

## **A Study on Dengue Prevention and Control Method for Aedes Mosquitoes Breeding in Selangor, Malaysia**

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### **ABSTRACT**

The abstract of this study is to use a tool and techniques when developing a product to develop the method of dengue prevention. Dengue is amongst the most essential arthropod-borne viral sicknesses as far as human grimness and mortality in Malaysia. Dengue breeding has turned into a critical general medical issue in Malaysia. Its influences tropical and subtropical in Selangor, Malaysia transcendently in urban and semi-urban territories. Dengue infections are transmitted to people through the bites of a striped aedesaegypti mosquito that has recently nibbled a contaminated individual. Dengue does not spread straight forwardly from individual to individual. It is just spread through the bite of a tainted mosquito. The main research problem starts in order have a massive issue in the dengue epidemic which increasing in Selangor, Malaysia and requires specific techniques of prevention especially in improving the product to prevent the dengue epidemic. Moreover, the main study is about aedes mosquitoes will spread quickly due to reclaimed water which in the housing area, playground and many more. This creates favorable breeding sites for the Aedes mosquitoes. The aims of this study to identify the method of preventing the dengue epidemic in specific dengue breeding places as in Selangor, Malaysia as a cause of the bite of a contaminated aedes mosquito. This study will contribute to reducing the case of dengue epidemic. Thus the study of design in a competencies framework for a portable fogging machine is needed to come with a proper design proposal in the fogging machine that can be improved accordingly to the most relevant techniques and methods.

### **Keywords**

Dengue prevention, Portable fogging machine, Technique and method of prevention

### **INTRODUCTION**

Taking care of health issues and practicing a good healthy lifestyle is significant for every individual perception. The dengue epidemic is a part of the most extensive crucial disease in Malaysia. Dengue epidemic transmitted from person to another person thru aedes mosquitoes bite. There are many cases reported every year. The first cases reported in 1902 which is, the dengue epidemic stated in Malaysia. The researcher has found that in the year 2008, there are many dengue cases were reported. The case in 2008 was affected in Selangor which was a hotspot due to the critical and high value of people was infected of dengue epidemic. In a year of 2008 there was 2,391 cases were reported in a week with fatality(S. & NOORANI, 2012). The dengue epidemic is a significant problem in urban, suburban areas and everywhere in Malaysia. The problem is occurred due to many abandoned places and possible to have a breeding for aedes mosquitoes. This scenario will be a high impact to people and chances to have a dengue epidemic. The dengue epidemic in Malaysia is primarily based on surveillance and vector control by spraying fogging machine (Kumarasamy, 2006). However, it does not fit abandoned places and takes time to destroy dengue breeding area. The researcher studied dengue prevention techniques to counter aedes mosquitoes in Malaysia Selangor Malaysia through this study. The specific study in Selangor, because due to the highest dengue cases in Malaysia with 21,689 cases in the year 2019 compared to other states in Malaysia. Thus there are many techniques on the dengue prevention and control program, which can reduce dengue cases (NaniMudin, 2015). The prevention also involves some departments from the government that have some fogging activity to reduce dengue epidemic. Dengue epidemic prevention and control depends on effective vector control measures. Sustained community involvement can improve vector control efforts

substantially. Fogging activity is a way to destroy and prevent Aedes breeding. These will prevent contribute to breeding essential because it can fertilize everywhere. Aedes mosquitoes also reproductive in water, which is to lay the eggs and reproduce. Thus, tropical and sub-tropical countries are the most suitable areas for spreading the dengue epidemic. Experimental results in research on the possibility of transmission of dengue virus and aedes mosquitoes bite have been reported (Kasai et al., 2014).

## LITERATURE REVIEW

In Malaysia, dengue control is primary based on surveillance by the doctor and vector control department (Hazra, Samanta, Karmakar, Sen, & Bakshi, 2017). However, Selangor is a enormous number of cases reported by the ministry of health Malaysia in 2019. The total number of cases in Selangor reached 69,701 dengue cases in the year 30 December 2018 to 16 December 2019. Selangor state is the west coast of Peninsular Malaysia, enclosed to the capital of Kuala Lumpur. The very massive state of Selangor with approximately 216 cases daily reported in the dengue epidemic. Thus, the most enormous population of aedes mosquitoes is breeding actively (Singh, Bansal, Sandhu, & Sidhu, 2018). The researcher also found that data from the Department Of Statistics of Malaysia (DOSM) shows that, there are 31.53 million residents in Selangor in 2018. Approximately 0.22% is infected out of 31.53 million. Thus, 0.068%, which is 216, is reported daily in Selangor to dengue epidemic cases. Moreover, research input is needed to develop effective dengue epidemic prevention and control methods. However, the west coast of Kuala Lumpur is located beside the state of Selangor. The entire case in Kuala Lumpur is a second highest after Selangor state epidemic virus are very wide (Hassan, Shohaimi, & Hashim, 2013).

