

# Effect of Health Education on Community Participation to Eradicate *Aedes aegypti*-Breeding Sites in Buahbatu and Cinambo Districts, Bandung

## Pengaruh Pendidikan Kesehatan pada Partisipasi Masyarakat Memberantas Sarang Nyamuk *Aedes aegypti* di Kecamatan Buahbatu dan Cinambo, Bandung

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Zahratul Elsa<sup>\*</sup>, Uun Sumardi<sup>\*\*</sup>, Lia Faridah<sup>\*\*\*</sup>

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<sup>\*</sup> Faculty of Medicine, Padjadjaran University, Bandung, Indonesia, <sup>\*\*</sup> Department of Internal Disease, Faculty of Medicine, Padjadjaran University/Hasan Sadikin Public Hospital, Bandung, Indonesia, <sup>\*\*\*</sup> Department of Microbiology and Parasitology, Faculty of Medicine, Padjadjaran University, Bandung, Indonesia

### Abstract

Dengue hemorrhagic fever (DHF) is still a major public health problem in many regions in Indonesia including Bandung City. Community participation in implementing Eradication of Mosquito-Breeding Sites is still needed as it is considered the most effective method in controlling the dengue fever. This study aimed to determine the influence of health education towards community participation to eradicate mosquito-breeding sites, which was measured by knowledge level and larva index conducted in Bandung, specifically in two different locations with the highest and the lowest incidence rates of DHF. This study used quasi-experimental method. Samples were 100 people living in Cijawura and Cisaranten Wetan Subdistricts taken by using purposive sampling technique. Pre-test results showed that knowledge level of respondents in both subdistricts was significantly increasing ( $p$  value = 0.000) after health education was given. Container index (CI) and House index (HI) values in Cijawura Subdistrict were 13.2% and 26.7% respectively, then 9.6% and 28.4% respectively in Cisaranten Wetan Subdistrict. After the health education, CI value in Cijawura and Cisaranten Wetan Subdistricts significantly decreased ( $p$  value < 0.05), but HI value did not ( $p$  value > 0.05).

**Keywords:** Dengue hemorrhagic fever, health education, larva index, knowledge

### Abstrak

Penyakit demam berdarah dengue (DBD) masih menjadi masalah kesehatan utama di beberapa wilayah di Indonesia, termasuk Kota Bandung. Partisipasi masyarakat dalam melaksanakan Pemberantasan Sarang Nyamuk (PSN) sangat diperlukan karena PSN masih menjadi metode pengendalian DBD yang paling efektif. Penelitian ini bertujuan untuk mengetahui pengaruh pendidikan kesehatan terhadap partisipasi masyarakat dalam memberantas sarang nyamuk *Aedes aegypti* yang diukur dari tingkat pengetahuan dan indikator larva index yang dilakukan di Kota Bandung di dua lokasi berbeda dengan kasus DBD tertinggi dan terendah. Penelitian ini merupakan penelitian *quasi experimental*. Besar sampel sebanyak 100 orang yang tinggal di Kelurahan Cijawura dan Cisaranten Wetan diperoleh melalui teknik *purposive sampling*. Hasil *pre-test* menunjukkan bahwa tingkat pengetahuan responden di dua kelurahan tersebut meningkat secara signifikan (nilai  $p = 0,000$ ) setelah pendidikan kesehatan diberikan. Nilai *container index* (CI) dan *house index* (HI) saat sebelum tes di Kelurahan Cijawura adalah 13.2% dan 26.7% dan Kelurahan Cisaranten Wetan adalah 9.6% dan 28.4%. Setelah dilakukan penyuluhan, nilai CI di Kelurahan Cijawura maupun Cisaranten Wetan dapat menurun secara signifikan (nilai  $p < 0,05$ ) namun tidak untuk HI (nilai  $p > 0,05$ ).

