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# *Aedes* Mosquito Population density of Dengue Fever Vectors in The Area of Pineleng Minahasa

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**Abstract**

Aedes mosquitoes have the behavior of sucking blood repeatedly (multiple bites) in one gonotropic cycle, these mosquitoes are also very effective at transmitting the virus to humans (WHO 2004). Kawada et al. (2007) reported that foraging activity of A. albopictus was less than 0.1 times compared to A. aegypti under laboratory conditions, this result is consistent with the tendency to bite both species in nature. The target-attack frequency (foraging activity) in A. aegypti female mosquitoes in unfed conditions is 30 times greater than that of A. albopictus mosquitoes in several laboratory treatments (Kawada, et al. 2007). Aedes sp is a deadly infectious vector between another dengue hemorrhagic fever (DHF) and chikumunya. Pineleng is a marginal / suburban area of Station 1. Recent studies have reported changes in habitat patterns of Aedes sp, especially *Aedes albopictus* and *Aedes aegypti* . The aim of this study is to characterize the population density of the Aagoan sp. Imago based on the time distribution and altitude of the sea surface. The population density characteristics of the Aedes spagoed imago captured inside and outside the room based on the time distribution in North Sulawesi. The stages of the study consisted of larvae surveying, larval extraction and analysis and imago extraction and analysis. The results showed that the results showed that the high population of Ae aegypti was at 8:00 a.m. to 10:00 p.m. in the morning and 14:00 to 16:00 p.m. in the afternoon before the afternoon. in the morning before noon and at 14:00 to 18:00 in the afternoon before evening.

**Key words:** *Aedes albopictus*, *Aedes aegypti* , Population density, Minahasa

## 1. INTRODUCTION

Dengue fever (DB) and dengue hemorrhagic fever (DHF) for which there is no cure is strongly related to the health of the environmental environment. The cause of dengue fever is a type of arbovirus virus that enters the human body through the mediation of *Aedes aegypti* or *Aedes albopictus* which likes to nest and breed in clean water storage, stagnant water in used goods, or leaves. (Erik Tapan, 2004). *Aedes aegypti* and *Aedes albopictus* mosquitoes attack urban

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areas that are densely populated and have high immobility. Various ways have been done to prevent the breeding of mosquitoes that cause DHF, but the results have not been optimal. Every year there is an increase in DHF sufferers and has claimed many lives ranging from children to adults.

Aedes mosquito is a type of mosquito that is usually found in the tropics. The name comes from the Greek aēdēs, which means "unpleasant", because this mosquito spreads a number of dangerous diseases such as dengue and yellow fever. Edges that act as vectors of disease are all classified as stegomya with body characteristics of black and white stripes on the chest, stomach , limbs. This style is the side that sticks to the outside of the mosquito's body. The white pattern on the dorsal of the chest (back) of the mosquito is shaped like a facing elbow. Aegypta is a species of mosquito that lives and is found in countries located between 35 South Latitude and 35 South Latitude at the lowest temperature around 100º C. In summer, this species is sometimes found in areas located up to about 450 South Latitudes. In addition, the resistance of this species also depends on the height of the area concerned above sea level. Usually this species is not found in areas with elevations of more than 1000 meters above sea level. With highly anthropophilic characteristics and habits of life near humans. Ae aegypti adults like a dark place hidden in the house as a place to rest, this mosquito is an efficient vector for arbovirus. Ae.aegypti also has a habit of looking for food (biting a human to be sucked up his blood) throughout the day especially between the hours of 8:00 to 13:00 and between the hours of 3:00 to 17:00. As a domestic mosquito in urban areas, this mosquito is the main vector (95%) for the spread of dengue fever.

The maximum distance of this type of female mosquito is limited to around 30-50 meters per day. Long-distance flying usually occurs passively through all types of vehicles including trains, ships and aircraft. Mosquito *Ae. aegypti* lives and breeds in clean water reservoirs that are not directly related to the soil such as bathtubs, jars, used cans, drinking places for birds and so on. *Ae mosquito* life. aegypti range from 2 weeks to 3 months or an average of 1.5 months depending on temperature, surrounding humidity. The density of mosquitoes will increase during the rainy season where there is a pool of clean water that can be a place to breed.

Besides Ae. aegypti, dengue fever can also be transmitted by Ae mosquitoes. Albopictus. But the role of mosquitoes in spreading dengue fever is less when compared to Ae mosquitoes. aegypti. Ae aegypti likes to rest in a dark, damp, and hidden place in a house or building,

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including in a bedroom, bathroom, bathroom or kitchen. In the room, mosquitoes like to rest on hanging objects such as clothes, mosquito nets, curtains in a dark and damp room. In general, Ae. aegyptus prefers breeding places in the form of clean water but from the results of studies by several researchers confirms that mosquito eggs are more in ovitrap with straw soaking than with ordinary clean water. Karen A Polson's research states that there are differences in the number of eggs in an ovitrap using 10% straw soaking water and an ovitrap that uses plain water. The number of eggs produced is more in 10% straw soaking water than using plain water. Ae albopictus belongs to the same subgenus as Ae. Aegyti (Stegomyia).

