

Aedes Aegypti Larva Density in Angin Nauli Village, North Sibolga District

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ABSTRACT**Keywords:**

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Dengue fever is a public health problem in Indonesia with high morbidity and mortality and has the potential to cause extraordinary events (KLB) and / or epidemics as well as to impact the economic loss of society. Dengue fever is a vector-borne disease. Dengue fever contributed 204,171 (47.87%) of the number of sufferers due to five vector-borne and zoonotic diseases in Indonesia in 2016 and ranks second after malaria. Efforts to eradicate mosquito vectors can be carried out through eradication of mosquito nests (PSN). The high density of Aedes aegypti mosquitoes has a high risk of transmitting mosquitoes for dengue transmission. Larva Free Rate (ABJ) is a measure of vector eradication efforts through the PSN-3M showing the level of community participation in preventing dengue. Sibolga City is one of the municipalities in North Sumatra Province. Sibolga City consists of 4 districts. The number of dengue cases in Sibolga City in 2016 was 103 cases, where the highest cases were in North Sibolga District, with 40 cases (4). This type of research uses descriptive method. This descriptive study aims to determine the density of aedes aegypti larvae. Time and place of research The research was conducted in August - November 2020 in Angin Nauli Village, North Sibolga District. The population and samples are all houses that have containers in Angin Nauli Village. Sampling was done by total sampling. The number of households in Angin Nauli Village is 858 households. This research should be useful for future researchers, and it is suggested to be a reference for the same research with a larger number of samples and in different places.

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1. Introduction

Dengue fever is still a public health problem in Indonesia with high morbidity and mortality and has the potential to cause extraordinary events (KLB) and / or epidemics as well as impact on the economic loss of society Dengue fever is a vector-borne disease. Feverbleeding accounted for 204,171 (47.87%) of the number of sufferers due to five vector-borne and zoonotic diseases in Indonesia in 2016 and ranks second after malaria (1).

Mosquito vector eradication efforts can be done through the eradication of mosquito nests (PSN). The effectiveness of PSN is measured by conducting periodic larva checks (PJB). PJB activities produce the Larva Free Rate (ABJ) indicator. ABJ in Indonesia since 2008-2012 has not met the target of 95%. ABJ data reporting also does not cover all districts / cities in Indonesia (2).

The presence of Aedes Egypti larvae in an area is an indicator of the presence of the Aedes aegypti mosquito population in the area. The high density of Aedes aegypti mosquitoes has a high risk of transmitting mosquitoes for dengue transmission. The Larva Free Rate (ABJ) is a benchmark for vector eradication efforts through the PSN-3M showing the level of community participation in preventing dengue (3).

Sibolga City is one of the municipalities in North Sumatra Province. Sibolga City consists of 4 districts. The number of dengue cases in Sibolga City in 2016 was 103 cases, where the highest cases were in North Sibolga District, with 40 cases (4).

The results of the research regarding the density of Aedes sp larvae in containers inside and outside the house in the Surgi Mufti Village, Banjarmasin in 2014, showed that from 100 houses surveyed, there were containers that positively acted as mosquito breeding places as many as 49 (17.44%) containers of the 281 checked. The type of container inside the house that was positive for Aedes sp larvae was found mostly in the bath (60.63%), the most positive container outside the house was found in Aedes sp larvae in the drum (54.55%). The density of Aedes sp larvae in Surgi Mufti Village had HI (33%), CI (19.93%), BI (49%), and DF values obtained a value of 5, so they are categorized as areas with moderate transmission rates (5).

Given the high cases of dengue fever in North Sibolga, the density of aedes aegypti larvae is not known, and the risk of dengue fever transmission, it is necessary to know how the density of aedes aegypti larvae is. This study aims to obtain data on the density of Aedes aegypti larvae and

community behavior in eradicating mosquito nests. This data can be used as an indicator of the effectiveness of the mosquito nest eradication program (PSN).

