

## RESEARCH REPORTS

### Spatiotemporal analysis of Malaria in West Java, Indonesia: An Evaluation and Recommendation of Elimination Strategies

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#### **Purpose**

We aim to analyze the association between malaria disease and the habitat of its vector, the mosquito. We will interpret the Malaria trend in West Java, Indonesia, for the past ten years. We also explore the facilitating and barriers factors to malaria elimination from the government's point of view.

#### **Methods**

##### *Retrieval Geotagging Sample Flick Mosquito*

We took larva mosquitoes with malaria eradication team of Puskesmas Kalipucang Pangandaran and the Pangandaran District Health Office. We carried out captivity larva mosquitoes in the morning and afternoon in the Village Pamotan and Village Putrapinggan, District Kalipucang, Pangandaran.

##### *Adult Mosquito Sampling*

Equipment used in this sampling activity are a Mosquito glass aspirator, flashlight, glass paper, cloth gauze, and cotton. Mosquitoes sampling are based on two location, outside and inside the house. Stanzas have divided into two, i.e., catch a mosquito with a human stanza for 40 minutes, and continue the next session to detect a medium mosquito resting for 10 minutes.

### *Identify the mosquito genus.*

Identification of mosquitoes has done using a microscope. The genus of mosquitoes determined from the form of wings, abdomen, a pattern on the thorax, legs, mandibles, and antennae mosquito.

### *Mosquito mounting*

Mounts or preservation of both larvae and adult mosquito aim for taxonomies identification and collections. Larvae or adult mosquito put in hot water ( $\pm 60^\circ \text{C}$ ) and done thoracic puncture with a needle. Then soak in 2% KOH for 2-4 hours in Petri disks so that the larvae become clear. Next, soak for 30 minutes in 10% acetic acid for fixation. Then soak in alcohol levels of 30 minutes each for dehydration. After that, soak in alcohol absolute 2-3 times for 10 minutes and soak in clove oil for 10 minutes so that the larvae become transparent. Next, move the specimen on a glass slide with a dorsal facing position up and head to the right. Done clearing, use xylene to clean all solutions and solutions dripped enough—close specimen with covered glass and dry at room temperature room.

### *Pinning mosquito*

Pinning is the step next when the specimen has passed step mounting. Pinning is positioning the mosquito on a needle pinning so we can use it for training taxonomies and collections. Tools and materials used form chloroform, needle pinning, point paper, label paper, boxes insect, beam pinning, Acampora, tweezers insects, nail polish, cotton, and mold point paper. Labeling specimen mosquito contains; Number of specimens, date in pinning, species, location taking, method arrest, and name of the collector.

## **Results**

Pangandaran was determined as a location activity because the area is not yet stated Free of Malaria (Ridwan Kamil: West Java Free of Malaria in 2022, 2019). According to the government of West Java, 15% of districts or cities in West Java still face Malaria problems, one of which is Pangandaran. Also added that the Pangandaran Malaria problem includes problem deployment locally, including problem vectors.

To support Malaria free in Indonesia, we work with Local Research and Development Pangandaran and Puskesmas Kalipucang to visit rice fields, ponds, swamps, and house citizens. We check water characteristics and larva mosquitoes' presence on-site in rice fields, ponds, and wetlands. On the other hand, we do adult mosquitos sampling at home and inhabitant around.

The technique used for checking water characteristics and the presence of larva mosquitoes is several taking water using a dipper. The process starts with choosing a location pool or suspected former rice fields there is a larva mosquito. Next, we use a tool dipper to take a water sample and check if there is a larva mosquito. If there is any larva mosquito, we put the larva inside a bottle prepared through pipette. The bottle will mark following the location of the taking. Next, the process is repeated in parts different in the same pond until done surrounding it. Finally, total larva found mosquitoes summed and distinguished between mosquito genera.

The difference between larva mosquitoes done through characteristics observation. Anopheles mosquitoes do not have chiffon but have hole spiracles for breathing. Because of it, the Anopheles larva looks parallel to the water's surface, distinguished from larva mosquitoes and others who have chiffon so that larvae do not parallel with the water surface; however, they have part of the tail leaning to the direction water's surface. One difference is that others who don't look apparent use their eyes in existing hair palmata. Feathers arranged on the side left and right abdomen from Anopheles larva and plasticity clear with the help tool microscope.

Adult mosquito sampling done at night-day at home and inhabitant area. We have distinguished into two assigned groups to 2 different houses. In each home, we shared the outside and the inside house again. The capture process started in a manner together and used 1 hour. The distribution duration from that 1 hour is 40 minutes using people feed and 10 minutes arresting mosquitoes on the wall. The remaining time using preparation and transition among the first house will continue inside arrest and, on the contrary, for the first in the place.