This species is widespread in Asia and countries from tropical to subtropical climates. Over the past two decades, this species has spread its wings to South and North America, the Caribbean, Africa, Northern Europe and several Pacific islands. Ae Albopictus has a habit of laying eggs outside the house, especially in the bamboo forest. This mosquito will bite throughout the day, starting from morning to evening. Even able to suck blood up to several times. Ae albopictus is a forest mosquito that obtains food by biting and sucking the blood of various species of animals, breeding in tree holes, hollowing plants, pieces of bamboo stems and open coconut fruit. Larvae or immature form of this type of mosquito has a living habitat in a pool of water in cans, other shelters including open air piles of garbage. This kind of larval habitat causes this species to be found in many rural areas, suburbs and city parks.

In the rainy season there are relatively more places suitable for Ae's habitat. Albopictus. That is why the population of *Ae. Albopictus* is very closely related to the rainy season. In the adult form this species also has a habit of looking for food during the day. The flight distance of this type of adult female mosquito ranges from 400 - 600 meters. Opportunity to move passively for *Ae. Albopictus* is more limited because this species lives outside the home. But on the other hand, Ae's eating habits. albopictus allows this species to transmit the dengue virus from apes to humans and vice versa.

In some parts of Asia, *Ae. Albopictus* is sometimes thought to be a vector of dengue epidemics, although it is not as important as Ae. aegypti. In the laboratory, both species of mosquitoes can transmit dengue viruses vertically through female mosquitoes to eggs to their offspring, although Ae albopictus does it faster. Hemorrhagic fever (DHF) is an infectious disease caused by dengue virus and is transmitted through the bite of Ae mosquitoes. aegypti. This

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disease can affect everyone and can cause death, especially in children and cause extraordinary events or outbreaks. This disease is transmitted by people who have dengue virus in their blood. This person usually shows symptoms of illness but also does not get sick ie if they have sufficient immunity against the dengue virus. If people get bitten by Ae mosquitoes. aegyptimaka virus will enter with the blood it sucks. In the mosquito's body, the dengue virus will multiply by dividing itself and spreading throughout the mosquito's body. Within one week the amount can reach tens or even hundreds of thousands so that it is ready to be transmitted or transferred to others. Furthermore, when a mosquito bites another person, then after the mosquito prick (proboscis) finds blood capillaries, before the person's blood is drained, saliva is removed from the mosquito's salivary glands so that the blood they suck does not clot.

Together with the Ae mosquito's saliva. aegypti which carries the Dengue virus will be attacked by dengue fever, people who have sufficient immunity against the Dengue virus, will not be attacked by this disease, even though in their blood there is the virus. Conversely in people who do not have sufficient immunity to the dengue virus, he will get a mild fever and even severe illness, namely high fever accompanied by bleeding and shock, depending on the level of immunity they have. Until now, 4 Dengue virus serotypes have been isolated in Indonesia, namely DEN-1, DEN-2, DEN-3 and DEN-4. it turns out that DEN-2 and DEN-3 are the most common serotypes as causes. Nimmannitya (1975) in Thailand reports that the DEN-2 serotype is dominant, whereas in Indonesia it is mainly DEN-3, although lately there is a tendency to be dominated by the DEN-2 virus.

North Sulawesi region is mostly plains, consisting of mountains and hills interspersed by valleys that make up the land. The climate of the North Sulawesi region is tropical, and the temperature is at each level of altitude more and more cooler such as Kota Station 5, Langowan in Minahasa Regency, Modoinding in Station 3 District, Modayag in Station 4 City and Pasi in Bolaang Mongondow Regency. Rising global temperatures are expected to cause other changes such as the increasing intensity of extreme weather phenomena. Many diseases related to climate change including diarrhea, skin diseases, malaria, dengue fever will increase the number of cases in extreme weather (Haryanto, 2009). In North Sulawesi Province the number of dengue fever cases fluctuates from year to year (Table 1), the area of distribution spreads to the height. Dengue fever has a variety of adverse effects both in terms of social and economic aspects.

