

EVALUATION OF DENGUE PREVENTION AND CONTROL PROGRAMS IN BANYUMAS HEALTH OFFICE, CENTRAL JAVA, INDONESIA

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ABSTRACT

Background: Evaluation of dengue prevention and control program is important to describe the current situation, results and identifying several drawbacks. This study aims to evaluate dengue prevention and control program based on input, process and output

Materials and Methods: This is qualitative study, located in Banyumas Regency, Central Java Indonesia. 38 of informants, consist of Banyumas Regency health officer, staff of primary health care, voluntary cadre and community were interviewed. To increase validity of this study, triangulation of source and method was carried out. Program evaluation consist of input (human resources, fund, method, regulation, and materials), process (plan, organization, implementation and evaluation), output (completeness of report).

Result: Results of this study indicated that the input component of dengue prevention and control program (funds, methods, and time) were relatively sufficient. While program implementation such as fogging focus, larvacide, mosquito breeding site eradication and regular larvae checking were still not optimal

Conclusion: This study suggested the need of supervision for program implementers to monitor the performance of Jumantik in conducting regular larvae checking. Result of this study also provide evaluation and feed back in each aspect of input, process and output, therefore improvement in each aspect could be done effectively.

Keywords: dengue virus, prevention, control program

1.0 Introduction

Dengue Virus (DENV) infection is still considered as important public health problems, mainly in tropical and sub tropical countries. This disease mostly endemic in urban and semi-urban areas due to the bionomic of its vector, *Aedes sp* mosquitoes [1]. DENV transmit to other host by female *Aedes aegypti* as primary vector and *Aedes albopictus* as secondary vector [2]. It is estimated that there are 390 million dengue infections per year, and 3.9 billion people in 128 countries are at risk for DENV infection [3,4]. Multiple factors influence the DENV transmission such as human mobility, *Aedes sp* density, demographic, socio economy etc [5,6]. DENV is endemic in Indonesia since it was identified in 1968 in the cities of Jakarta (capital of Indonesia) and Surabaya (East Java) [7]. Banyumas Regency is one of dengue endemic area in Central Java. Based on the monthly report of the Banyumas District Health Office, there are 26,31% increase of dengue cases from 2014 to 2015. In 2016, dengue outbreak recorded in this area, caused 536 cases of dengue with 7 people died.

Although dengue vaccine is available, however dengue prevention and control are still rely on reducing *Aedes sp* mosquitoes by several methods such as repellents, mosquito coils, fish predators, and mosquito breeding site eradication [8,9]. In Indonesia, 3M plus program was applied since decades ago to prevent DENV transmission. 3 M consist of “menguras” to to drain water holding container in each house, “menutup” or to cover water holding container and “mengubur” to to burry/reuse used goods which condusive for mosquitoes breeding site. In addition, “plus” means all method to minimize mosquito bites such as using mosquito repellents, keeping fish predators or wearing long shirt to minimize from mosquito bites [10]. While application of outdoor spatial spraying or “fogging” was carried out in the event of dengue outbreak to stop the transmission [11].

Although a dengue prevention and control program has been implemented, however dengue cases still occur in some areas in Indonesia. This fact raise the need of program evaluation in local health officer. This study aims to evaluate dengue prevention and control program which implemented by Banyumas Regency Health Office, Central Java, Indonesia. This is qualitative study which evaluate in input, process, output. Evaluation of input include human resources, funds, methods, and facilities, while process evaluation included mosquito nest eradication (PSN), periodic larvae examination and fogging foccus. In addition, output evaluation would focused on report of free larvae index, cases detection and dengue mortality rates. Information of this study could provide evaluation of program, therefore improvement of dengue prevention and control program could be made.

2.0 Materials and Methods

2.1. Description of the study area

This study located in Banyumas Regency, located in the southwest of Central Java Province, Indonesia. Coordinates for this location are as follows: 108° 39' 17" - 109° 27' 15" East longitude, and 7° 15' 05" - 7° 37' 10" South latitude. Dengue cases occurred every year in this regency, with outbreak happened in certain year. For more than 10 years, most cases of DHF in this regency were located at Purwokerto, the capital of Banyumas Regency.

