Research Title : A Study on the Number of Aedes Mosquito Larvae at Risk of Causing Dengue Fever in the Area, Kalasin Province

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Abstract

This study investigates the population of dengue mosquito larvae in Kalasin Province to assess the risk of dengue fever outbreaks. The study was conducted in four communities: Ban Khok Kon in Lam Phan Sub-district, Mueang Kalasin District; Ban Dong Noi in Huai Pho Sub-district, Mueang Kalasin District; Ban Dong Noi in Nong I Thao Sub-district, Yang Talat District; and Ban Na in Muang Na Sub-district, Don Chan District. The study employed standard mosquito larvae survey methods based on the GLOBE Program (Institute for the Promotion of Teaching Science and Technology, 2009). Key indices including the House Index (HI), Container Index (CI), and Breteau Index (BI) were calculated to analyze the risk levels in each area.

The findings revealed that Ban Dong Noi community in Nong I Thao Sub-district, Yang Talat District, exhibited the highest indices, with an HI of 80.00, CI of 40.00, and BI of 120.00, indicating a high risk of dengue fever outbreak. Ban Khok Kon community in Lam Phan Sub-district, Mueang Kalasin District, and Ban Na community in Muang Na Sub-district, Don Chan District, also showed high indices, warranting special attention and monitoring. Conversely, Ban Dong Noi community in Huai Pho Sub-district, Mueang Kalasin District, recorded indices of zero, reflecting effective mosquito larvae management in the area.

In conclusion, the study underscores the necessity for stringent monitoring and control measures in areas with high indices. Promoting public awareness and community participation in eliminating mosquito breeding grounds, along with preventive measures such as using Abate sand and reducing stagnant water sources, are crucial strategies to mitigate the risk of dengue fever outbreaks in Kalasin Province.

Introduction

Dengue fever is a significant public health concern in Thailand. In 2023, over one hundred thousand cases were reported, with Kalasin Province being among the areas with high infection rates (Department of Disease Control, 2023). The province's geographical characteristics and environmental conditions favor the growth of *Aedes* mosquitoes, the disease vector. Increased stagnant water during the rainy season leads to a surge in mosquito larvae populations, exacerbating the risk of dengue fever transmission.

According to the World Health Organization (WHO, 2023), dengue fever can affect individuals of all ages, but is most prevalent among school-aged children who frequent areas with mosquito breeding grounds, such as schools and communities. Therefore, this study aims to investigate the population of dengue mosquito larvae in the communities of Ban Khok Kon, Ban Dong Noi (Huai Pho), Ban Dong Noi (Nong I Thao), and Ban Na in Kalasin Province, to assess the risk of dengue fever outbreaks and to raise public awareness regarding the importance of controlling mosquito breeding sites as a means to reduce disease transmission.

Objective

To assess the risk of dengue fever outbreaks in Kalasin Province.

Scope of Study

The study was conducted in 4 communities, with 5 households surveyed in each community, within Kalasin Province:

1. Ban Khok Kon, Lam Phan Sub-district, Mueang Kalasin District
2. Ban Dong Noi, Huai Pho Sub-district, Mueang Kalasin District
3. Ban Dong Noi, Nong I Thao Sub-district, Yang Talat District
4. Ban Na, Muang Na Sub-district, Don Chan District

Methodology

Survey and record the number of mosquito larvae found in each community.

1. Select the villages for the study in Kalasin Province.

1.1 Survey the number of mosquito larvae in Ban Khok Kon, Lam Phan Sub-district, Mueang Kalasin District.

1.2 Survey the number of mosquito larvae in Ban Dong Noi, Huai Pho Sub-district, Mueang Kalasin District.

1.3 Survey the number of mosquito larvae in Ban Dong Noi, Nong I Thao Sub-district, Yang Talat District.

1.4 Survey the number of mosquito larvae in Ban Na, Muang Na Sub-district, Don Chan District.

2. Conduct the survey of mosquito larvae according to the GLOBE Program (Institute for the Promotion of Teaching Science and Technology, 2009) in 5 households in each village.

3. Classify, count, and record the data.

4. Calculate the various indices as follows

$$\text{House Index (HI)} = \frac{\text{Number of positive houses}}{\text{Total number of houses inspected}} \text{ X } 100\%,$$

$$\text{Container Index (CI)} = \frac{\text{Number of positive containers}}{\text{Total number of containers inspected}} \text{ X } 100\%,$$

$$\text{Breteau Index (BI)} = \frac{\text{Number of positive containers}}{\text{Total number of houses inspected}} \text{ X } 100$$