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Table 1. Number of Dengue Fever Sufferers and Deaths in North Sulawesi Province in 2005-2015

| Years | Sufferers | Deadh |
|---|---|---|
| 2005 | 1926 | 26 |
| 2006 | 1290 | 19 |
| 2007 | 1865 | 24 |
| 2008 | 1430 | 16 |
| 2009 | 1639 | 20 |
| 2010 | 2178 | 40 |
| 2015 | 293 | 3 |

Source: North Sulawesi Provincial Health Office (2014)

Ae aegypti is a type of mosquito that can carry dengue virus, which causes dengue fever. Besides dengue, *Ae. aegypti* is also a carrier of the yellow fever virus (yellow fever) and chikungunya. The main vector of dengue fever is Ae. aegypti, while the potential vector, namely: / te. albopictus (Anonymous, 2002a; 2002b; Kapoh, 2003; Reiter, 1995; Sembel, 1994; Sembel, JAA., 2001; Wantania, c / M., 2002). Dengue fever is a very dangerous viral disease because it can cause patients to die in a very short time (several days). Cases of dengue fever are characterized by four clinical manifestations, namely high fever, bleeding (especially skin bleeding), hepatomegaly, and circulatory failure (Gandahusada et al, 1988).

Other diseases that can be transmitted by mosquitoes belonging to the genus Aedes are filariasis, both caused by Wuchereria bancrofti and Brugia Malay. Some species which are vector filariasis are Ae. aegypti, Ae. kochi, Ae. Togol, Ae. fifiensis, and Ae. polynesiensis (Faus et al., 1971; James & Harwood, 1969). This study aims to: obtain a population density profile of the Aedes Aegypty and *Aedes albopictus* mosquitoes in the Minahasa Pineleng Region.

## 2. MATERIAL AND METHODS

### 2.1 Place and Time of Research

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Sampling location of Aedes sp. Mosquitoes in Pineleng Village, Minahasa Regency. The identification and analysis of mosquito morphology was carried out at the Biology Laboratory of FMIPA State University Station 1.

### 2.2 Tools and Materials

The tools and materials used are:

1. Fishing net: used to catch mosquitoes
2. Sample bottle: used to collect mosquito samples
3. Label: used to provide information about the location of sampling.
4. Technical chloroform: used to monitor mosquito samples
5. Alcohol 70%: used to preserve mosquito samples
6. Tweezers: used to transfer mosquito samples caught on the sample bottle.
7. Loop: used to observe the morphological character of the markers of *Aedes* sp
8. Sample box: used to collect samples with a constant temperature.

### 2.3. Research Methods

This research uses descriptive method where the object of research is Aedes sp obtained at the research location described based on data obtained in the field.

### Research procedure

The study consisted of 4 stages: stage 1 larvae survey, stage 2 larvae sampling, stage 3 imago sampling.

1. The larva survey

In the Entomology Survey on Aedes aegypty mosquitoes, *Aedes albopictus* there are 5 Main Activities, namely: collection of related data, egg surveys, larval or larval surveys, mosquito surveys, and other surveys (MOH RI, 2002). The parameters observed were the behavior of various environments, vectors, ways of controlling vectors and ways of assessing the results of vector control. One way is a visual method that is only seen and recorded whether there is a larvae in the container, water but no larvae are collected and examined. This survey was carried out in a follow-

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up survey to monitor larvae indexes or assess PSN conducted (MOH RI, 2002). Three indices are commonly used to monitor the level of A. aegypti interference, namely:

2. Retrieval of larvae

Intake of Aedes aegypty and Aedes albopiktus larvae was carried out in each study area. Retrieval of larvae, mosquito samples were carried out twice a month on mosquito development media that exist in nature, namely used tires, tree branches, water reservoirs around residents 'homes and other pools of water that are found around residential areas or residents' homes. Larvae are taken as much as possible for 6 months. Some larvae were kept to adulthood and some were put into alcohol for identification with key morphology in the Laboratory of Pests and Diseases at the Faculty of Agriculture, UNSRAT. Each sample was measured in temperature, humidity and pH to see the effect of these three factors.

3. Intake of Imago (adult mosquito)

Imago sampling is done twice a month for six months. Population calculations are carried out every hour starting at 6:00 to 18:00 pm. It aims to look at the flight behavior of Aedes aegypty and *Aedes albopictus* and foraging activity. Each sample was measured temperature, humidity and pH to see the effect of these three factors. Imago taking technique is done by sweeping namely catching adult mosquitoes using a jarring (Dep. Kes. RI, 2012). Catching mosquitoes using a net is carried out with the following steps:

1. Prepare bottles and catch nets.

2. The fishing net is moved by swinging it into the air with the intention of catching mosquitoes that fly in the air.

3. Mosquitoes trapped in a net are then caught using a bottle.

4. The captured mosquito is put into a bottle and then put into the Frezer at a temperature of -

5. Cover the hole in the gauze using cotton

## 3. RESULTS AND DISCUSSION

### Population Density by Daily Time Range (Hours)

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The highest average population density of *Aedes aegypti* according to the time range was found at 8:00 to 10:00 in the morning and 14:00 to 16:00 in the afternoon before the afternoon. From the nine locations analyzed, the highest average mosquito totaled from 06.00 to 18.00 (10 hours of observation) at location 1, namely 7.00 individual mosquitoes with a height of place I (Bakorstanalsda) while the lowest average at location eight was 3.00 individuals mosquitoes are located at altitude III (Bakortanasda). (Table 1).