**Kata Kunci :** Demam berdarah, indeks larva, pengetahuan, penyuluhan

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Correspondence: Zahratul Elsa, Faculty of Medicine, Padjadjaran University, Raya Bandung-Sumedang Street KM.21 Jatiningor Bandung Indonesia, Phone: +6222-7796575, e-mail: elszahratul@gmail.com

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### Introduction

Dengue hemorrhagic fever (DHF) is still a major public health problem in several regions in Indonesia including in Bandung City, West Java. The number of patients in Bandung City has been increasing since the last three years.<sup>1,2</sup>

Eradication of Mosquito-Breeding Sites Program as a method in controlling and preventing dengue fever is still the most effective and efficient method because eradicating mosquito larvae and limiting mosquito breeding sites can reduce its population that will lead to decreasing number of dengue fever transmission risk. The program involves all members of community and this program should be done regularly and continuously, because the community participation is the success key of this activity.<sup>3</sup>

Health education is part of community empowerment process to maintain and improve their health independently. Health education not only changes the behavior of individuals, but also communities in the health sector. Health education on an on-going basis may lead the community to actively participate in the program, because this activity is expected to increase their awareness, so that they will run the program correctly. Because of the aforementioned reasons, this study aimed to determine the effect of health education on community participation in eradicating *Aedes aegypti*-breeding sites measured by the level of knowledge and the existence of larva both inside and outside each house conducted in Bandung City. Buahbatu and Cinambo Subdistricts were selected as the study location in order to compare the level of knowledge and the existence of larvae in those two subdistricts as regions with highest and lowest dengue fever cases in Bandung City.<sup>1,2</sup>

### Method

A quasi-experimental with one group pre-test and post-test study design was used to determine the effect of health education. This study was conducted from August to November 2016 in Cijawura Subdistrict, Buahbatu District and Cisaranten Wetan Subdistrict, Cinambo Subdistrict, Bandung City. This study has been approved by the Health Research Ethics Committee, Faculty of Medicine, Padjajaran University with Registration No. 0715020119.

A purposive sampling method was used to select 100 subjects who met the inclusion criteria that were adults representing every house in the study location. This sample size was the minimum number required for larvae surveys in a region under the guidelines of the Ministry of Health of Indonesia in the “Dengue Fever Control Module”.<sup>4</sup> The exclusion criteria of this study were those who were not willing to participate in this study, member of a family that was not at home when the study was con-

ducted, and citizens who had already got pre-test but did not participate in the counseling. Of the 129 respondents in Cijawura Subdistrict and 102 respondents from Cisaranten Wetan Subdistrict, only 86 respondents and 88 respondents respectively who met the exclusion criteria.

The instruments of this study were questionnaires that had been validated, counseling books and in form of larvae survey. Before the intervention (health education) took place, pre-test was given to respondents who had received the inform consent. To obtain the knowledge level, respondents filled the questionnaire with 20 multiple choice questions. The level of knowledge was divided into three categories, namely high if the score was higher than 70, adequate if the score was between 35 to 70, and low if the score was lower than 35.<sup>5</sup>

Meanwhile, *Aedes aegypti* larvae surveys were performed in the containers that were replaced inside and outside respondents’ houses. The finding would then be presented in the table of larvae-positive containers based on the type of container and the larvae index indicators, namely container index (CI) and house index (HI) according to the Formula 1.<sup>4</sup>

Two weeks after the counseling was provided, the respondents returned to participate in the post-test by filling the questionnaire and performing larvae surveys. Marginal Homogeneity test was used to compare the level of knowledge and CI values before and after the counseling. However, to compare the value of HI, McNemar Test would be conducted.

### Results

Table 1 shows that most respondents in Cisaranten Wetan Subdistrict and Cijawura Subdistrict were housewives whose education levels were mostly elementary school, middle school and high school.

Before the counseling, as much as 83.7% of respondents in Cijawura Subdistrict had adequate knowledge and 15.3% of the respondents had high level of knowledge. After counseling, respondents who had high level of knowledge increased from 15.3% to 39.5%, while 60.5% still at the adequate level (Table 2).