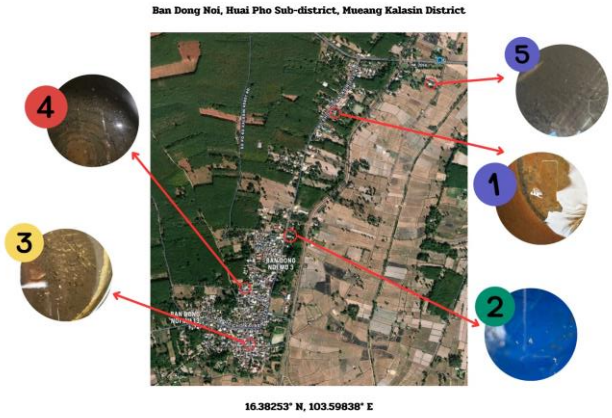
Results

Survey of the number of mosquito larvae found in each community:

Ban Khok Kon, Lam Phan Sub-district, Mueang Kalasin District

Number	Number of containers	Number of containers found
1	6	0
2	7	0
3	5	0
4	11	1
5	5	0

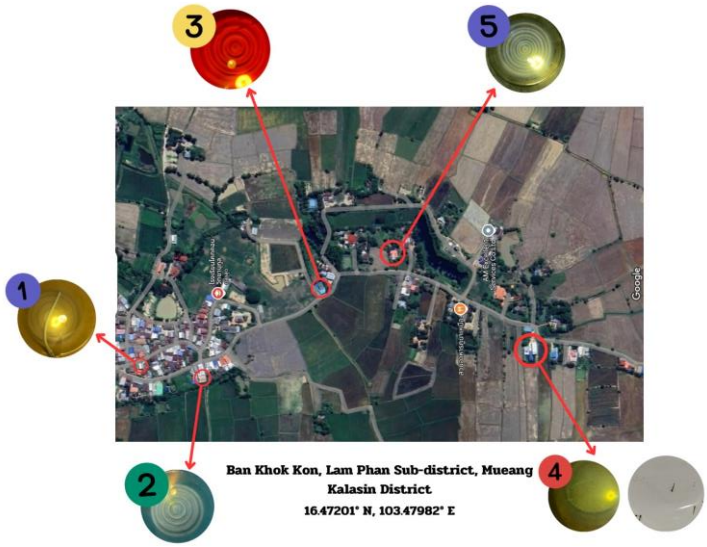
The survey of mosquito larvae in Ban Khok Kon, Lam Phan Sub-district, Mueang Kalasin District, revealed that out of 34 containers inspected in 5 households, only 1 container had mosquito larvae, representing 2.94% of the total containers.



Ban Dong Noi, Huai Pho Sub-district, Mueang Kalasin District

Number	Number of containers	Number of containers found
1	3	0
2	4	0
3	2	0
4	2	0
5	4	0

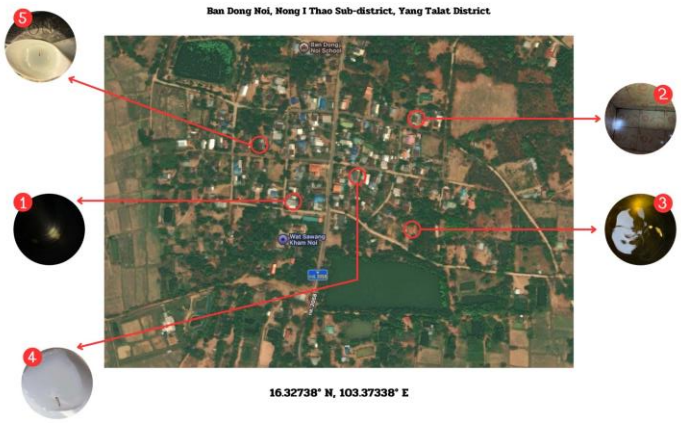
The survey of mosquito larvae in Ban Dong Noi, Huai Pho Sub-district, Mueang Kalasin District, in 5 households, showed that no mosquito larvae were found in any of the 15 containers inspected, representing 0%.



Ban Dong Noi, Nong I Thao Sub-district, Yang Talat District

Number	Number of containers	Number of containers found
1	3	0
2	3	2
3	3	1
4	3	2
5	3	1

The survey of mosquito larvae in Ban Dong Noi, Nong I Thao Sub-district, Yang Talat District, in 5 households, revealed that out of 15 containers inspected, 6 containers had mosquito larvae, representing 40% of the total containers.



Ban Na, Muang Na Sub-district, Don Chan District

Number	Number of containers	Number of containers found
1	2	0
2	3	0
3	4	0
4	2	1
5	2	1

The survey of mosquito larvae in Ban Na, Muang Na Sub-district, Don Chan District, in 5 households, showed that out of 13 containers inspected, 2 containers had mosquito larvae, representing 15.38% of the total containers.

