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# Android based mosquito monitoring model for Dengue Hemorrhagic Fever Control

Authors
**Teguh Budiharjo[1], Surati[2], Setya Wijayanta[3]**
[1,2,3]Department of Health Analysis, Ministry of Health Polytechnic Semarang
Corresponding Author
**Teguh Budiharjo**
Department of Health Analysis, Ministry of Health Polytechnic Semarang

**Abstract**

**Background**: *This study aims to develop an Android-based mosquito larvae monitoring information system to support dengue fever vector surveillance in the Tembalang District Health Center, Semarang City. Dengue fever is still a severe problem in Central Java Province. Increased rate of larvae can increase dengue cases. Dengue prevention efforts are carried out by fumigation (Fogging)and the mobilization of the larvae monitoring officer (Larva controller). The reporting system of larva monitoring starts from the worms of the serial 1 (JPJ1) observers, the serial 2 larva observers (JPJ2), and the house/building larva cards are currently related to each other so that if the previous report is not completed or submitted, it will also arise incompleteness and delay in reporting the next larva. To overcome the incompleteness of the data, the delay in access, maximizing and facilitating inputting data, it is necessary to develop a mosquito larva monitoring information system.*

**Methods**: *This type of research uses action research. The location of this research was conducted in the Semarang Health Polytechnic, precisely at Campus III Pedurungan and Campus, I Tembalang Polytechnic Semarang. The research subjects were people involved with the mosquito larvae monitoring information system in the health center consisting of the head of the Semarang City Bangetayu Health Center and The Dengue Fever Eradication Sub-Unit and the Larva, controller officer. The process of analyzing data uses content analysis.*

**Result**: *The results of this study succeeded in establishing an Android-based mosquito larvae monitoring system reporting model (89% relevance, 66% accuracy, 80% timeliness and 86% ease of access) and can be applied in the community well.*

**Conclusion**: *The conclusion of this study was successfully built an Android-based mosquito larvae monitoring system reporting model that is system tested and can be applied in the community well. However, the model of monitoring reporting system for Android mosquito larvae, still measures the larvae density in the ABJ parameter has not provided facilities for the size of the Container Index (CI) and Breteu Index (BI) and is still limited to Tembalang district.*

**Keyword:** *Flick monitor, Mosquito Reports Monitoring System Model.*

## Introduction

According to Kemenkes (2014), dengue fever is still a severe problem of Central Java Province, and it is proven that 35 districts/cities have been infected with dengue. In 2015 in Central Java Province there was an increase in *Incidence Rate* (IR) from 32.95 in 2014 to 33.90per 100,000 inhabitants.

According to Hastuti (2008), increased rate of larvae can increase dengue cases. Dengue fever can only be transmitted through mosquitoes, so free larva figures statusis one of the most valid indicators to describe the trend of dengue fever. Thus the free larva figures status validity can predict the development of dengue cases. Dengue fever prevention efforts are carried out by fumigation (fogging) and the mobilization of the larvae monitoring officer (Aditama,2011).

Larva controller is a form of movement or active participation from the community in tackling dengue disease which until now has not been completely eradicated. The active role of Larva controller can reduce the number of dengue cases through repeated larval examinations, the implementation of the eradication of mosquito nests, and counseling to the community (Santoso, 2008).

Based on the results of observations and interviews with the eradication and control officers of Tembalang Community Health Center, Pedurung and Semarang City Health Office in 2016, information was obtained that the reporting system of larvae monitoring began in several steps from the lower officer and home larva cards/buildings are currently related to each other so that if the previous report is not completed or submitted, there will also be incompleteness and delay in reporting the next larva. To overcome the incompleteness of the data, the delay in access, maximizing and facilitating inputting data, it is necessary to develop a mosquito larva monitoring information system.

The alternative supporting device for the larva monitoring reporter is amobile device. These devices include mobile phones, smartphones, and tablets. The operating system for mobile devices based on the Linux kernel is Android. The advantage of Android is that it provides an open platform for developers to create their applications for use by various mobile devices. The power of Android lies in its ability to integrate with the database, the ability to access the internet through cellular and wifi networks, support for GPS access, touch screens, cameras, and mini keyboard (Kadir,2014).