2.2. Data Collection

This is qualitative study which involved 38 of informants. Informants consist of Banyumas Regency health officer, staff of primary health care, voluntary cadre and community. To increase validity of this study, triangulation of source and method was carried out. Interview process was conducted around 45 minutes for each informants. Informed consents was applied before the interview process. Program evaluation consist of input (human resources, fund, method, regulation, and materials), process (plan, organization, implementation and evaluation), output (completeness of report).

2.3. Data Analysis

Data was analysed by content analysis. Results from interviews were recorded and then transcribed. Data reduction was done by summarized, sorted out the main idea which correlated with program management of dengue control .

3.0. Result

3.1. Characteristic of Informants

38 of informants were interviewed in this study, consist of staff from Banyumas Regency Health Office, primary health care, voluntary cadre and community. Detail of informan characteristic showed in Table 1.

Table 1. Characteristic of informants.

Code	Job desription	Education	Length of work in current position
D.1	Head of section of infectious disease management, Banyumas health office	Master	24 years
D.2	Head of division of infectious disease management, Banyumas health office	Master	11 months
D.3	Programmer staff of Infectious disease management section, Banyumas health office	Bachelor	20 years
P.1	Sanitarian staff in primary healthcare	Diploma 4	2 months
P.2	Sanitarian staff in primary healthcare	Diploma 4	3 years
P.3	Health promotion staff in primary health care	Bachelor	29 years
P.4	Health promotion staff in primary health care	Bachelor	6 months
P.5	Sanitarian staff in primary healthcare	Bachelor	2 years
P.6	Sanitarian staff in primary healthcare	Bachelor	1,5 years
P.7	Health promotion staff in primary health care	Diploma 3	10 years
P.8	Health promotion staff in primary health care	Bachelor	19 years
P.9	Sanitarian staff in primary healthcare	Diploma 3	10 years
K.1	Voluntary cadre	Junior High school	5 years

K.2	Head of voluntary cadre	Secondary school	12 years
K.3	Cadre	Senior School	High 27 years
K.4	Cadre	Senior School	High 31 years
K.5	Cadre	SMP	15 years
K.6	Cadre	Senior School	High 25 years
M.1	Housewives	Senior School	High -
M.2	Housewives	Senior School	High -
M.3	Employee	Bachelor	-
M.4	Employee	Bachelor	-
M.5	Entrepreneur	Bachelor	-
M.6	Entrepreneur	Senior School	High -
M.7	Entrepreneur	Bachelor	-
M.8	Housewives	Senior School	High -
M.9	Housewives	Junior school	High -

Education background of informants came from various fields (public health, health analysts, nursing, environmental engineering) and general education (Junior high, Senior high school, Bachelor). The informants also came from various positions or agencies, each of which represented a field in its policy or even in the case of implementing DHF prevention and control programs in Banyumas Regency.

3.2. Evaluation of Input

The evaluation results of the input variable of dengue prevention and control program in Banyumas Regency in detail were presented in Table 2.

Table 2. Evaluation of input variables

Variables of Input	Interview and Observation Results		Standard
1. Human Resources			
Number of staffs	✓	No entomology personnel	Availability of :
	✓	Lack of epidemiologists at the primary health care level.	Entomology staff, sanitarian staff
	✓	Number of active cadres are not well distributed	fogging personnel, epidemiologist personnel according to the number of primary health care
Kompetensi		Not all personnel obtain technical or professional training	All personnel obtain technical or professional training
2. Sarana			
➤ Primary health care	➤	39	➤ 39
	➤	1	➤ 39
➤ Fogging machine	➤	Complete	➤ Complete
➤ Personal protective equipment	➤	Complete	➤ Complete
	➤	Sufficient	➤ Sufficient
➤ Epidemiological examination form	➤	IgG and IgM test	➤ IgG and IgM test
	➤	Not available in every primary health care	➤ Available in every primary health care
			➤ Available

➤ Vehicle	➤ Not available	
➤ Flashlight		
➤ Laboratorium test		
➤ Abate		
➤ PSN KIT		
3. Guidelines		
➤ UU No. 4 years 1984	Complete	Complete
➤ PP No. 40 Tahun 1991		
➤ Standard operating procedures of cases		
➤ Implementation instructions		
➤ Technical instructions		
➤ Guidelines		
4. Participation of Community		
Mosquito breeding site eradication and routine larval checking	➤ Only conducted when dengue cases occurred	Regular once a week
	➤ A lot of people who did not cooperative when routine larval checking	
5. Fund	Sufficient	Sufficient

Results of interviews and secondary data observations indicated that input of dengue prevention program in Banyumas Regency is relatively good but still need improvement in terms of personnel, regulation and community participation.

