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Malaria Vector Surveillance in Kepulauan Seribu as Threat in DKI Jakarta, 2023

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ABSTRACT

Malaria is a vector borne disease that can affect morbidity and mortality, especially in endemic countries. Malaria cases worldwide in 2017, 219 million cases vector-borne in 2017-2020. Southeast Asian countries especially Indonesia contributed to high cases due to the presence of endemic diseases which were confirmed first by Indonesia at 49.6%, second country India at 36.4%, and third country Myanmar, at 11.5%. The purpose of the surveillance is to find out the malaria control vectors in the area, such as the integration of malaria managers into post-malaria elimination. This study uses observational methods and direct collection of primary or current data specimens. The results of observation showed that there were 3 islands, detected to contain Anopheles Sp. Tidung Island, Lancang Island, and Untung Jawa Island. From the results of observations, it is necessary to provide integration of malaria vector managers in post-malaria elimination, immediately carried out so as not to cause new cases or extraordinary events that were not initially detected, resulting in extraordinary events even though the area has implemented malaria elimination.

1. INTRODUCTION

Malaria is still a threat in a country with a tropical climate, Indonesia is a tropical climate. Indonesia has committed to implementing various efforts to reduce malaria vectors, but it is undeniable that transmission in various archipelagic areas or intersecting is still a problem in malaria control and its vectors are continuously implemented. Malaria vectors are determined by several factors: the presence of intermediate vectors such as the Anopheles mosquito, the environment, and humans which are often intermediate sources and new infections. So that the Indonesian ministry of health seeks control studies with one of them controlling the vectors that cause Anopheles to multiply [1].

A study revealed malaria is a type of mosquito-borne re-emerging disease. This disease is found in areas that have 2 climates and accompanies symptoms caused such as fever with fluctuations in body temperature, decreased platelets, enlarged spleen glands, and enlarged pigments in tissues. Malaria is infected by one-celled parasites of class Sporozoa, Haemosporida and Plasmodium. Infections in humans are caused by classes of Plasmodium such as plasmodium falciparum, plasmodium malariae, plasmodium vivax, and plasmodium ovale. Causes of parasites by mosquitoes Anopheles sp [2].

In 2020 during the coronavirus disease pandemic that infected all countries, Indonesia may be the highest case because funding taken from malaria observation and monitoring posts was taken by the central government for handling Covid and Vaccines while handling endemic areas such as malaria cases detected and confirmed by 49.6% followed by India at 36.4% and Myanmar at 11.5%. Malaria cases in Indonesia in 2020 reached 254,050 cases. As well as annual Parasite Incidence (API) morbidity. In the period 2018-2020 experienced an increase in 2018 by 0.83, in 2019 by 0.93, and in 2020 by 0.94 per 1,000 population [3].

MDGs were initiated by World Health Organization (WHO) in 2000 as well as a joint

commitment to the 60th World Health Assembly (WHA). In 2007 with the issue of reducing re-emerging diseases, especially malaria, the Indonesian state committed to carrying out the "Malaria-Free Indonesia 2030" program. The program has been stated in Minister of Health Republic Indonesia No. 293 / MENKES / SK / IV / 2009 on April 28, 2009, with a malaria elimination program in the territory of the Indonesian state in realizing a healthy living society and not infected with malaria transmission. However, the program will be gradually achieved until 2030. The target elimination area is divided into four zones starting from Kepulauan Seribu (DKI Jakarta), Bali, and Batam in 2010. The second phase of Java island, Aceh province, and Riau islands province in 2015. The third zone of Sumatra islands (except Aceh and Riau islands), West Nusa Tenggara, Kalimantan, and Sulawesi in 2020. Fourth zone of Papua, West Papua, Maluku, East Nusa Tenggara, and North Maluku Provinces in 2030 [4].