From the background above the researchers were interested in developing Android-based mosquito larvae monitoring information system to support dengue fever vector surveillance in the Tembalang District Health Center, Semarang City.

**Methods**

This type of research is analytic carried out in the development of Android-based mosquito larvae Monitoring Information System. It isaction research accompanied by qualitative methods, namely the type of research carried out using approaches, analysis, and resolution of operational problems through scientific processes and art in decision making to get the best results.

Research carried out in the Semarang Health Polytechnic precisely at Campus III Pedurungan and Campus I Tembalang Polytechnic Semarang. The research subjects were people involved with the Mosquito larvae monitoring information system in the Health center consisting of the Head of the Semarang City Bangetayu Health Center, the Dengue Fever Eradication Sub-Unit and the larva controller officer.

The data collected was then analyzed. The results of in-depth interviews were analyzed using content analysis *(content),* which is a method for analyzing communication systematically, objectively and quantitatively towards the message that appears. Data is selected according to relevance and presented in narrative form. The systemis evaluated before and after the new system is implemented whether it runs as it should and vice versa.

**Results**

The model of making a mosquito larva monitoring reporting system utilizes an android application using the Model Driven Development (MDD) method. The products in this study are the mosquito larvae Monitoring Reporting System to support officers' activities and dengue fever prevention. The system can be used as a tool for

mosquito larvae monitoring reporting so that it can improve the quality of information (concerning relevance, accuracy, the speed of time, and ease of access). It takes time from the development stage of the reporting system and its implementation for 1-3 months (Paryati,2007).

According to Hartono (2008), the Flicking Monitoring Report System in this study uses an android smartphone as a means of data input so that an Application Programming Interface (API) is needed which can be accessed by android applications, databases, and the web. In this study for android applications used the Cordova library framework. Whereas for the internet applied framework Code Igniter which is a PHP framework that is open source and uses the MVC (Model, View, Controller) method to facilitate web development. Then for the Data Base Management System in this study was MYSQL, which is an Open Source database management system. The advantages of MYSQL are that it can be integrated with PHP. Before the system is developed, the prerequisite must be fulfilled:

a. Larva controller uses this mosquito larvae reporting system controler as input data using the means of the Android application.
b. The system can recap larva monitoring results.
c. The system can display the results of online recapitations.
d. Administrator can log into the system as an administrator.
e. Administrator can set the larva monitoring location master.
f. Administrator can download the recap of the results of the larva in Microsoft Excel format.
g. Only the health center administrator can register larva controller cadres.
h. Cadres (larva controller) can log in through the larva controller mobile application with the username and password given by the admin of the health center.
i. Cadres (larva controller) can fill out the flicking monitoring form online.
j. The larva monitoring form is adjusted from the current manual form.
k. The input results of the larva monitoring form can be stored in the database (MYSQL).
l. Before being uploaded to the internet, there is a confirmation that the data entered is complete and correct.
m. Cadres can delete the inputted monitoring form.
n. User cadres can log out.


**Fig 1** design Android application interface design Android interface

The implementation phase is a continuation stage of the system design activities. The result of this implementation is a system that is ready to be tested and used by users. The form of application developed in the reporting system of the results of this larva monitoring is based on Android mobile and web-based. Browsers (Mozilla, Chrome, Safari, Internet Explorer, etc.). Testing systems was done by Testing Blackbox Test and Beta Testing Test.

Test function model reporting system monitoring mosquito larvae base android.

**Discussion**

The socialization activities were conducted at the Rowosari Tembalang Health Center hall followed by larva controller coordinator, student of health analyst (candidate for larva controller), social welfare section as coordinator of larva controller

district, head of community health center, health center disease observation section, head of disease prevention and eradication in Semarang. The information dissemination activity was filled with information about the monitoring reporting information system application of mosquito larvae with models that had been built based on Android. The training was conducted with the health analyst academic participants as candidates for the larva controller and larva controller coordination offices from the five villages of the health center reporting admin staff. Training material on dengue fever, tools needed as well as procedures for using the mosquito larvae reporting application. to make it easier for the training participants to get the android-based mosquito larva monitoring report model application book, the guidebook can also be a handle when using the application when monitoring mosquito larvae.