**Figure 1. Dengue hotspots from Ministry Of Health Malaysia (2019).**  
 (<http://idengue.arasm.gov.my/index.php>)

NEGERI	KES HARIAN PADA 16 Dec 2019	*JUMLAH KES TERKUMPUL DARI 30 Dec 2018 HINGGA 16 Dec 2019
JOHOR	32	10,541
KEDAH	7	1,558
KELANTAN	18	5,836
MELAKA	2	2,081
NEGERI SEMBILAN	6	2,229
PAHANG	3	2,730
PERAK	9	3,087
PERLIS	0	279
PULAU PINANG	3	4,068
SABAH	21	5,230
SARAWAK	11	2,507
<b>SELANGOR</b>	<b>216</b>	<b>69,701</b>
TERENGGANU	0	536
WP KUALA LUMPUR	31	13,962
WP LABUAN	0	36
WP PUTRAJAYA	1	1,053
<b>MALAYSIA</b>	<b>360</b>	<b>125,434</b>

The prevention role of the dengue epidemic in enhancing the method of prevents aedes mosquitoes using the portable fogging device.

Based on the research and findings in enhancing the sense of aedes mosquitoes, a portable fogging machine device outcome gives a wide range of fogging activities and uses a proper access and comforts, so that people can easily use the method to prevent of aedes mosquitoes (Reiter, 2016). Moreover, the fogging device should be easy to use and user-friendly device. The criteria are essential to create a better solution to prevent the dengue epidemic in urban and suburban areas (Oaks & Aberdeen, 2013). This research paper has been focused on the roles of the fogging machine in enhancing the sense of the prevention of the dengue epidemic that currently increasing. Therefore, by understanding the importance of the fogging machine, assessing the user needs, for instance, comfort, user friendly and easy to use criteria is more important in this study. In Malaysia, there is a rule, which will have fogging activity if there are dengue cases (Boubidi et al., 2016). Besides the researcher trying to come with a solution that early preparation to avoid the dengue epidemic. The solution comes with the respondent's preference with their need because the people in the situation more know to what the facilities are have to avoid the dengue epidemic.

### **DESIGN CRITERIA**

The study is to provide a design of a portable fogging machine as an effective operation procedure in preventing the dengue epidemic. According to respondent preference, the new function and features lead to method and techniques of preventing from the dengue epidemic. The design of the portable fogging machine retained the idea from the portable device concept. The main factor for this design is to practice a healthier lifestyle from preventing form dengue epidemic (Asmai, Zukhairin, Jaya, Rahman, &Abas, 2019). Besides that, this design will give users the impression and make more appropriate to protect their family from aedes mosquitoes. This factor aims to maximize the size that can replace the enormous size of the previous fogging machine. This product was designed for the consumer(from respondent) who stays most of their time indoor with their daily activities where a portable fogging machine can be used to defense mosquitoes and prevent dengue epidemic in daily life. Besides, this product can be used in indoor, outdoor, and aerosol method in this portable fogging machine as a replacement aerosol (Abeyasuriya, Nugapola, Perera, Karunaratne, &Karunaratne, 2017).The fogging machine is an electronic device which can use indoor, outdoor, and anywhere without any limitation in term of the functionalities needed by the respondents. The portable fogging machine can function with using any wireless charging to the body attached because it operated from its primary power, DC for 5 volts and 2.1 amps. It can last a maximum of one hour after fully charged. Thus this product can detect the percentage which can appear in the LCD touch screen. The system also can detect the battery percentage and auto cut off if the battery is full. The researchers' have come out with the detection thru infrared sensor detector that consists of full charge and automatically cut it off the energy. On the other hand, the design of the portable fogging machine was inspired by the portable designs.



**Figure 2. Visual Propose Design**

Figure 2 shows the final design with actual rendering and the design is proportional. This product is possible to use indoor and outdoor. The design of the arrow is to show the nozzle area to release the smoke. The grey color (grip) material by solid PLA plastic material because more comfortable to grip and follows modern style. Thus the design plays a portable device which leads to user friendly. Moreover, connection with arduino and it has a screen to see the functions and reading. The process of design development of this study is lead to a prototype which able to demonstrate by using opens source hardware arduino which the device can operate with all functions and features.

## **METHODOLOGY**

The researchers have found the techniques for preventing the dengue epidemic and it has been proven by (Ong, 2016) which is vector control by the Malaysian health department. There will be a fogging session on dengue season to prevent on dengue case. The total program is conducted by vector control of Malaysia. Fogging activity has some reason why cannot run frequently. It is due to preventing natural pollution and noise pollution. The department of health Malaysia will come to the housing area to inspect larvae control. Thus if there is a high risk of getting dengue cases in a certain area, the department comes with a solution which is thermal fogging activity. Therefore current inspection was carried out for the houses, companies, and land as surveillance of aedes mosquitoes breeding prevention. The poor coverage of inspection could lead to the raising of aedes mosquitoes breeding. The communities also have to work on this case, which cleans its surrounding houses to prevent breeding sides of aedes mosquitoes (Yap, Chong, Foo, & Lee, 1994).