After the malaria elimination program takes place even though there are still other areas that are still not malaria elimination, the Indonesian state has achieved the next target, Sustainable Development Goals (SDGs) program in 2030 [5]. Scope of malaria elimination program in national data center data at Indonesian Ministry Health in 2022 until now is 70% or 362 districts/ cities declared malaria free and there are still 26 districts/cities with high cases, 17 districts/ cities with moderate endemic cases and 109 districts/cities with low endemic cases.20)

Through the Ministry of Health, it initiated an assessment of malaria elimination certification for Indonesia to the World Health Organization in 2030. However, the previous process was preceded by an elimination assessment for the islands of Java and Bali in 20an 23; an assessment for the islands of Sumatra, NTB, and Sulawesi in 2025; an assessment of islands Kalimantan and North Maluku in 2027; an assessment of not islands East Nusa Tenggara and Maluku in 2028 and assessment for West Papua and Papua regions in 2029 [7].

Problems with vector-borne diseases can be prevented by knowing the uniqueness and diversity and behavior of mosquitoes in biting. So entomologists believe this information can be a solution for handling mosquito behavior patterns so that it becomes useful and knows and evaluates the cycle of course of vector infectious diseases from the uniqueness of mosquito behavior, human behavior, and environmental factors. Furthermore, information obtained becomes material in taking and discussing a decision, in tackle ing spread of disease [5]. Based on previous research and previous explanations, the author seeks to establish a theory after the malaria elimination program is implemented, it is necessary to follow up programs such as mosquito resistance to certain materials and early detection or field observation if mosquito larvae are found [8].

Efforts malaria elimination program Kepulauan seribu by existing data in PUSDATIN for malaria disease from 2001 to 2022 have developed in terms of malaria elimination, and success in the program, it can be narrated that there were malaria cases, in 2001-2005 several cases many as 450 cases of causes occurred in local cases in Kepulauan seribu this result is related the o lifestyle of people n Kepulauan seribu which is still not in education on how malaria prevention takes place and existence of pancaroba season that causes brackish water land to grow and develop in the area, from 2006 to 2010 there were 33 cases of malaria that occurred in local cases in Kepulauan Seribu, decrease in several malaria cases is due to public awareness of the importance of malaria prevention and participation of community cadres and health workers to continue to promote dangers of malaria [9].

Post-elimination maintenance efforts carried out in Kepulauan Seribu are relatively good and received a certificate of elimination program from mthe ministry health in 2013. However, inseparable from the program certificate, entomologists in the thousand islands area continue to strive to monitor, evaluate and monitor because in other areas there will continue to be imported cases from regions, of course, entomologists must try to carry out post-elimination maintenance of malaria because the cause of malaria as imported cases often occurs in various regions the main cause is a high level of human mobility in various regions, malaria cases are not once lost in tropics, especially in Indonesia [10].

After post-elimination is carried out in a certain area, there are times when the obligation of entomologists to carry out maintenance by conducting education with clean and healthy living behaviors, improving public health protection, increasing public knowledge by improving education

in the region, behavior that pays attention to the environment, work, traditions/culture, social and economic, then strengthening cross-sectoral cooperation, and development of environmental insights [11].

However, it is inseparable from all epidemic programs in one particular area that cannot be completed 100%, but in other vectors that can breed due to natural factors such as weather factors, sanitary factors, and a good environment for the development of mosquitoes in the area.

2. METHOD

Surveillance research observational, taking specimens form of mosquito larvae retrieval then placed in specimen bottles and island label paper and, calculating the level of density retrieval material and tools used consist of compound microscopes, paper cups, label paper, glass objects, deck glass, paper bags, scissors, bottle vials, pipettes, larval vials and cryotubes and other materials needed. The data source used comes from primary data taken directly from every thousand islands consisting of Pramuka Island, Panggang Island, Tidung Island, Lancang Island, Pari Island, and Untung Java Island. The specimen collection time for each island is different which starts at 09.00 to 15.00 WIB, with a device, and net capture filter for mosquito larvae. As well as providing specimen bottles and label paper to count the number of catches on mosquito larvae in certain places/areas/islands.