Tabel 1. Population density of *Aedes aegypti*

| Location | Averager population | | | | | | Total | Average | K |
|---|---|---|---|---|---|---|---|---|---|
| | 06.00–08.00 | 08.00–10.00 | 10.00–12.00 | 12.00–14.00 | 14.00–16.00 | 16.00–18.00 | | | |
| 1 | 4 | 10 | 3 | 2 | 15 | 8 | 42 | 7,000 | |
| 2 | 2 | 11 | 5 | 3 | 9 | 5 | 35 | 5,833 | I |
| 3 | 3 | 12 | 3 | 1 | 9 | 5 | 33 | 5,500 | |
| TOTAL | 9 | 33 | 11 | 6 | 33 | 18 | 110 | 18,333 | |
| 4 | 3 | 11 | 8 | 2 | 13 | 5 | 42 | 7,000 | |
| 5 | 2 | 3 | 4 | 1 | 3 | 3 | 16 | 2,667 | II |
| 6 | 1 | 4 | 3 | 1 | 4 | 5 | 18 | 3,000 | |
| TOTAL | 6 | 18 | 15 | 4 | 20 | 13 | 76 | 12,667 | |
| 7 | 2 | 4 | 4 | 2 | 9 | 2 | 23 | 3,833 | |
| 8 | 1 | 4 | 2 | 2 | 4 | 5 | 18 | 3,000 | III |
| 9 | 0 | 6 | 1 | 2 | 3 | 7 | 19 | 3,167 | |
| TOTAL | 3 | 14 | 7 | 6 | 16 | 14 | 60 | 10,000 | |
| Averag | | | | | | | | | |

Information I: II: III:

The highest average population of *Aedes albopictus* is at 08.00-10.00 in the morning and 14.00-16.00 in the afternoon before the afternoon. From the nine locations analyzed, the highest average mosquito totaled from 06.00 to 18.00 (10 hours of observation) at location 3, which is 11.00 individual mosquitoes with a height of place I (... asl) while the lowest average at location eight is 8, 33 individual mosquitoes are located at altitude III (Bakorstanasda). (Table 2).

Table 2. Population density ***Aedes albopictus***

| LOCATION | Average population | | | | | | Total | average | K |
|---|---|---|---|---|---|---|---|---|---|
| | 06.00–08.00 | 08.00–10.00 | 10.00–12.00 | 12.00–14.00 | 14.00–16.00 | 16.00–18.00 | | | |
| 1 | 6 | 10 | 13 | 11 | 15 | 9 | 64 | 10,667 | |
| 2 | 8 | 11 | 14 | 9 | 15 | 9 | 66 | 11,000 | I |
| 3 | 7 | 12 | 17 | 12 | 15 | 7 | 70 | 11,667 | |
| TOTAL | 21 | 33 | 44 | 32 | 45 | 25 | 200 | 33,333 | |
| 4 | 5 | 11 | 13 | 12 | 12 | 11 | 64 | 10,667 | |
| 5 | 7 | 3 | 15 | 11 | 13 | 9 | 58 | 9,667 | II |
| 6 | 8 | 4 | 19 | 11 | 12 | 8 | 62 | 10,333 | |
| TOTAL | 20 | 18 | 47 | 34 | 37 | 28 | 184 | 30,667 | |
| 7 | 4 | 4 | 12 | 11 | 12 | 14 | 57 | 9,500 | III |

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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 8 | 4 | 4 | 12 | 9 | 9 | 12 | 50 | 8,333 | |
| 9 | 3 | 6 | 19 | 8 | 7 | 11 | 54 | 9,000 | |
| TOTAL | 11 | 14 | 43 | 28 | 28 | 37 | 161 | 26,833 | |
| Average | | | | | | | | | |

Information I : II : III :

**Mosquito Population Density by Location**

**a. *Aedes aegypti***

To compare the population density of mosquitoes from the main research location in Kota Station 4, a study was conducted on mosquito populations in districts / cities in North Sulawesi. From the sample locations determined purposively, the highest average population density of *Aedes aegypti* in the city in Station 1, while the lowest population was found in Station City 4. The highest peak population density of *Aedes aegypti* in the room was found in the range of hours at 06.00 s / d 7:00 and 10:00 to 11:00 (Figure 1). Thus in one day found twice the highest density of mosquito populations in the room.

