West Nusa Tenggara 165 out of 245 Districts / Cities with elimination at 67% [2].

West Seram Regency consists of 62 islands, inhabited by only 10 islands, and 52 uninhabited islands. West Seram Regency consists of 11 districts with an area of 6,848.40 km². Dominated by land stretches at elevations of 0 - 500 meters above sea level, while places above 1000 meters above sea level are not very common in the West Seram Regency area [3].

Having abundant water resources, both surface water resources and groundwater resources. With greater rainfall of 2000 mm/year, it can be ensured that all rivers flowing in this area are permanent or always have water throughout the year [3]. Looking at the topographical conditions, West Seram Regency mostly has land with slopes of 30-50%, so several areas cannot be used as cultivation areas and are required to be conservation areas. Looking at the geological structure, the earthquake-prone areas of West Seram Regency are in the northern region, where the earthquake points are located in its marine areas [2].

The climate in this area is highly influenced by the ocean and occurs simultaneously with the seasonal climate, namely the West or North season and the East or Southeast season. The change of seasons is always interspersed with the transitional season. The West season generally occurs from December to March, while April is a transitional period to the East season. The East season lasts from May to October, followed by the transitional season in November, which transitions to the West season [2].

Referring to H.L. Blum's theory (1974)[4], it is stated that the health status of an individual or group is influenced by a number of factors, namely; individual inherent

since birth, environment, habits, and health services. Quoted from Salakory in 2022, that these factors can be seen in Figure 1.

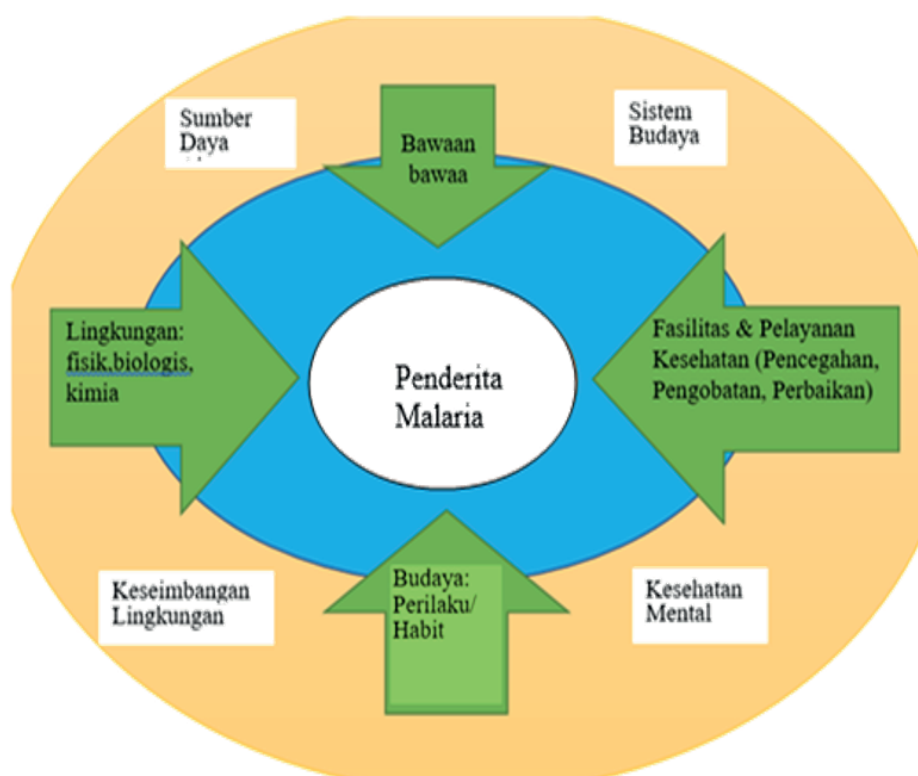




Figure 1: Theory Framework of the Domino Effect from Severe Malaria Patients Based on Blum's Theory, modified from [2].

Preventing new malaria cases (OR) or the ratio of individuals contracting malaria (RR) in the community, especially those identified as potentially at risk, both individually and collectively, is based on Green's theory (1991), which states that changing an individual's or a group's health behavior needs to be directed towards progress or improvement in the underlying factors (Green, 1991).[5] Generally, the strategy for behavior change can be depicted as shown in Figure 2.

Essentially, anyone can get infected by disease agents, serving as their breeding ground (*Plasmodium* parasites). For the host, there are several intrinsic factors that can influence the vulnerability to the agent. These factors include age, gender, race, socioeconomic status, marital status, previous medical history, lifestyle, heredity, nutritional status, and immune level [6].