3. RESULTS AND DISCUSSION

Table 1. Results Capture Malaria Vector Larvae in Island Pramuka

Habitat Type	Well	Used Ship Containers	Well Toren	Fish breeding container
Volume water (L)	700	500	1000	10.000
Salt (o/oo)	3	4	1	1
Acid level (pH)	4	4	4	4
Density larva	0	0	0	0

From the capture of mosquito larva table 1 on Pramuka Island, it was found that there were no larvae either in the type of well habitat, used boat container, toren wells, and fish breeding container, with a volume area of 500 -10.000 liters, with an average pH 4.

Table 2. Results Capture Malaria Vector Larvae in Island Panggang

Habitat Type	Lagoon 1
Volume water (L)	25.000
Salt (o/oo)	30
Acid level (pH)	3
Density larva	0

From the capture of mosquito larvae in table 2 in Panggang Island, there is only 1 place, then, there are no mosquito larvae in the pond habitat with a total water reservoir of 25,000 liters, with an acid level pH of 3.

Table 3. Result Capture Malaria Vector Larvae in Island Tidung

Habitat Type	Lagoon1	Lagoon2	Fish Pond	Trash Pond	Well 1	Well 2
Volume water (L)	50.000	50.000	35.000	100	200	200
Salt (o/oo)	29	33	30	31	0	0
Acid level (pH)	4	4	4	4	7	7
Type Species	-	-	Anopheles Sp	Anopheles Sp	-	-
Density larva	0	0	5	5	0	0

The capture of mosquito larvae in table 3 on Tidung Island, was obtained for lagoon 1 and

lagoon 2 with pH = 4 and a water volume area of 50.000 liters, no mosquito larvae in catches and specimens, in well 1 and well 2 with an area of 200 liters with pH = 7 mosquito larvae were not obtained. then in fish ponds and trash ponds, there are species of Anopheles Sp mosquito larvae, with a density of 5 with a water volume area of 35.000 to 100 liters, pH 4. Specimen collection is carried out once retrieval is obtained quite a lot, the level of density of retrieval on the larvae with a range of 1-4 larvae retrieval has a low density, > 5 has a high density, obtained from retrieval as many as 5 larvae, it is categorized as high density, at the location of the abandoned fish pond and pond trash can that was not closed and pier dam was carried out at 09.00 – 11.00 WIB at the location there was moss and mixed with domestic waste such as food waste plastic, wrapping plastic, styrofoam and wood at the location.

Table 4. Result Capture Malaria Vector Larvae in Lancang Island

Habitat Type	Pond1	Pond2	Pond3	Pond4	Pond5	Pond6	Pond7
Volume water (L)	1000	2000	3000	1000	1000	2000	1000
Salt (o/oo)	33	30	25	21	26	26	27
Acid level (pH)	6	6	6	6	6	6	6
Type Species	-	-	Anopheles Sp	-	-	-	-
Density larva	0	0	5	0	0	0	0

From the capture of mosquito larvae in table 4, on Lancang Island, it was found that in 7 pond carried out specimens, there was 1 pond having larvae, pond 3 with a total water volume of 3000 liters and with a pH = 5. Specimen collection is carried out once retrieval is obtained quite a lot, the level of density of one blade on the larvae with a range of 1-4 larvae once retrieval has a low density, > 5 has a high density, obtained from retrieval as many as 5 larvae, it is categorized as high density. While resting in pond 6 were not found the presence of anopheles Sp. mosquito larvae. The habitat location in pond 3 is abandoned and there is moss, as well as domestic waste such as plastic food packaging wrap and other packaging made of plastic, styrofoam, and wood, specimen collection is carried out at 12.00 – 14.00 WIB.

Table 5. Result Capture Malaria Vector Larvae in Pari Island

Habitat Type	seaweed pond1	Well	seaweed pond2	seaweed pond3	Well	seaweed pond4	Pond
Volume water (L)	500	150	300	200	150	300	500
Salt (o/oo)	4	16	31	9	4	4	33
Acid level (pH)	6	5	6	6	6	5	6
Density larva	0	0	0	0	0	0	0

From the capture in table 5 mosquito larvae, on Pari Island in table 5 with types of habitats for seaweed ponds, wells, and ponds, with a volume area ranging from 500 liters to 150 liters with a pH level of 5-6, there are no mosquito larvae in area of the location being inspected.