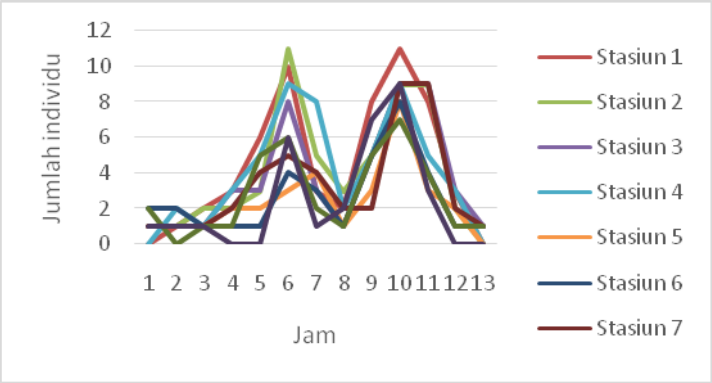


Figure 2. Density of *Aedes aegypti* in the room

The highest average population density of Aedes aegyti outdoor is found at the sample location at Station 3. While the lowest average outdoor population density is found at the sample location of Station 8. Unlike the indoor population density, the outdoor population density is only one time shows the highest peak population density at 15:00 to 16:00 West Indonesia Time (Figure 3).

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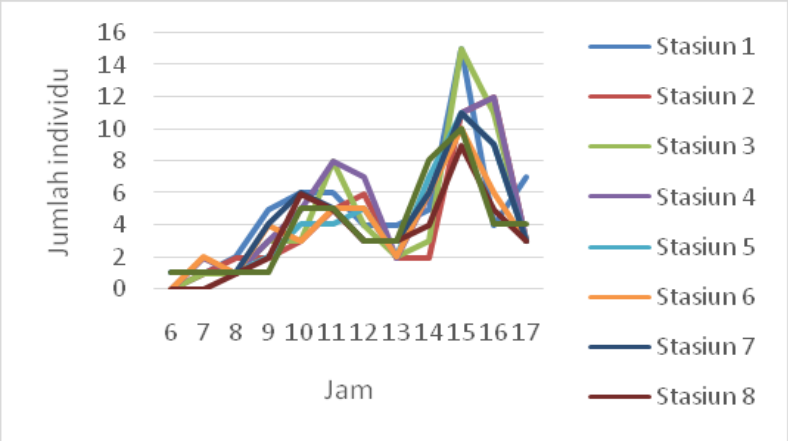


Gambar 3. Density of *Aedes aegypti* in the room

**a. *Aedes albopictus***

The highest peak population density of *Aedes albopictus* in the room was found at the Station 3 sample location while the lowest was at the Station 8 sample population. The highest peak population density was at 12.00 pm while the lowest was at the Station 8 sample location (Figure 4). In contrast to the population density of *Aedes aegypti* in the room which has the 2 highest peak population densities with relatively equal number of individual mosquitoes, in *Aedes albopictus* only one peak is the highest population density by hour.

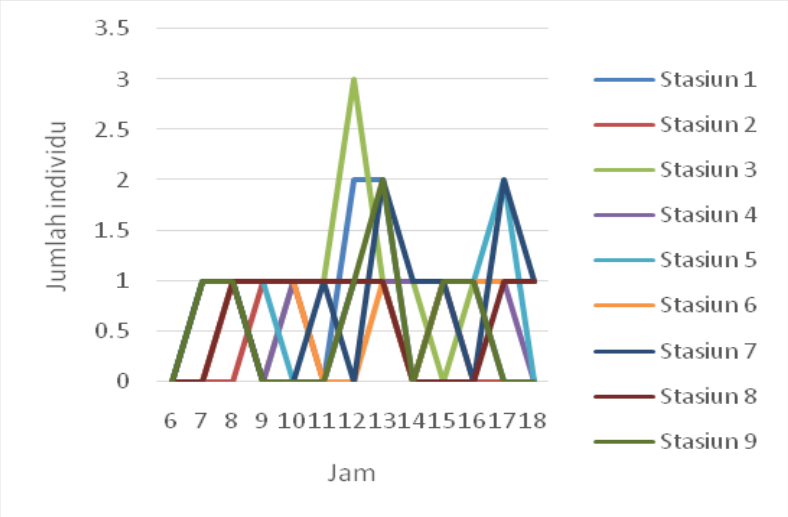


Figure 4. Density of *Aedes aegypti* in the room

The highest average outdoor population density of *Aedes albopictus* is found at sample locations at Station 3 and Station 8. As is the case with *Aedes aegypti* outdoor population density, Aedes alobopictus outdoor population density only shows the highest peak population density at 16.00 Wita and 18.00 Wita (Figure 3).