The knowledge level of Cisaranten Wetan people can be seen in Table 2. Prior to the counseling, most respondents already had adequate level of knowledge, as much as 79.5% and 18.2% of the respondents had high know-

$$HI = \frac{\text{Number of houses with larvae}}{\text{Number of examined houses}} \times 100\%$$

$$CI = \frac{\text{Number of containers with larvae}}{\text{Number of examined containers}} \times 100\%$$

Formula 1

Table 1. The Demographic Characteristics of Respondents

General Characteristics	Category	Cijawura		Cisaranten Wetan		Total	
		n	%	n	%	n	%
Age	<45 years old	54	63%	58	66%	112	64.3%
	>45 years old	32	37%	30	34%	62	35.7%
Sex	Male	6	7%	10	11.4%	16	9%
	Female	80	93%	78	88.6%	158	81%
Education Level	Under elementary	0	0%	0	0%	0	0%
	Elementary school	25	29%	28	31.8%	53	30.5%
	Junior high school	25	29%	26	29.5%	51	29.3%
	Senior high school	25	29%	27	30.7%	52	29.9%
	Bachelor degree	11	13%	7	8%	18	10.3%
Occupation	Employed	12	14%	19	21.6%	31	17.8%
	Unemployed	74	86%	69	78.4%	143	82.2%

Notes:

n = Number of Sample; % = Percentage

Table 2. The Knowledge Level of Respondents

Education Level	Category	Time of Health Education	
		Before n (%)	After n (%)
Cijawura	Low	0	0
	Adequate	72 (83.7%)	52 (60.5%)
	High	14 (15.3%)	34 (39.5%)
Cisaranten Wetan	Low	2 (2.7%)	1 (1.1%)
	Adequate	70 (79.5%)	47 (53.4%)
	High	16 (18.2%)	40 (45.5%)

Notes:

n = Number of Sample; % = Percentage

ledge level. After counseling, the people with high level of knowledge increased to 45.5%, while 53.4% of the respondents were still at adequate level (Table 2).

To find out whether the counseling affected on the increasing knowledge of respondents, Marginal Homogeneity test was used and the result obtained p value = 0.000 (p value < 0.05), which means that there was a significant increase in the level of knowledge before and after the counseling in both subdistricts.

A total of 187 larvae obtained from larvae surveys before the counseling were identified and the results found 97.3% of the larvae were the *Aedes aegypti* species (Table 3). The mosquito larvae was mostly found in the tub, drum, dispenser and bucket in both Cisaranten and Cijawura Wetan Subdistricts. Before the counseling, of 86 houses in Cijawura Village, larvae was found in 23 houses. Meanwhile of 88 houses in Cisaranten Wetan Village, larvae was found in 25 houses (Table 4).

After counseling, there was a decreasing number of containers containing *Aedes* larvae. To determine whether the counseling affected on the HI rate reduction in Cijawura and Cisaranten Wetan Subdistricts, McNemar test was conducted, and the results obtained p value = 0.096 and p value = 0.200 (p value > 0.05), which presents that the counseling did not significantly

affect on the decline of HI in those two subdistricts. Furthermore, the influence of the counseling to the CI was analyzed using Marginal Homogeneity test and the results obtained p value = 0.012 and p value = 0.036 (p value < 0.05), which means that counseling significantly affect on the decrease in the number of CI.

## Discussion

The knowledge about mosquito-breeding sites control includes the knowledge about the causes of dengue fever and how it transmits; the transmission and the time of transmission; habit and life cycle of the mosquito that transmit the fever; also the practice of closing, draining, and burying including the knowledge of other controls which include using abate and putting the fish inside the containers. From the study, it is known that people living in both subdistricts with different endemicity levels had almost the same level of knowledge, while most of respondents already had adequate level of knowledge about mosquito-breeding sites control (83.7% in Cijawura and 79.5% in Cisaranten Wetan Subdistricts respectively).