Table 6. Result Capture Malaria Vector Larvae in Island Untung Jawa

Habitat Type	Pond1	Lagoon	Pond2	Pond3	Pond4	Pond5
Volume water (L)	1000	300	500	1000	2000	2000
Salt (o/oo)	20	15	26	15	3	20
Acid level (pH)	5	5	5	5	5	5
Type Species	-	-	Anopheles Sp	-	-	Anopheles Sp
Density larva	-	-	3	-	-	2

From the capture in table 6, on island Untung Jawa on habitat type pond 2 and pond 5, with a water volume area of 500 to 2000 liters with a pH = 5 obtained anopheles Sp mosquito larvae with the amount of density at pond 2, retrieval there are 3 larvae of anopheles Sp and pond 5 obtained retrieval

there are 2 larvae of anopheles sp mosquitoes, level of density of one blade on larvae with a range of 1-4 larvae once retrieval has a low density, > 5 has a high density. So pond 2 and pond 5 have a low density of mosquito larvae. Location of abandoned ponds 2 and 5 habitats in a location many mosses and shrubs are jutting into the pond, a specimen collection time is 13.00-15.00 WIB.

Figure 1. Surveillance of Specimen Collection in Garbage Collection

Figure 2. Surveillance of Specimen Collection in an Abandoned Pond in Island Seribu

Figure 3. Surveillance Coverage Area Map

From 2018-2021, specimens have never been taken from each island due to manpower or human resources, unavailability of entomology at the island's serious health office, and the most important thing in terms of funding that does not exist because in 2018 there was no budget to carry out post-elimination vector surveillance in the region, then in 2019-2021 there is no budget also for

surveillance because all funds are diverted for handling Covid-19 Virus pandemic, then in 2019 - 2021 there is an increase in API rate figure, this is an important concern because areas that have eliminated malaria, detected vectors and causes of malaria disease reappear, so that in 2022 Kepulauan Seribu health office budgeted to review areas that had been eliminated malaria, then 3 islands were found to have malaria vectors, and immediately followed up.

Vector control can be more effective, cost-effective, environmentally friendly, and sustainable. aims to achieve a basic degree of health on evidence in a particular region, by addressing some diseases and by using existing systems and local human resources. The integration of vector management is aimed at making decisions in optimizing the use of existing resources to prevent control vectors. As a basis for integration management, promotion, as well as basic knowledge regarding vectors, diseases, and disease determination.

Problem-solving approaches to vector control, where present and past based on field observations, supervision, and analysis of the situation form the basis for an action plan. Since almost every situation is different and complex, it is impossible to determine standard actions and strategies for all situations. Instead, skills and capacities for supervision, analysis, and adaptive management should be designed at all appropriate levels of administration. Smaller areas for situation analysis, more detailed and accurate data, and more responsive mitigation measures will. Approach to problem-solving requires the right skills and capacities at the central, district, and village levels. Once established, these skills and capacities will strengthen the health system as it has direct benefits to other public health.

Constraints that exist in each region and their causes must be identified. Situation analysis can be used to identify, for example, factors that reduce the efficiency of vector control or the effectiveness of interventions and any adverse side effects. Situation analysis is a component of "vector control", which is discussed in detail in the journal separately

a. Government policy, the policy doesn't automatically produce results. The procedure for the government to carry out public policy is a "policy instrument". Examples are legislation, regulation, persuasion, and programs. It is a tool that governments can use to establish and implement vector management. Integration strategies nationwide. Policy instruments are to be used in establishing national strategies and new governing bodies, adjusting institutional arrangements, or establishing cooperation between sectors. They can also be used to advise on training and research directions, regulate the use and management of pesticides for public health and guide allocation budgets.
b. Decentralization of health reform, in most countries endemic to vector-borne diseases, health reform has resulted in the decentralization of decision-making and allocation of resources. In decentralization, decision-making is taken to the most appropriate lower administrative level, transferring responsibility for planning, budgeting, and carrying out certain functions of the central government to local districts or units. Therefore, health services were transferred from the ministry of health to the district health office, and the role of the ministry was limited to policy, guidance, and technical support. A prerequisite for decentralization is that skills and capacity for analysis and decision-making are firmly established at the district level. Capacity for vector control at the district level often requires further reinforcement for its implementation of complex programs.
c. Subsidiarity, decentralization is guided by the principle of "subsidiarity", where the central government has the authority to perform only tasks that cannot be performed effectively at a higher level, but direct or locally. The vector management integration approach adheres to the principle of subsidiarity in terms of promoting planning, implementation, and evaluation of vector control at most at the local level. Decisions made locally have the potential to be more responsive, flexible, precise, and accountable; Local elected representatives have better information about the needs of their constituents. A decentralized health system provides a suitable framework for vector integration.
d. Monitoring and evaluation, in monitoring and evaluating with indicators identifying factors of vector management integration, analyzing the situation in full, cause and effect on the economy in a spread of disease, the composition of vector integration direction that has been developed,