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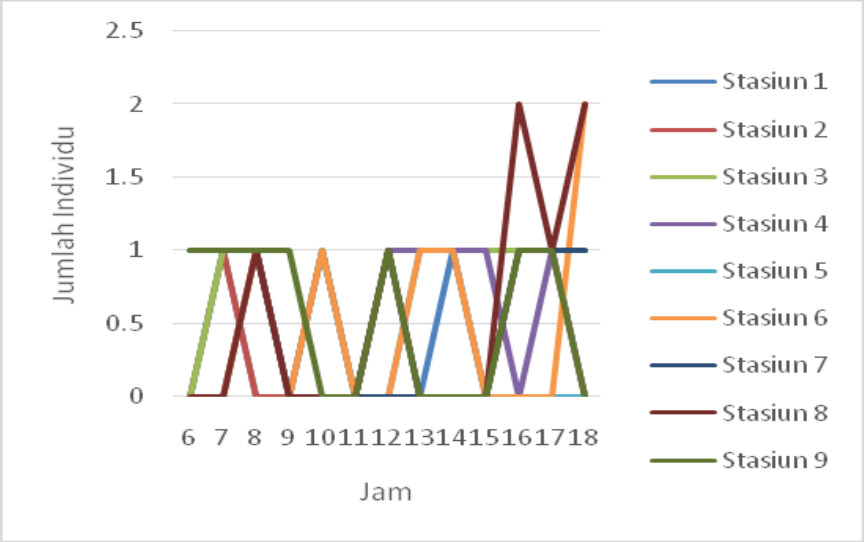


Figure 5. Density of *Aedes albopictus* outdoors

The average population density of *Aedes aegypti* at each sample location was found most in the room. The highest average population of A. aegypti in the room was found at Station 1, which was 4.38 individuals, while the lowest at Station 5 and Station 9 was 2.38 individuals. The sample locations in both Kota Station 5 and Station 9 are located in high altitude areas with few mosquito breeding areas, this causes mosquito density to be relatively low (Figure 6). The high density of mosquito populations in Kota Station 1, Station 4 and Station 2 is caused by the many mosquito breeding places, so that the mosquito population is relatively high. The density of the human population at the sample location is also high, namely dense residential settlements, many breeding sites and poor sanitation. The high number of human population causes mosquito preferences to look for prey is very high. A. aegypti has chemoreceptors which can detect the smell of sweat and heat of the human body. Besides intraspecific communication in mosquito populations increases mosquito preferences for prey and blood sucking in areas with high human population densities (...)

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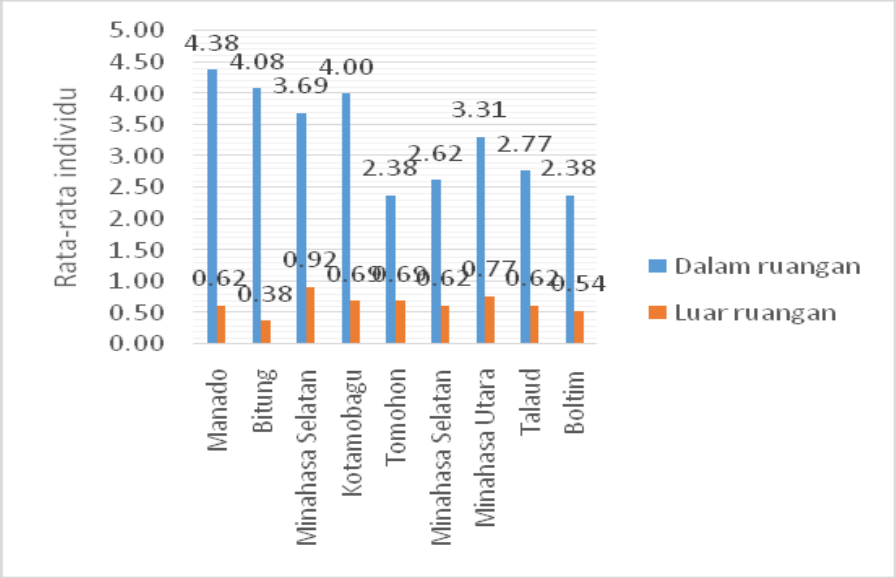


Figure 6. Diagram of the average population density of *Aedes aegypti* inside and outside the room

In inverse proportion to the population density of A. aegypti, A. albopictus is mostly found outdoors. The highest population density was found at Station 1 and Kota Station 4 while the lowest was found at Station 8 (Figure 7). According to Rondonuwu, A. albopictus prefers habitats in marginal areas close to dense plant vegetation while A. aegypti is more anthropogenic or prefers activities in residential areas. In this study, A. albopictus was found indoors but with a small average compared to outdoors in all sample locations.