The focus area of this research is health and medicine with the theme of developing and strengthening institutional systems, health policies, and empowering communities to support drug self-sufficiency. The research topic is strengthening knowledge and developing community habits in healthy behavior.

a. Framework of Mind

The framework for this research is as follows:

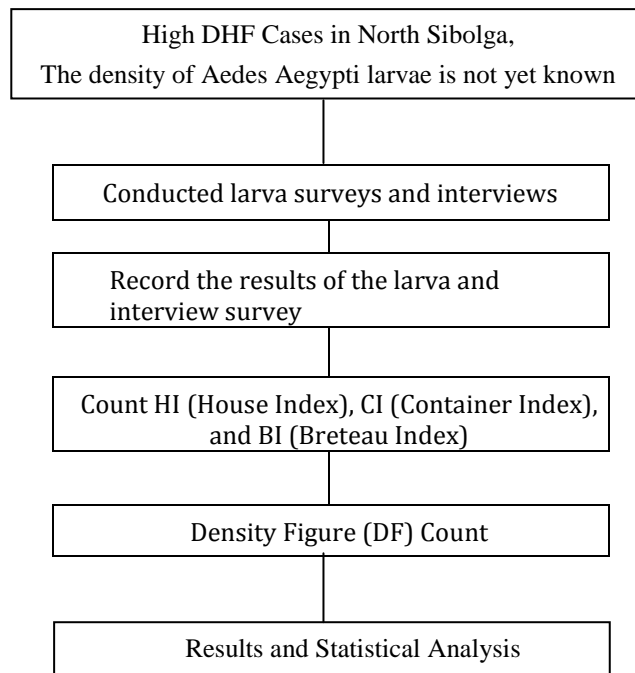


Fig 1.Research Framework

2. Research methods

This type of research uses descriptive method. This descriptive study aims to determine the density of *Aedes aegypti* larvae. Time and place of research The research was conducted in August - November 2020 in Angin Nauli Village, North Sibolga District. The population and samples are all houses that have containers in Angin Nauli Village. Sampling was done by total sampling. The number of households in Angin Nauli Village is 858 households.

The data collection process is carried out as follows:

- a. Preparation of Tools and Materials
 - 1) Dipper (catching mosquito larvae) or tea filter
 - 2) Drop pipette
 - 3) Larva bottle
 - 4) House code sticker
 - 5) Looks plastic
 - 6) Camera
 - 7) Digital / loop microscope (magnifying glass)
- b. Conduct a contract with the occupants of the house to observe larvae in the container that is found.
- c. Conduct larvae surveys by means of the visual larva method with a formular guide for larva inspection. Larvae are surveyed using the single larva method, that is, for each container found by larvae, it is enough to just take 1 tail or visually, that is, if larvae are difficult to retrieve, then just observe, whether there are larvae in the container.
- d. Record the results of larvae observations
- e. Calculating Density Figure (DF), HI (House Index), CI (Container index) and BI (Breteau Index).

- f. Calculate larva density.
g. Delivering the results to interested parties (Health Office, Angin Nauli Village and North Sibolga District).

Table 1.

| Mosquito Larva Population Density (Density Figure) | | | |
|--|------------------|----------------------|--------------------|
| Density figure (DF) | House Index (HI) | Container Index (CI) | Breteau Index (BI) |
| 1 | 1 - 3 | 1 - 2 | 1 - 4 |
| 2 | 4 - 7 | 3 - 5 | 5 - 9 |
| 3 | 8 - 17 | 6 - 9 | 10-19 |
| 4 | 18 - 28 | 10 - 14 | 20 - 34 |
| 5 | 29 - 37 | 15 - 20 | 35 - 49 |
| 6 | 38 - 49 | 21 - 27 | 50 - 74 |
| 7 | 50-59 | 28 - 31 | 75 - 99 |
| 8 | 60 - 76 | 32 - 40 | 100 - 199 |
| 9 | > 77 | > 41 | > 200 |

Source: Queensland Government (2011)

Table Description:

DF = 1 = low density

DF = 2-5 = medium density

DF = 6-9 = high density.

Data Analyzed Data were analyzed descriptively using the indicator approach of DHF larvae population which was assessed using Density Figure (DF), HI (House Index), CI (Container index), and BI (Breteau Index). Another indicator that can be used is the Larva Free Rate (ABJ).

3. Results and Discussion

Based on the research, the values are shown in the table below.