After counseling, knowledge level of the respondents in both subdistricts significantly increased (p value = 0.000). These results are in accordance with study by Saleha Sungkar *et al*,<sup>5</sup> in which the knowledge of the people about the mosquito-breeding sites control in Bayah Subdistrict, Banten Province can be significantly increased after the counseling. As well as the study by Su Wei *et al*,<sup>6</sup> to Malaysian students, Bhawna pant *et al*,<sup>7</sup> to students in Meerut India, and Firawan,<sup>8</sup> to the community in Magetan, Indonesia.

According Notoatjomojo,<sup>9</sup> knowledge is the information acquired by someone after a specific sensing of objects either it is through the sense of hearing, sighting, smelling, tasting, or touching. Before the counseling was given, most respondents were already familiar with the term cleaning, covering, burying activity or well-known

**Table 3. The Existence of Larvae Based on The Containers Type Before and After Counseling**

Containers Type	Cijawura Village				Cisaranten Wetan Village			
	Pre-test		Post-test		Pre-test		Post-test	
	(+) Larvae	(-) Larvae	(+)	(-)	(+) Larvae	(-) Larvae	(+)	(-)
Tub	6	26	5	27	6	42	2	46
Drum	4	14	3	15	7	39	4	42
Crock	0	3	0	3	0	5	0	5
Bucket	18	163	6	175	12	163	6	169
Vas	0	6	1	5	0	2	0	2
Drink containers for animals	0	10	0	10	0	14	0	14
Pond	1	1	0	2	0	3	0	3
Dispenser, refrigerator and AC container	8	29	4	33	4	24	5	23
Non-water containers	0	9	0	9	0	6	0	6
Other containers	0	9	0	9	3	5	0	8
<b>Total</b>	<b>57</b>	<b>270</b>	<b>19</b>	<b>288</b>	<b>32</b>	<b>303</b>	<b>17</b>	<b>318</b>

**Table 4. Container Index and House Index Values**

Time of Health Education	Cijawura		Cisaranten Wetan	
	HI	CI	HI	CI
Before	26.7%	13.2%	28.4%	9.58%
After	18.6%	6.7%	19%	5%
p Value	0.096	0.012	0.20	0.036

Notes:  
HI= House Index; CI= Container Index

as *menguras, menutup, mengubur* (3M) activity in Indonesia. Thus even before counseling, the respondents already had a sufficient level of knowledge. Mosquito-breeding sites control program itself is not something new to the community and has been widely disseminated through various information media, such as television, radio, leaflets, and posters. Based on the study by Su Wei *et al.*,<sup>6</sup> to Malaysian students, the information about dengue fever is gained mostly from the media information, such as television, newspapers, and the internet than from the counseling. However, this one-way information delivery causes the people to only know without fully understanding how to do the 3M activity correctly. Therefore, counseling gives people the opportunity to acquire knowledge and fully understanding because the way it delivers its information uses two-directions, so residents may ask if there is any information that is not understandable when the counseling takes place.

The purpose of the counseling is not only to educate the people, but also to move the residents to carry out the advice related to their own health, in this case is to implement the program.<sup>10</sup> Knowledge is an important aspect in shaping a person's actions. Counseling is needed to enhance a person's knowledge, so it is expected that the counseling can also increase the community participation in implementing the mosquito breeding sites con-

trol program.

The effectiveness of mosquito breeding sites control activity carried out by the community can be measured by mosquito larvae surveys using these indicators, namely CI, HI, Breteau Index (BI).<sup>4</sup> The high density of larvae will increase the risk of dengue fever transmission. According to the World Health Organization (WHO), an area has a high risk of dengue fever if the value  $CI \geq 5\%$  and  $HI \geq 10\%$ .<sup>11</sup> Before the counseling, Cijawura Subdistrict's HI was 26.7% and CI was 13.2%, while in the Cisaranten Wetan Subdistrict, the HI value was 28.4% and CI was 9.58%. These conditions threaten the two subdistricts at risk of dengue transmission because both of them had CI and HI values exceeding WHO standards. Many factors can affect the high density of larvae. Based on the study by Suyasa *et al.*,<sup>12</sup> that examines the relation of environmental factors with the existence of dengue fever vector, the population density and mobility that affect on dengue fever, also the use of container and the rainwater channel. The neighboring system in the two subdistricts selected are not far from each other which facilitate the spread of mosquito because *Aedes* mosquitoes can only fly in about 200 meter. In addition, these two subdistricts have poor water conditions, so the residents must keep the clean water for daily use using containers and this is the factor that will increase the number of *Aedes aegypti* mosquito breeding.