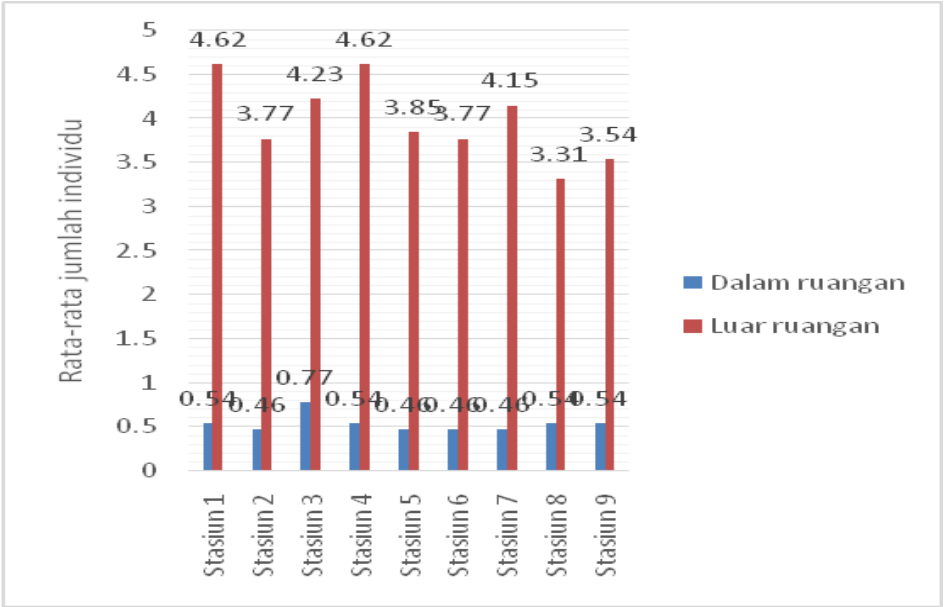


Figure 7. The average population density of *Aedes albopictus*, indoor and outdoor.

Adult mosquito density is the most appropriate measure to predict the potential for arbovirus transmission (Sanchez et.al. 2006). Adult mosquito surveys can produce important information about seasonal population trends, distribution dynamics, and evaluation of eradication

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programs. Changes in the environment such as clearing of unused land with dense vegetation into housing complexes may cause Ae albopictus to lose its natural habitat and survive in other areas with sufficient vegetation density. Land, yards or plots left empty in urban environments make a good habitat for Ae albopictus mosquitoes that migrate from their original habitat in forests and dense vegetation areas in rural or suburban areas (WHO, 2005). This kind of phenomenon is common in the suburbs of Semarang, so the dominance of the species Ae albopictus is logical. Ae albopictus breeds in temporary containers but prefers natural containers in forests, such as tree holes, leaf axes, stone holes and coconut shells, and breeds more frequently outside the home in gardens and is rarely found indoors in artificial containers such as roofs and car tires. This species has eggs that can survive dry conditions but still alive. The eggs are placed on car tires and carried to various regions. Ae aegypti is a species of mosquito that lives and is found in countries located between 350 North Latitude and 350 South Latitude at the lowest air temperature around 100 C. In summer, this species is sometimes found in areas located up to about 450 Southern Latitudes . In addition, the resistance of this species also depends on the height of the area concerned above sea level. Usually this species is not found in areas with elevations of more than 1000 meters above sea level. With highly anthropophilic characteristics and habits of life near humans. Ae Adult Aegypti likes a dark place hidden in the house as a place to rest, this mosquito is an efficient vector for arbovirus. Ae.Aegypti also has a habit of looking for food (stabbing a stylet in humans for blood to suck) throughout the day especially between the hours of 8:00 to 13:00 and between the hours of 15:00 to 17:00.

As a domestic mosquito in urban areas, this mosquito is the main vector (95%) for the spread of DHF. The maximum distance of this type of female mosquito is limited to around 30-50 meters per day. Long-distance flying usually occurs passively through all types of vehicles including trains, ships and aircraft. Mosquito *Ae. aegypti* lives and breeds in clean water reservoirs that are not directly related to the soil such as bathtubs, water jars, used cans, drinking places for birds and so on. Ae mosquito life. aegypti ranges from 2 weeks to 3 months or an average of 1.5 months depending on temperature, humidity.

In general, *Ae. aegypti* prefers breeding places in the form of clean water but from the results of studies by several researchers confirms that mosquito eggs are more in ovitrap with straw soaking than with ordinary clean water. Karen A Polson's research states that there are

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differences in the number of eggs in an ovitrap using 10% straw soaking water and an ovitrap that uses plain water. The number of eggs produced is more in 10% straw soaking water than using plain water. Ae albopictus belongs to the same subgenus as Ae. Aegyti (Stegomyia). This species is widespread in Asia and countries from tropical to subtropical climates.