3.1 Calculating Density Figure (DF), HI (Host Index), CI (Container Index) and BI (Breteau Index)

Formula :

- a. **House Index(HI)** is the number of positive houses for mosquito larvae from all houses examined.

$$\begin{aligned} \text{HI} &= \frac{\text{Number of houses that are positive for larvae}}{\text{Number of houses inspected}} \times 100\% \\ &= \frac{311}{858} \times 100\% \\ \text{HI} &= 36.2\% \end{aligned}$$

- b. **Container Index(CI)** is the number of positive containers for mosquito larvae from all containers examined

$$\begin{aligned} \text{CI} &= \frac{\text{Number of positive containers larva}}{\text{Number of containers inspected}} \times 100\% \\ &= \frac{62}{311} \times 100\% \\ \text{CI} &= 19.9 \end{aligned}$$

- c. **Breteau Index(BI)** is the number of positive containers for mosquito larvae in one hundred houses.

$$\begin{aligned} \text{BI} &= \frac{\text{Number of containers that are positive larva}}{\text{house that is inspected}} \times 100\% \\ &= \frac{19}{858} \times 100\% \\ \text{BI} &= 2.21 \end{aligned}$$

- d. **ABJ (Larva Free Rate)** is the ratio of houses in which there are no larvae found in the water reservoir to all the houses of the respondents being examined

ABJ = Amount Free of Larva x 100%

Number that is checked

$$= \frac{547}{858} \times 100\% = 63,7\%$$

Based on the larva survey conducted in Angin Nauli Village, North Sibolga District, as many as 858 houses, data was obtained regarding the number of houses inspected and the number of positive larva houses. From this data, the House Index (HI) value can be calculated. The following is a table of the distribution of the number of larvae according to the presence of *Aedes aegypti* larvae, namely:

Table 2

Distribution of the number of larvae according to the presence of *Aedes aegypti* larvae

| Checked | amount | Larva | | HI | CI | BI | DF |
|---------|--------|-------|-----|------|----|-----|----|
| | | (+) | (-) | 36.2 | 19 | 2,3 | 5 |
| Home | 858 | 311 | 547 | % | % | % | |

Table 2 shows that of the 858 households examined, there were 311 positive *Aedes aegypti* mosquito larvae and 547 houses that were not found, so the house index (HI) value was 36.2%. Based on HI, this value is included in the category of density figure (DF) 5 which means that it has a high mosquito density so that it has a high enough risk of mosquito transmission for dengue transmission.

3.1 Discussion

Sibolga City Sibolga City is an endemic area for DHF. The increase in the dengue mortality rate in Sibolga City continues to increase even though the incidence tends to decrease during the 2018-2019 period. The density of *Aedes aegypti* larvae is influenced by climatic factors. In the rainy season the density of *Aedes aegypti* larvae can increase due to stagnant water as a breeding place for mosquitoes. One of the factors affecting the increase in dengue cases in Sibolga City, especially North Sibolga, Angin Nauli Village is the presence of the *Ae.aegypti* mosquito as a vector of infection. According to WHO, the house index (HI) is the most widely used indicator to monitor mosquito infestation levels. The HI value increases the percentage of houses that are positive for vector reproduction, so that it reflects the number of populations at risk.

Based on the results of the study, it is known that from 858 houses examined, there were 311 *Aedes aegypti* larvae and 547 houses that were not found, so the HI value was 36.2%. Based on the density figure (DF), this value is included in category 5 which means that it has a high mosquito density so that it has a moderate risk of mosquito transmission for dengue transmission. The distribution of *Aedes sp.* is influenced by population density. The distance between houses affects the spread of mosquitoes from one house to another. The closer the distance between residents' houses, the easier it is for mosquitoes to spread from house to house because *Aedes aegypti*'s flight distance is 50-100 meters. The house index (HI) number further emphasizes the extent of the spread of mosquitoes in an area. Based on the HI indicator, Sibolga City has a moderate risk of spreading dengue fever. The results of this study when compared with research by Umami et al (2017) show the results of research with the number HI = 44.44%, DF = 6 with a sample of 54 respondents in the city of Semarang, and Octa Putra Pratama and Ayu Made Ariasi (2019) showing HI = 9 % of the 100 houses examined, then CI = 3% of the 271 responses examined, BI = 9% of the 100 houses examined and the larvae free rate was 91% with DF = 5.6.

4. Conclusion

From the results of the larva survey at the respondent's house in Sibolga City, the house index (HI) number was 36.2%, BI = 2.21% and CI = 19.9% which was included in the density figure (DF) 5 category with the medium density category. This shows that the transmission of *Aedes aegypti* mosquitoes is high so that the spread of mosquitoes is faster and the transmission of dengue disease becomes easier.

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