The activity after the training was to test the use of the mosquito larvae monitoring reporting application system in the field. Determination of the trial location was carried out in the Tembalang Subdistrict around the Semarang Health Polytechnic. The location of the trial was determined by the discussion and advice from the Semarang City Health Office, namely the Rowosari subdistrict area, considering that the dengue fever number was still relatively high.

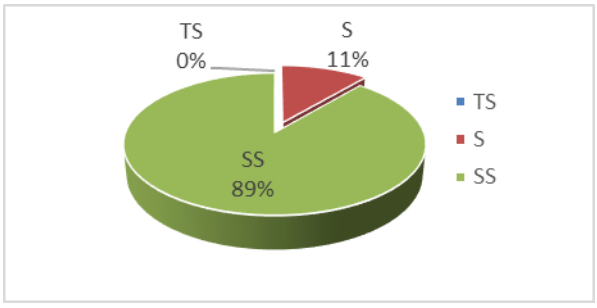


**Figure 3.2** Graph of information quality element of relevance

The evaluation results on the relevance parameter found that as many as 89% stated that Strongly Agree to Information Systems used to produce information relevant to the reporting needs of mosquito larvae monitoring. This data shows the Android-based mosquito larvae monitoring reporting model following the requirements in the field both larva controller cadres, larva controller coordinators and health center as admin mosquito larvae monitoring reports Health center area unit level.

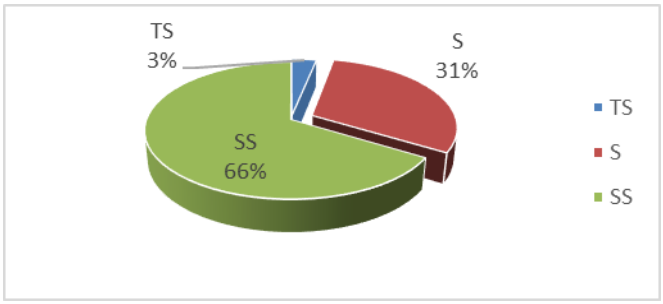


**Figure 3** Graph Information Quality Elements Accuracy

Evaluation of accuracy parameters obtained by 3 % and 66% stated strongly agree that the Android-based mosquito larvae monitoring reporting model sent data is accurate, meaning that the Android-based mosquito larvae monitoring reporting system model produces accurate mosquito larvae data.

Results evaluation of elements timeliness of data delivery results of mosquito larvae monitoring obtained 1% of respondents expressed disagreement, 19% of respondents stated agreed that the information system used was agreed that information data from Android-based reporting models could be fast and on time.

Results evaluation of the ease of access element is obtained, as many as 14% of respondents agreed, and 86% stated strongly agree if the reporting model for monitoring android base larvae is easily accessed and used. Its functions are easy to use, not simple convoluted.

Another advantage of the mosquito larvae monitoring reporting model is that in the process of calculating larva-free numbers do not need to count manually. The user only runs the Flick of Monitoring Reporting Information System application and inputs the results of the larva monitoring that has been done, and the system automatically calculates larva free numbers by itself without having to count again manually.

Policymakers can be faster, and right in the budget plan to carry out mosquito nets restriction activities. Larva free number status calculations do not need to be manual. The monitoring form is standard and paperless.

**Conclusion**

The mosquito larvae monitoring reporting system model is still manually using forms in reporting and Larva free number status is obtained by calculating the data collected from the collected forms. Successfully built an Android-based mosquito larvae monitoring system reporting model can be applied in the community to speed the process. Besides, mosquito larvae monitoring data are well documented in a database, can be immediately accessed anytime and accurately. This device also indicates that mosquito larvae monitoring reporting system model has good, relevant, fast, accurate, easy access to information quality. The use of information technology can increase the participation of the academics to be involved in monitoring mosquito larvae because android has become a daily grip on students so that their activities are more interesting.

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