The technique used for adult mosquito sampling is the use aspirator or tube sucker. The process started with 1 in 2 people going to become bait where they sat still and let mosquito land so the second person could catch it. When mosquitoes are detected, the second person will direct the inner aspirator tip 90-degree angle to back the mosquitoes and suck the mosquito into in tube. Fingers will cover the aspirator tip, and mosquitoes will lay in hole cups. Those cups have been prepared previously for covered by cloth gauze perforated and cotton that will use to protect the hole cloth gauze. After the mosquitoes successfully entered to cups, the team will repeat the process with mosquitoes differently. The different technique when catching mosquitoes on the wall is we need to look for Mosquitoes perched on the border with flashlights actively, not wait for mosquito perch.

Collected mosquitoes will be distinguished among the genus to identify the Anopheles mosquito. Anopheles mosquitoes have the same palpi length as a beak. It is different from other genera of mosquitoes, such as Aedes or Culex, that have palpi and proboscis lengths the same. Another part that can be distinguished is the scutellum located in the section thorax of the mosquito. The scutellum of the Anopheles mosquito has one lobe, whereas Aedes or Culex mosquitoes have three lobes on their scutellum.

This activity expected to support the Malaria Elimination Program in West Java by identifying the spread cases of Malaria become description in effort prevention as well as control to spread effective and efficient malaria cases. Implementation results of a visitation to Pangandaran is in framework participation support the Malaria Elimination Program in West Java. Interview the participating experts present to participate in the activity Study Tular Malaria vector, i.e., team Puskesmas malaria eradication Kalipucang, Pangandaran, and from the Pangandaran District Health Office. The interview has done for information about moderate latest faced by cadres' disease transmitted vectors as well as how circumstances the people involved in handling deployment disease transmitted vectors.

Visit Local Research and Development Pangandaran gives education for strengthening understanding about species of mosquitoes, experience visiting particular museum mosquitoes and see garden repellent mosquitoes, and analyze type larva mosquitoes in the room *insectarium*. The team also shares in the preservation environment in the area of Pangandaran to minimize existing abrasion beaches. Next, the team down live to the field to take sample larva mosquitoes and mark the habitat of mosquito development breeds.

### **Future challenges**

Positive side implementation visit to Pangandaran that is, indicator activity while in Pangandaran has achieved like compactness team, education about difference larvae and mosquito adults, interviews to related parties, implementation *geotagging* as well as *pinning* mosquito maturity. The Compactness team became evaluation positive because a team capable of knowing one another significantly and adapted to a wide range of conditions when taking sample larvae on the *lagoon* and retrieving sample mosquitoes mature.

The challenge of the moment visit Pangandaran is the need for an understanding team in operating the application *Essential GPS* and the

difference between android and IOS *users* becoming a problem when installing the application GPS essential. Still, we resolved the matter resolved with the method using an application for *geotagging*. Education return covers application geotagging app with on duty mark something the place, for example, restaurant, clothing stores and places lodging before doing activity *geotagging* marking of larvae habitat mosquito.

## Documentation



**Figure A.** Geotagging introduction



**Figure B.** Interview



**Figure C.** Mosquito identification, mounting, and pinning



**Figure D.** Planting mangrove trees



**Figure E.** Mosquito larvae collection guided by malaria eradication team of Puskesmas Kalipucang Pangandaran & Pangandaran District Health Office



**Figure F.** Identification, mosquito *Anopheles* female, see from colored wings black white symmetrical and the same length of proboscis-palpus.

## Research Collaboration EHIME UNPAD



### MECOH lab's collaboration with the Universitas Padjadjaran, Bandung Indonesia

12/20/2022

0 Comments

Dr. Kozo Watanabe and Jerica Reyes (Ph.D. student) visited the Universitas Padjadjaran in Bandung Indonesia to discuss their long-standing collaboration. For the past years, the MECOH lab has conducted projects focusing on arthropod-borne diseases together with Dr. Lia Faridah, Dr. Savira Ekawardhani, and Dr. Nisa Fauziah. They discussed future research collaboration in the meeting and the prospect of establishing a satellite laboratory under Ehime University at the Universitas Padjadjaran.



From left to right: Dr. Savira Ekawardhani, Jerica Reyes, Dr. Lia Faridah, Dr. Kozo Watanabe, Dr. Ruswana Anwar, and Dr. Nisa Fauziah

Dr. Ruswana Anwar, Vice Dean for Academic, Student Affairs, and Research in the Universitas Padjadjaran attended the meeting to exchange ideas regarding the satellite laboratory. One of the main goals of the satellite laboratory is to strengthen the international collaborative research between Ehime University and Universitas Padjadjaran. Both universities intend to collaborate on researches involving Dengue, Malaria, and Anti-microbial Resistance (AMR). The two universities plan to merge their research goals to resolve global issues on both health and the environment.

The meeting also included a tour of the research facilities in the Universitas Padjadjaran. Their facilities include a cell culture room, cytogenetics laboratory, immunology laboratory, next-generation sequencing, and a MoVi Labtainer which is a recent addition to handle COVID-19 samples.



MECOH Lab

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