the existence of building cooperative and coordination relations with units in carrying out vector control.

Roles and responsibilities, vector control units or entities that have similar capabilities will have overall responsibility for the coordination and facilitation of partnerships and training partners. Health staff or health departments and sub-district health centers must acquire skills to facilitate partnerships and guide their activities. Facilitation skills are not part of conventional training in the health sector and should be developed i.e :

a. Management of pesticide/ larvicide use, pesticide management in particular requires cross-sectoral cooperation. involved in the good management of public health pesticides including health service as control, procurement, storage, transportation, distribution, application, management, resistance, quality control, and disposal. In many countries, the ministry of agriculture and the ministry of health organize the registration of all pesticides, including those intended for use in public places. Therefore, coordination on requirements for public health is very important. The use of larvicides will have important implications for public health, not only for poisoning, but also for control of vector-borne diseases, and in particular for control of malarial mosquitoes. The use of larvicides used in certain ponds or shelters will affect other habitats, and malaria vectors and can be resistant to insecticides. So in the administration of larvicides should be of particular concern is the use of pyrethroids in agriculture and fisheries, which has been associated with the development of malaria vector resistance. Pyrethroids are the only group of pesticides available for use in insecticidal nets. Therefore, to ensure the effectiveness of sustainable vector control must be coordinated with relevant parties in how much use and presence of resistance to the use of larvicides.
b. Use of IRS (Indoor Residual Spraying), an effective post-malaria elimination effort is to use home spraying, IRS insecticides that can kill adult mosquitoes. Assuming that with the killing of adult mosquitoes, parasites that exist in adult mosquitoes, do not spread / transmission of disease can be interrupted. As a direct impact, reducing or eliminating the place of induction so that the development of adult mosquitoes can be reduced and affect the transmission of disease spread.
c. Sowing of fish seedlings on ponds or lakes, cross-sectoral cooperation is very necessary in surveliance, if there are large and large numbers of mosquito seedlings or larvae, then related parties, health centers and health offices, provide a recommendation letter to local fisheries service to give fish seeds in abandoned ponds or lakes as an effort to prevent emergence of mosquito vectors, because these efforts are carried out as early detection in prevention of extraordinary events If area has been eliminated malaria, it is possible that there are costs that must be incurred from region as an effort to prevent malaria vector disease.

4. CONCLUSION

It can be concluded that if it is caused by environmental changes such as weather changes in environment and the conversion of land that was once a pond, it is converted into buildings, and at certain border locations, it is necessary to be aware that it will have an impact on types of vector-sourced diseases such as mosquitoes. Type of potential habitat for malaria vectors in health service area of community health center Kepulauan Seribu District is in form of mossy, dam and pond, then location has status of a receptive location and at any time will be at risk of malaria vector infectious disease, community health center and local residents carry out larvicide sowing, in places where mosquito larvae are indicated, as well as carry out routine supervision at location of mosquito breeding sites by local health center workers.

It is obtained that timing of implementation of vector surveillance is carried out during winter or rainy season there is a potential habitat, the form of a mossy dam, or mossy pond which has the status of a permanent habitat for mosquito larvae vectors.

A general description is dam, which is close to settlements that are habitat of malaria vectors with their spread increasingly widespread so that they can become malaria transmission.

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