## **DATA ANALYSIS**

Data analysis focused on the study's main findings and the conclusion. These displays of the result generated from data analysis (IBM Statistical Package Service Solution (SPSS) version 20) include the respondent's background and data to answer the following primary and sub research questions and followed by main research objective and sub- research objectives. Thus this data analysis discussed the result from the practical data collection procedures. The result from the preference survey was analyzed by using descriptive statistics of frequency, mod, mean, median, and average from IBM Statistical Package Service Solution (SPSS) version 20. The respondent

background was a result of the data collection and finding in the relation to the research objectives. The result presented in this part from the survey questionnaire user thru Google survey (online platform) by open which refers to everyone mainly in Selangor, Malaysia.

## RESULTS

**Table 1: Analysis result data preference and characteristics of a portable fogging machine.**

<b>RECOMMENDATION</b>	<b>200 RESPONDENT</b>	<b>PERCENTAGE</b>
<b>Male</b>	101	50.5%
<b>28-50 years old</b>	116	58.0%
<b>4k-8k</b>	70	35.0%
<b>Extreme high fever</b>	61	30.5%
<b>Mosquito coil</b>	57	28.5%
<b>Close the windows</b>	78	39.0%
<b>Fogging activity</b>	90	45.0%
<b>Fogging activity effectiveness</b>	94	47.0%
<b>Button / Switch, Colour, Size, Weight of machine</b>	87	43.5%
<b>Battery function, Come out with technology, Multi-function, Touch screen</b>	86	43.0%

Table 1 shows the online survey which the researcher found and identified several ideas for improvement on the current fogging machine and design characteristic. The following ideas have been a response by 200 respondents during the survey process taken for 2 months. After analyzing IBM Statistical Package Service Solution (SPSS) version 20, the researcher found that development needed to the fogging machine to avoid dengue epidemic as a prevention solution. There are 100% (200 respondents) of the total respondents have participated in an online survey on Google surveys to answer their suggestions and recommendation. The highest percentage of recommendation is 45% on developing a fogging machine. Secondly, the respondent statement for 39% is practicing close their house window when mosquitoes fly in their house. Almost in Malaysia are practicing the same implementation due to a general knowledge practicing, because the mosquitoes breeding outside, of their house (S. & NOORANI, 2012). Thus, 47% prefer that fogging activity is more effective from other prevention methods because the fogging ingredient will destroy from the first stage, which is a larva. Some stages naturally produce mosquitoes, which start from the egg, pupae, larvae, and adult (aedes mosquitoes). These types of mosquitos have to prevent breeding to avoid in dengue epidemic situation (Teng& Singh, 2001). The respondent also needs a product to improve on aedes mosquitoes to destroy equipment, helps in a nowadays healthy lifestyle. Moreover, in response to the research question, this research implies the strategic design, function, portable functions, technology, and sizes. Since the previous fogging machine in big sizes and uses diesel to start up the machine, the respondent is preferred

to generate it through the battery energy. Results for the preference survey, both in terms of portable sizes and easy to use, will provide a good comfort for the user. The strategy in developing the forging machine device can be enhanced from the existing fogging machine, which is discussed in more detailed.

## **DISCUSSIONS**

The data was generated and listed to answer the research objectives. Based on the findings in this study, and it is clear that aedes mosquitoes on prevent the major positive impact in preventing the dengue epidemic. In Selangor, most of the respondents gave a proper and easy implication on preventing aedes mosquitoes. The respondents came out with a reliable suggestion for the fogging machine and contributes a huge method of prevention (Singh et al., 2018). Based on the observation and survey method that the researcher has conducted, the total result from the questionnaire is made sense with different respondents which lead to a proper fogging device in preventing on aedes mosquitoes breeding around the residential area. However, there are some parts of the irrelevant methods of aedes mosquito prevention and fogging device in the current market exists. The current fogging device does not meet the user criteria because of the sizes and the function make a heavy usage for the users and not in simple designs and comforts. Besides, based on the survey, the researcher wanted to measure the need for the people out there to prevent in dengue epidemic. The origin cause for the dengue epidemic is from aedes mosquitos. The study was focused on the method of prevention on aedes mosquitoes, as a solution for preventing in dengue epidemic using a proper design of a portable fogging machine for household uses.

## **CONCLUSION**

This research has addressed the problem of the existence of a fogging machine and based on respondent preference that wants to be in as addressed portable fogging machines. The objective was determined the roles of the prevention of dengue epidemic and the method of prevention of aedes mosquitoes. Thus this statement is to identify the user's perception of the prevention of the dengue epidemic. Using a responding preference and survey preference of the users with providers of the preference is more reliable features to the environment (Wong, Shakir, Atefi, &AbuBakar, 2015). The findings are consistent and support the theoretical explanation in preventing dengue epidemic. Finally, the research has contributed to the body of knowledge in preventing the dengue epidemic and preventing aedes mosquitoes. A discussion of the limitation of this research has highlighted opportunities for future research approaches.

## **LIMITATIONS AND FUTURE STUDIES**

This study has several limitations which the finding should be interpreted cautiously. The most limitation was the design study on portable sizes and weight. The obtained results were carried out over the period online platform questionnaire was used, which may also mean that there was potential information since some respondents decline the surveys. Besides, this study only covers in Selangor Malaysia.

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