In situations like this, educating healthy behavior changes with a risk communication approach is necessary in preventing, treating, and rehabilitating malaria risk environments in the community of Osi island hamlet. This education aims to enhance public

TABLE 1: Domino Effect Theoretical Framework for Severe Malaria Sufferers Based on Green's Theory (1991), modified from [2].

Phase 5 Policy and Administrative Diagnosis	Phase 4 Educational and Organizational Diagnosis	Phase 3 Behavioral and Environmental Diagnosis	Phase 2 Epidemiological Diagnosis	Phase 1 Social Diagnostic
Health Promotion	Predisposing Factors			
		Behavior and Habits		
Health Education	Strengthening Factors		Malaria Sufferers	Health Status
		Environment		
Organizational Regulatory Policy	Possible Factors			
Phase 6 Implementation	Phase 7 Process Evaluation Phase 8 Evaluation Impact			

knowledge of potential health risks and threats. Thus, they can determine appropriate steps and actions to protect themselves from these issues.

Health education, according to [7], is a systematic effort to positively influence public health behavior using various principles, strategies, and methods, both through interpersonal communication and mass involvement.

In general, the goal of education in combating helminthiasis based on local food materials with medicinal properties obtainable from the surrounding environment is to enhance understanding, perception, attitudes towards the risks, causes, symptoms, and prevention of STH transmission in an effort to boost the immune system of at-risk groups among all stakeholders involved.

2. Method

The method used is “Education” with a Project-Based Learning model that combines lecture, discussion, and field practice. The target group is high school students of SMA PGRI Pelita Jaya, West Seram. The subjects are 30 students from classes II and III selected through purposive sampling based on active participation in the Intra-School Organization (OSIS) or extracurricular activities.

In general, the development of science and technology (lpteks) from 2013 to 2023 and even after 2023 can be seen in diagram 1.

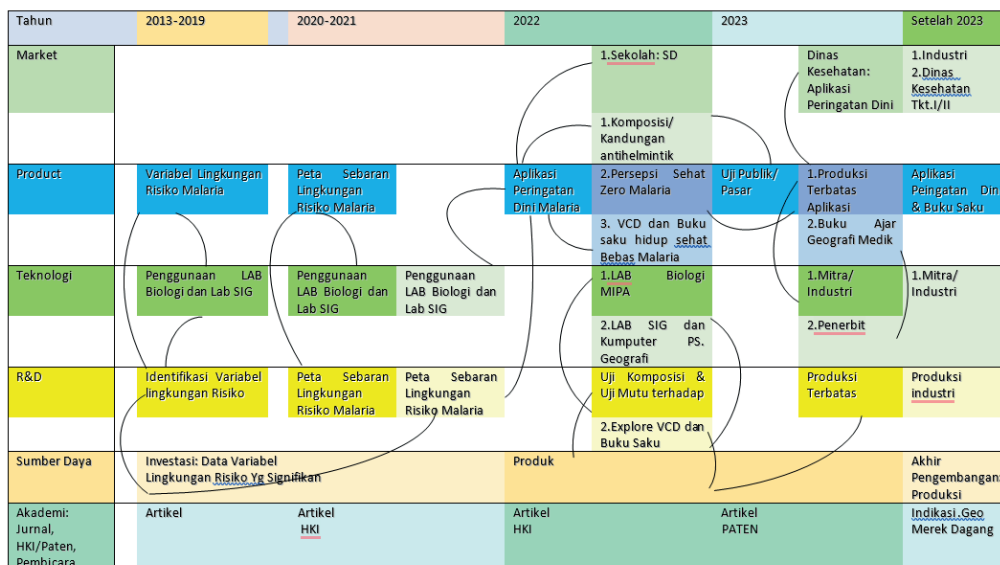


Figure 2: The Development Of Science And Technology (lpteks).

3. Result And Discussion

3.1. Presenting Result

A. Preparation (Develop an Education/Learning Plan)

The first step is preparation by developing an education/learning plan. The education plan includes the type of community service program, which in this case is the Adopted Village. It takes the form of education titled “Utilization of Environmental Information Education Towards Zero Malaria Elimination in the Resettlement Area of Osi Island, West Seram Regency.” The activity duration is 180 minutes (3 hours) consisting of face-to-face interaction and field practice. The implementation location is the Resettlement Area of Osi Island, West Seram Regency.

The competency standards to be achieved after this Community Service Program (PKM) are to produce potential JUMANTIK (Larval Observers) volunteers who understand the concept of a malaria-free healthy environment, behave healthily, can observe larvae and larvae in their environment, and provide this information to the village government for further dissemination in stages.

The expected final abilities, teaching materials, learning experiences, time allocation, and assessment are as shown in the following data display.

TABLE 2: The Expected Final Abilities, Teaching Materials, Learning Experiences, Time Allocation, and Assessment.