After counseling, there was a decline in numbers of HI and CI, but not to the extent of minimum standards. Moreover, after conducting the test to determine whether the declines in both indicators were significant or not, the significant result was only in CI, meanwhile the HI number did not decrease significantly with a probability of 0.05. In the post-test or larvae survey, most of the houses which originally had many larvae contained less number of larvae. Even though larva is not completely found in all

containers, it was still found in one or two containers which caused the HI value not decrease significantly. There was also a container which originally had no larva, but after post-test, a number of larvae surprisingly was found. This indicates that the counseling service that was conducted only once could move the people to implement the eradication program, but not completely eradicate the larva inside the house.

The results obtained from this study is slightly different with the results of a study by Saleha Sungkar *et al.*<sup>5</sup> After the counseling was given to Bayah residents, both CI and HI values declined, but did not reach the minimum number of WHO standards, but both CI and HI at Bayah Village decreased even though it was insignificant (p value = 0.5 for CI and p value = 0.1 to HI).<sup>5</sup> This also occurred in a study by Ramadhani *et al.*,<sup>13</sup> in which the counseling has not been able to lower the CI and HI values to the minimum limit in Paseban Village, East Jakarta.

Based on the type of container, most larvae were found in the water containers, such as bath tub, drums and pails. Similar to the results obtained by Saleha Sungkar *et al.*,<sup>5</sup> mostly larvae were found in the tub, drum, and bucket. This also occurred to a study by Wanti and Darman,<sup>14</sup> in which most larvae found in the endemic area is in the water containers like drums and crocks. A study by Sunaryo and Pramestuti,<sup>15</sup> found that tubs and buckets as a major larva positive-containers at four subdistricts in Semarang City. In a study by Joharina,<sup>16</sup> it is argued that the tub is the key container of dengue fever vector, meaning this tub has major play as mosquito-breeding site. Finding the key container is important to determine the primary target in the vector control. Hence, the efforts such as draining and scrubbing the tub and the drum, closing the containers tightly that are parts of the eradication program become important in controlling dengue vector. In this study, there was no monitoring of larva in gutters that could be a breeding ground for *Aedes aegypti* mosquitoes, especially in the rainy season which is the limitation to this study.

Another limitation was insufficient number of sample size that should be 100 respondents for 100 houses in each subdistrict due to various constraints, such as time constraint of study, manpower and facilities, also the absence of respondents to participate in the study completely. In addition, environmental factors such as climatic factors (rainfall, temperature, humidity) and the population density can affect on the existence of larva, which is also not examined in this study.

## Conclusion

In conclusion, health education given to the community is able to improve level of knowledge and their participation to eradicate *Aedes aegypti* mosquito' breeding

sites. This can be seen from the increasing knowledge level of citizens and declining CI in Cijawura Subdistrict, Buahbatu District and Cisaranten Wetan Subdistrict, Cinambo District. However, it has not been able to significantly reduce HI value and lower the dengue vector density to the minimum limit referring to WHO standards, so the people are still likely at high risk of the dengue transmission. The health education should be conducted in a sustainable manner and using more attractive methods, for example, by showing a video or demonstration.

## Recommendation

In aim to achieve a decrease in the density and the spread of dengue vectors in the two subdistricts, the counseling should be conducted in a sustainable manner by using more attractive methods to improve knowledge and community participation. In addition, another way is by reactivating cleaning program on Fridays (*Jumat Bersih*) followed by continual survey that requires participation of residents assigned as the larvae monitor.

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