Over the past two decades, this species has spread its wings to South and North America, the Caribbean, Africa, Northern Europe and several Pacific islands. Ae Albopictus has a habit of laying eggs outside the house, especially in the bamboo forest. This mosquito will bite throughout the day, starting from morning to evening. Even able to suck blood up to several times. Ae albopictus is a forest mosquito that obtains food by biting and sucking the blood of various kinds of animals, breeding in tree holes, hollowing plants, pieces of bamboo stems and open coconut fruit. Larvae or immature form of this type of mosquito has a living habitat in a pool of water in cans, other shelters including open air piles of garbage. This kind of larval habitat causes this species to be found in many rural areas, suburbs and city parks.

Ae Albopictus is basically a forest species that adapts to the human environment in rural, suburban and urban areas. Mosquitoes lay eggs and grow in tree holes, bamboo segments, and leaf base as their forest habitat, as well as artificial reservoirs in urban areas. This mosquito is a bloodsucker that is random and more zoophilic (choosing animals) than Ae. aegypti. The flight distance can reach 500 meters. Not like Ae. aegypti, some strains of this species have adapted to the cold weather in the North Asian and American regions, when the eggs spend the winter resting.

In the rainy season there are relatively more places suitable for Ae's habitat. Albopictus. That is why the population of Ae. Albopicus is very closely related to the rainy season. In the adult form this species also has a habit of looking for food during the day. The flight distance of this type of adult female mosquito ranges from 400 - 600 meters. Opportunity to move passively for *Ae. Albopictus* is more limited because this species lives outside the home. But on the other hand, Ae's eating habits. Albopictus allows this species to transmit the dengue virus from apes to humans and vice versa. In some Asian regions, *Ae. Albopictus* is sometimes thought to be a vector of dengue epidemics, although it is not as important as Ae. aegypti. In the laboratory, both species of mosquitoes can transmit the dengue virus vertically through female mosquitoes to their eggs to offspring, although Ae albopictus does it faster.

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Dengue Hemorrhagic Fever (DHF) is an infectious disease caused by dengue virus and is transmitted through the bite of Ae mosquitoes. aegypti. This disease can affect everyone and can cause death, especially in children and cause extraordinary events or outbreaks. This disease is transmitted by people who have Dengue virus in their blood. This person usually shows symptoms of illness but also does not get sick ie if they have sufficient immunity against the dengue virus. If people get bitten by Ae mosquitoes. aegypti then the virus will enter with the blood it sucks. In the mosquito's body, the dengue virus will multiply by dividing itself and spreading throughout the mosquito's body. Within one week the amount can reach tens or even hundreds of thousands so that it is ready to be transmitted or transferred to others. Furthermore, when a mosquito bites another person, then after the mosquito prick (proboscis) finds blood capillaries, before the person's blood is drained, saliva is removed from the mosquito's salivary glands so that the blood they suck does not clot. Referring to the research of Sonoto (2009) that *Aedes aegypti* sp. And *Aedes albopictus* sp. more in sewer water, mosquitoes have an interest in sewer water conditions that contain good chemical compounds and organic compounds (aquatic plants) that can be used as food.

Referring to the index of prevention of urban DHF the number of Aedes breeding should not be more than 5%, whereas in the type of *Aedes aegypti* sp. And *Aedes albopictus* sp. the average in sewer water is 23.66% and 21.44%, in well water is 33.32% and 16.66% and in rainwater is 16.66% and 31.03%. so that the conclusion is drawn that with an average of over 5% both in rain water, dug well water and sewer water is likely to cause dengue disease in a certain area, it is necessary to prevent and control previous higher DHF studies.

Together with the Ae mosquito's saliva. aegypti which carries the Dengue virus will be attacked by dengue fever, people who have sufficient immunity against the Dengue virus, will not be attacked by this disease, even though in their blood there is the virus. Conversely in people who do not have sufficient immunity to the dengue virus, he will get a mild fever and even severe illness, namely high fever accompanied by bleeding and shock, depending on the level of immunity they have. Until now, 4 Dengue virus serotypes have been isolated in Indonesia, namely DEN-1, DEN-2, DEN-3 and DEN-4. it turns out that DEN-2 and DEN-3 are the most common serotypes as causes. Nimmannitya (1975) in Thailand reported that the dominant DEN-2 serotype is being used

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in Indonesia, especially by DEN-3, although lately there is a tendency to be dominated by the DEN-2 virus.

## 4. CONCLUSION

From the results of this study it can be concluded that:

1. From the results of the study it can be seen that the high population of Ae aegypti is from 8:00 to 10:00 in the morning and 14:00 to 16:00 in the afternoon before the afternoon.
2. From the results of the study it can be seen that the population of Ae albopictus is highest at 10.00-1200 in the morning before noon and at 16.00-18.00 in the afternoon before evening.

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