In human resources, there was a lack of staff number in primary health care. High burden of task in primary health care task identified as consequences of limited number of staff. As quoted by the following interview:

“ There were staff who handle more than one job, therefore she/he had high burden of task in daily basis” (D1)

“ Here, we could found staff who handle dengue surveillance, but she/he also had other responsibility. This could made their performance were not optimal (P6)

Based on the results of the interview, the personell competencies in Banyumas Health Office are in accordance with the Ministry of Health standards, however there were several personnel in primary health care who are not suitable.

3.2. Evaluation of Process

Evaluation of process consist of planning, organizing, implementation and monitoring of dengue prevention and control program. Result of process evaluation from indepth interview summarized in Table 3.

Table 3. Evaluation fo process variables.

Process Variables	Jawaban Pertanyaan
	Interview and observation results
Planning	Planning of program based on results of previous year's program evaluation
Organization	<ul style="list-style-type: none"> ➤ Prevention and control program were conducted by two different sections. ➤ For prevention was conducted by Public health sesction, health promotion and community empowerment, while for dengue control was conducted by prevention and control section of infectious disease
Implementation	<ul style="list-style-type: none"> ✓ Regular case report and active survaillance ✓ Prompt Epidemiological examination after case report ✓ Fogging foccus was applied based on epidemilogical investigation. ✓ Routine larvae checking was conducted when dengue cases occured. ✓ Mosquito breeding site is unregular ✓ Home visit was done only when case occurred.
Monitoring	Lack of monitoring

Based on result of interview, there was a lack of planning to manage prevention and control program in each year. There is no process of formulating the problem, setting priority issues, setting the goals, targets and targets of the performance of the puskesmas in full, based solely on the analysis of the situation. This facts supported by several informants :

“ Sometimes, we plan the program only based on previous report, still not organized well” (P1)

“We proposed prevention and control program based on previous dengue report. But still need improvement for more systematic plan (P3)

3.3. Evaluation of Output

Evaluation of output included case management, report of incidence rate, case fatality rate and vector density. Detail of output in this study are shown in Table 4.

Table 4. Evaluation of output variables

Process Variables	Interview results and observation	Standard
Case Management	100 % handled	100 %
Incidence Rate (IR)	3,35 / 100.000 inhabitant	< 40/100.000
Case Fatality Rate	1,47 %	CFR < 1 %
Vector Density	<95 %,	ABJ >95 %

Based on evaluation of output variables, case management and incidence rate were met the standard, however for case fatality rate and vector density were still unqualified the standard. Indeed, it is need improvement of prevention and control program to increase the output.

4.0 Discussion

Results of this study indicated that the input component of dengue prevention and control program (funds, methods, and time) were relatively sufficient. While program implementation such as fogging focus, larvacide, mosquito breeding site eradication and regular larvae checking were still not optimal. In addition, evaluation of program output also need a lot of improvement. The results of study highlighted the need of evaluation and feed back of dengue program for improvement program implementation. In process evaluation, we also found that there is lack of effective dengue surveillance. Based on WHO, effective dengue surveillance could detect outbreaks in order to initiate timely and effective control measures, to monitor number of severe dengue cases and deaths, to monitor the trends of incidence including temporal and geographic distribution of case, to assess and confirm possibility of outbreaks based on serological evidence and to monitor the impact of control interventions [12]. In addition, dengue prevention and control program in the area of study is still partial, not having well collaboration with other sectors. Dengue prevention and control program need to be multisectoral, multidisciplinary, and multilevel. This is required environmental, political, social, and medical inputs to be coordinated so that effective activities of one sector are not negated by the lack of commitment from another [13].

In this study, we found that program implementation such as fogging focus, larvacide, mosquito breeding site eradication and regular larvae checking were still not optimal. This could be due to lack of input and commitment for program implementation. Community participation for conducting prevention also still low. Several studies showed that community participation at the level of family, community and national level has been found effective in dengue prevention and control [14,15]. Active participation of community requires decentralization of resources, good policy and high level of coordination among all stakeholders. Lack of coordination among stakeholders may lead to ineffectiveness of program [16].