Expected Capabilities	Final	Study Materials (Teaching Materials)	Learning Experience	Time	Evaluation
1	2	3	4	5	
Education participants can: Have knowledge of being healthy and free from malaria.	Healthy, free from malaria (7), (8), (9), (10)	Explain, train, discuss, carry out assignments related to the concept of healthy, malaria-free.		Tasks Presentation After attending the education, participants' abilities can be measured in: understand the concept of healthy, malaria-free	
Piling up trash (containers) from the yard (Psychomotor)	Storing rubbish (Containers) [8]	Explain, train, discuss, carry out tasks related to collecting waste (containers) from the yard		Tasks Presentation After taking part in the education, it can be measured by the participant's ability to choose pictures related to the accumulation of waste (containers) in the yard	
4. Drain water reservoirs in the house and in the yard	Drain the water reservoir (9)	Explain, train, discuss, carry out tasks related to draining water reservoirs.		Tasks Presentation After participating in the education, participants' ability to choose images related to draining water reservoirs can be measured.	
5. Make a simple mosquito trap using used materials	Mosquito traps from used materials (9)	Explain, train, discuss, carry out the task of making mosquito traps from used materials.		Tasks Presentation After attending the education, it can be measured by the participant's ability to choose pictures related to making mosquito traps from used materials.	
6. Sleeping using a mosquito net (Psychomotor)	Use of mosquito nets (9)	Explain, train, discuss, carry out tasks related to the use of mosquito nets.		Tasks Presentation After attending the education, participants' ability to choose images related to the use of bed nets can be measured.	
6. Observing larvae and larvae (Psychomotor)	Observing larvae and larvae [7]	explain, train, discuss, do assignments: Observe larvae and larvae		Tasks Presentation After attending the education, participants' abilities can be measured in: explaining, training, discussing, carrying out assignments: Observing larvae and larvae.	

The activity was carried out on August 25 2022 at PGRI Pelita Jaya High School, West Seram District, West Seram Regency, in the following order:

- a. Healthy Video Screening Without Mosquitoes (Time 15 minutes)
- b. Presentation: made by speaker 1 with the title: towards eliminating zero malaria in endemic areas. Speaker 2. with the title malaria environmental information system towards zero elimination.

c. Practice: observing larvae and larvae, hoarding containers found from the yard environment (Time 60 minutes).



Figure 3: Identifying Containers at the survey location.



Figure 4: Measuring Container Water Temperature at the survey location.



Figure 5: Take Mosquito Larva From Container At The Survey Location.

d. Discussion, ten minutes.



Figure 6: Accompanied By Team Members. Accompanying Student: Temporarily Directs Class Discussions.

4. Discussion

The way of life has a big influence on malaria transmission, for example sleeping without a mosquito net and often being outside the house at night. The socio-economic conditions of people living in malaria endemic areas are closely related to malaria infection. People who have poor nutrition and live in malaria endemic areas are more susceptible to malaria infection. People who live in malaria endemic areas usually have natural immunity so they have natural defenses against malaria infection.

Mosquito factors that need to be considered here include:

- 1) Mosquito behavior: place to land or rest, place to bite, object bitten.
- 2) Mosquito lifespan (longevity): the longer the mosquito's lifespan, the more likely it is to become a human transmitter or vector.
- 3) Mosquito susceptibility to gametocyte infection
- 4) Frequency of human biting
- 5) Gonotrophic cycle, or the time required for an egg to mature.

There are more than 80 types of anopheles in Indonesia. Of these types, only a few types have the potential to transmit malaria (vectors or suspected vectors). So far it has been known as the main vector in Indonesia, among others; *An.aconitur*, *An.punctulatus*, *An.faraudi*, *An.balabacensis*, *An.barbirostris*, *An.sundaicus*, *An.maculatus*. [8] [1]

All of these main vectors need to be studied in order to take action against both their adult and larval forms.

Plasmodium lives in the human body and in the body of mosquitoes. *Plasmodium* lives in the mosquito's body in the sexual cycle stage (reproduction through mating)

and lives in the human body in the asexual cycle (reproduction without mating/through self-division). The agents that cause malaria include biological agents, namely protozoa.