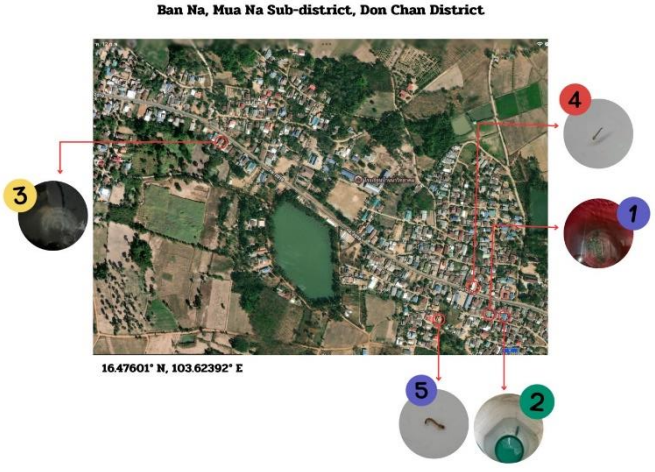


Table: Risk Analysis Index for Dengue Fever Transmission in Communities of Kalasin Province

Index value / Location	HI	CI	BI
Ban Khok Kon, Lam Phan Sub-district, Mueang Kalasin District	20.00	2.94	20.00
Ban Dong Noi, Huai Pho Sub-district, Mueang Kalasin District	0	0	0
Ban Dong Noi, Nong I Thao Sub-district, Yang Talat Disrict	80.00	40.00	120.00
Ban Na, Muang Na Sub-district, Don Chan Disrict	40.00	15.38	40.00

The survey and analysis of the various indices in the communities of Kalasin Province showed that the House Index (HI) of mosquito larvae in Ban Khok Kon, Lam Phan Sub-district, Mueang Kalasin District; Ban Dong Noi, Nong I Thao Sub-district, Yang Talat District; and Ban Na, Muang Na Sub-district, Don Chan District, were all greater than 10, while the HI in Ban Dong Noi, Huai Pho Sub-district, Mueang Kalasin District, was less than 10.

The Container Index (CI) in Ban Khok Kon, Lam Phan Sub-district, Mueang Kalasin District; Ban Dong Noi, Nong I Thao Sub-district, Yang Talat District; and Ban Na, Muang Na Sub-district, Don Chan District, were all greater than 0, while the CI in Ban Dong Noi, Huai Pho Sub-district, Mueang Kalasin District, was 0.

The Breteau Index (BI) in Ban Khok Kon, Lam Phan Sub-district, Mueang Kalasin District; Ban Dong Noi, Huai Pho Sub-district, Mueang Kalasin District; and Ban Na, Muang Na Sub-district, Don Chan District, were all less than 50, while the BI in Ban Dong Noi, Nong I Thao Sub-district, Yang Talat District, was greater than 50. In conclusion, the communities of Ban Dong Noi, Nong I Thao Sub-district, Yang Talat District; Ban Na, Muang Na Sub-district, Don Chan District; and Ban Khok Kon, Lam Phan Sub-district, Mueang Kalasin District, are at high risk for dengue fever transmission, in descending order.

Discussion

The results indicate variations in mosquito larvae populations across the surveyed communities, reflecting differing levels of dengue fever transmission risk. The communities of Ban Khok Kon, Ban Dong Noi (Nong I Thao), and Ban Na exhibited high HI, CI, and BI values, indicating a significant risk of dengue fever spread.

The community of Ban Dong Noi (Huai Pho) demonstrated a zero index, suggesting effective mosquito breeding ground control measures. Factors potentially influencing these differences in larvae populations include the physical characteristics of the areas, public health policies and measures, and community awareness regarding dengue fever prevention.

The community of Ban Dong Noi (Nong I Thao) showed the highest indices, implying a greater number of containers with mosquito larvae, and therefore the highest risk of dengue fever outbreaks. This finding is consistent with the World Health Organization (WHO, 2023) which states that areas with a HI greater than 10 and a BI greater than 50 are at high risk of dengue fever outbreaks.

Conclusion

The study of dengue mosquito larvae in 4 communities in Kalasin Province revealed that 3 communities – Ban Khok Kon, Ban Dong Noi (Nong I Thao), and Ban Na – exhibited indices higher than the established standards, indicating a high risk of dengue fever outbreaks. Ban Dong Noi (Nong I Thao) exhibited the highest risk.

Conversely, Ban Dong Noi (Huai Pho) showed a zero index, demonstrating effective mosquito breeding ground management, potentially serving as a model for dengue fever prevention.

These findings underscore the necessity for stringent mosquito larvae control measures. Efforts should focus on promoting public awareness regarding the importance of eliminating mosquito breeding grounds, implementing preventive measures such as using Abate sand and removing stagnant water containers, and providing education about dengue fever to help reduce disease transmission rates in Kalasin Province.

Bibliography

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