The output of dengue program in Banyumas Regency health office also still need improvement. Case management and incidence rate were met the standard, however for case fatality rate and vector density were still unqualified the standard. This could be because there was a limitation in input and drawback in process variables. It is need hard work and serious commitment from the stakeholder to improve dengue program implementation. Indeed, prevention of edengue requires involvement of all segments of society, including government, business, community organizations and home owners [17].

5.0 Conclusion and recommendation

This study suggested the need of supervision for program implementers to monitor the performance of Jumantik in conducting regular larvae checking. Result of this study also provide evaluation and feed back in each aspect of input, process and output, therefore improvemet in each aspect could be done effectively.

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Declaration

Authors declare that we have no conflict of interest

Authors contribution

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References

1. WHO (2018) Dengue and severe dengue. WHO.
2. Higa Y (2011) Dengue Vectors and their Spatial Distribution. *Tropical Medicine and Health* 39: 17-27.
3. Bhatt S, Gething PW, Brady OJ, Messina JP, Farlow AW, et al. (2013) The global distribution and burden of dengue. *Nature* 496: 504-507.
4. Brady OJ, Gething PW, Bhatt S, Messina JP, Brownstein JS, et al. (2012) Refining the Global Spatial Limits of Dengue Virus Transmission by Evidence-Based Consensus. *PLOS Neglected Tropical Diseases* 6: e1760.
5. Wijayanti SPM, Porphyre T, Chase-Topping M, Rainey SM, McFarlane M, et al. (2016) The Importance of Socio-Economic Versus Environmental Risk Factors for Reported Dengue Cases in Java, Indonesia. *PLOS Neglected Tropical Diseases* 10: e0004964.
6. Wijayanti SPM, Sunaryo S, Suprihatin S, McFarlane M, Rainey SM, et al. (2016) Dengue in Java, Indonesia: Relevance of Mosquito Indices as Risk Predictors. *PLOS Neglected Tropical Diseases* 10: e0004500.
7. Karyanti MR, Uiterwaal CSPM, Kusriastuti R, Hadinegoro SR, Rovers MM, et al. (2014) The changing incidence of Dengue Haemorrhagic Fever in Indonesia: a 45-year registry-based analysis. *BMC Infectious Diseases* 14: 412.
8. Dorsett C, Oh H, Paulemond ML, Rychtar J (2016) Optimal Repellent Usage to Combat Dengue Fever. *Bull Math Biol* 78: 916-922.
9. Cavalcanti LP, Pontes RJ, Regazzi AC, de Paula Junior FJ, Frutuoso RL, et al. (2007) [Efficacy of fish as predators of *Aedes aegypti* larvae, under laboratory conditions]. *Rev Saude Publica* 41: 638-644.
10. Rather IA, Parray HA, Lone JB, Paek WK, Lim J, et al. (2017) Prevention and Control Strategies to Counter Dengue Virus Infection. *Frontiers in cellular and infection microbiology* 7: 336-336.
11. Reyes-Castro PA, Castro-Luque L, Díaz-Caravantes R, Walker KR, Hayden MH, et al. (2017) Outdoor spatial spraying against dengue: A false sense of security among inhabitants of Hermosillo, Mexico. *PLoS neglected tropical diseases* 11: e0005611-e0005611.
12. WHO (2018) Monitoring and evaluation of programmes.
13. Harrington J, Kroeger A, Runge-Ranzinger S, O'Dempsey T (2013) Detecting and Responding to a Dengue Outbreak: Evaluation of Existing Strategies in Country Outbreak Response Planning. *Journal of Tropical Medicine* 2013: 9.

14. Kantachuessiri A (2002) Dengue hemorrhagic fever in Thai society. *Southeast Asian J Trop Med Public Health* 33: 56-62.
15. Zahir A, Ullah A, Shah M, Mussawar A (2016) Community Participation, Dengue Fever Prevention and Control Practices in Swat, Pakistan. *International journal of MCH and AIDS* 5: 39-45.
16. Tapia-Conyer R, Mendez-Galvan J, Burciaga-Zuniga P (2012) Community participation in the prevention and control of dengue: the patio limpio strategy in Mexico. *Paediatr Int Child Health* 32 Suppl 1: 10-13.
17. Eisen L, Beaty BJ, Morrison AC, Scott TW (2009) Proactive Vector Control Strategies and Improved Monitoring and Evaluation Practices for Dengue Prevention. *Journal of Medical Entomology* 46: 1245-1255.