Is the environment where humans and mosquitoes live. Mosquitoes breed well if the environment is suitable for the conditions needed for mosquitoes to develop. Environmental factors can be grouped into 4 groups, namely: (1) Physical environment, which includes; air temperature, air humidity, rainfall, wind, sunlight, water currents. (2) Chemical environment: what is currently known is the salt content and pH of the breeding site. (3) Biological environment, which includes; mangrove plants, moss, algae, various other types of plants that can affect the life of mosquito larvae because they can affect direct sunlight or interference from other living creatures. Also, several types of fish are predators of mosquito eggs and larvae, as well as large animals that can reduce mosquito bites on humans because mosquitoes bite these animals (for example cows, buffalo). (4) Socio-cultural environment, which includes; personal hygiene and community hygiene habits, and community perceptions of malaria [1]

(Achmad, 2003) in Salakory (2012) with his research in the malaria endemic area of the Menoreh mountains, found 15 hamlet environmental risk factors which epidemiologically directly or indirectly influence the increase in malaria transmission/outbreaks. The fifteen hamlet environmental risk factors are as follows: (1) water body; (2) moor; (3) bushes; (4) rice fields; (5) grass; (6) house yard; (7) mixed gardens; (8) forest; (9) air temperature; (10) air humidity; (11) rainfall; (12) height of the hamlet area; (13) flow pattern; (14) vector mosquito density; (15) distance from the hamlet to the mosquito breeding area [1]

By [1] after going through a discriminant test, 6 environmental predictor variables were found that significantly influenced the estimation of the intensity level of malaria transmission, namely: (1) Body of water, (2). Air temperature; (3). vector mosquito density; (4). humidity; (5). yard; (6). mixed garden. [1]

5. Conclusion

JUMANTIK cadres have knowledge of being healthy and free from malaria (cognitive), hoarding rubbish (containers) from the yard (psychomotor), not allowing water to stagnate (affective), draining water reservoirs in and around the house (psychomotor), making simple mosquito catchers using used materials. Participants also use mosquito nets when sleeping (Psychomotor), and can observe larvae and larvae (Psychomotor). On the basis of this conclusion, it is recommended that JUMANTIK cadres who have been educated can be empowered by the school in order to help the government and society towards eliminating zero malaria as a national policy.

References

- [1] Salakory Melianus, "Media Medika," *Pemberian Cairan Karbohidrat Elektrolit, Status Hidrasi dan Kelelahan pada Pekerja Wan.*, vol. 46, no. 14, pp. 6–11, 2012.
- [2] M. Salakory and G. E. Tetelepta, "Edukasi Pemanfaatan Informasi Lingkungan Menuju Eliminasi Zero Malaria Di Daerah Resetlemen Pulau Osi Kabupaten Seram Barat," *J. Geogr. Lingkung. dan ...*, vol. 1, no. 2, pp. 1–12, 2023, [Online]. Available: <https://ojs3.unpatti.ac.id/index.php/jglk/article/view/9976%0Ahttps://ojs3.unpatti.ac.id/index.php/jglk/article/download/9976/6266>
- [3] A. Soumokil et al., *MALUKU MASA DEPAN* (Alfonsina Marthina Tapotubun, Friesland Tuapetel, Agustina Soumokil, Hendry I Elim, Melianus Salakory, Putri Reno Intan, Febby J Polnaya, Natelda R Timisela, Ilyas Marzuki, Maria Nindatu, Gun Mardiatmoko). 2021.
- [4] Salakory M. Pengembangan Sistem Kewaspadaan Dini Malaria Berbasis Sistem Informasi Lingkungan (Eis-Ewsm) Bagi Pengambilan Kebijakan Di Daerah Endemis Pedesaan Pulau Ambon, *Media Medika Indonesia*. 2012;46(3). <https://ejournal.undip.ac.id/index.php/mmi/issue/view/1035>
- [5] K. K. RI, "Pedoman Tata Laksana Malaria," *Kementeri. Kesehat. RI*, no. 128, pp. 1–62, 2013, doi: 10.1017/CBO9781107415324.004.
- [6] M. Salakory and D. Promotor Prof. Dr. dr. Soeyoko SU, "Beberapa aspek ekoepidemiologi dan dinamika populasi geohelminths serta prevalensi dan distribusinya di perdesaan Pulau Ambon Maluku." *S3 Ilmu Kedokteran dan Kesehatan Universitas Gadjah Mada*, 2010. [Online]. Available: https://ugm.summon.serialssolutions.com/2.0.0/link/0/eLvHCXMwIR27TsMw0CqwIBYQIN7yjNSQxi5yR14VS1GHDSASXexLG6V5qGkGdj6cO1PUigkmy7J99v1vofvhFBREHZ_3QIK64FJjDM2dLRLbD8KjU019EOduChhSchbWl3e1etEjzrC_HyNwaULWHjeZKxyDtppwd3QMhGvj2wfBuXK1vKG3awQG7SlvLZ2GLwwtZgWG9
- [7] S. Notoadmodjo, *Promosi Kesehatan & Prilaku Kesehatan*. 2012.
- [8] *Kemenkes RI, Petunjuk Teknis Jejaring Pemeriksa Malaria*. 2020.