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### Evaluation of the Dengue Hemorrhagic Fever Eradication Program in Palembang

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#### ABSTRACT

**Background:** Dengue Haemorrhagic Fever (DHF) has the potential to cause Extraordinary Events (KLB), hence the government has made efforts to control DHF, one of which is through the PSN program. Evaluation is necessary to determine how the implementation of the PSN program is following the planned objectives and whether the program can control the breeding of mosquito larvae to reduce the number of dengue cases in Palembang City. **Methods:** This study utilized a qualitative method with an analytical descriptive approach. The CIPP evaluation model was used to evaluate the context, input, process, and product to determine the success of the PSN program. The information was obtained from twelve informants who were recruited by purposive sampling. **Results:** The study data was collected in the form of interviews, observations, and a document review to evaluate the dengue fever mosquito nest eradication program (PSN) in Palembang City in 2022. In general, the PSN program has gone well but is still constrained by budget. Furthermore, SOPs related to eradicating mosquito nests do not yet exist and there is a lack of community participation. **Conclusion:** It is anticipated that Palembang City Health Office can use these study findings as a basis to justify budget allocation for the mosquito nest eradication program and develop SOPs regarding the eradication of mosquito nests to facilitate the program. They could also improve coordination, participation, and community empowerment to implement a larva-free village competition and providing a reward for villages that have been declared larva-free by the Puskesmas to encourage community participation in the eradication of mosquito nests.

#### 1. Introduction

Dengue Hemorrhagic Fever (DHF) is widespread throughout Africa, America, the Eastern Mediterranean, Southeast Asia, and the Western Pacific.<sup>1</sup> In particular, Southeast Asia and the Western Pacific regions are most severely affected by the dengue virus, with cases exceeding 1.2 million in 2008 and more than 3.34 million in 2016.<sup>2</sup> In Indonesia, dengue cases in 2020 amounted to 108,303, with deaths due to DHF also decreasing from 919 in 2019 to 747 in 2020.<sup>3</sup> There is no specific treatment for this

disease, so mosquito vector control employing environmental management and modification is the main way to prevent virus transmission.

South Sumatra Province ranks 23<sup>rd</sup> in Indonesia with a DHF incidence rate of 2,359 cases, with Palembang City having the most DHF cases (435) in South Sumatra.<sup>4</sup> The three sub-districts with the highest number of dengue cases were Sukarami District with 60 cases, followed by Ilir Barat I District with 46 cases, and Seberang Ulu II District with 30 cases. Strategic efforts for DHF control include

increasing early diagnosis and adequate management of dengue cases in health facilities and health promotion for a clean and healthy lifestyle. The one house one jumantik movement in Palembang City has been implemented as part of the Mosquito Nest Eradication (*Pemberantasan Sarang Nyamuk/PSN*) program. Community participation in independent monitoring of *Aedes aegypti* mosquito larvae in households, agencies, and institutions to support community independence in preventing dengue transmission. It is hoped that the involvement of all parties and cross-sectoral commitments can be integrated to deal with DHF in Palembang.<sup>5</sup>

However, there were several obstacles to implementing the PSN program.<sup>6</sup> Counseling of the community by medical personnel is necessary for the implementation of PSN activities,<sup>6</sup> as a lack of awareness of the dangers posed by DHF will not change people's attitudes and actions to prevent DHF.<sup>7</sup> The CIPP evaluation model was developed to determine whether the PSN program is meeting its objectives,<sup>8,9</sup> and comprises four stages namely context evaluation, input evaluation, process evaluation, and product evaluation. This evaluation is necessary, not only to determine whether the PSN program is following the planned objectives, but whether the program can control the breeding of mosquito larvae to reduce the number of dengue cases in Palembang City.

## **2. Methods**

This study adopted a qualitative method with an analytical descriptive approach and used the CIPP evaluation model to evaluate the DHF PSN program in Palembang City.

The information was obtained from twelve informants who were selected by purposive sampling. The informants consisted of the Head of the Palembang City Health Office, the Head of the Disease Control and Eradication Division of the Palembang City Health Office, four Heads of the Palembang City Health Center (puskesmas Sukarami, Sukarami District, Taman Bacaan Health Center, Seberang Ulu II District, and sporadic areas, namely the Sei Health

Center). Selincih Kalidoni Subdistrict and Twenty Tiga Ilir Health Center Bukit Kecil District), two Heads of Disease Prevention and Surveillance (P3MS) at Palembang City Health Center, two Environmental Health Program Managers at Palembang City Health Center, and two jumantik cadres. The triangulation informants consisted of two staff/employees for disease control and eradication, two Palembang City Health Center staff, and two community members. Primary data were obtained from observation sheets and in-depth interviews.

The data analysis from in-depth interviews with informants were transcribed from recordings and presented descriptively and narrated in the form of a matrix. This study passed ethical review by the Health Research Ethics Commission, Faculty of Health, Universitas Sriwijaya, with number 1661/UN9.FKM/TU.KKE/2022 on March 31<sup>st</sup>, 2022.

## **3. Results**

### **PSN program context**

#### **Program target**

The in-depth interviews conducted by researchers with informants revealed that the PSN program target was the community:

“... As conducted by the community health center in our area, PSN activities are aimed toward the local community. The cadre promotes community empowerment.” (P2).

The community in the puskesmas area in Palembang City was empowered by inviting them to jointly conduct 3M activities in their environment to eradicate mosquito nests to reduce DHF incidence.

#### **Input PSN program**

##### **Human resources**

The communities received training in the form of seminars organized by the district and province. The material provided during the training was not specific to the eradication of mosquito nests but to the DHF program itself because the eradication of mosquito

nests is part of the DHF program. Regarding human resources, the interviewees stated:

“.....Program managers, the surveillance team, and the environmental health team are all participating in PSN. Additionally, there will be a breakthrough on Friday to get rid of larvae, which is typically shared using Whatsapp, saving us from having to walk into the field. There is training, but it is more focused on the DHF program that was run at the Palembang City Health Office.” (S1).

### **Facilities and infrastructure**

In-depth interviews with informants at the Sukarami Health Center revealed that epidemiological investigations (PE) already have an SOP that regulates what facilities and infrastructure are required to support these activities, such as stationery, flashlights, PE forms, and abatements. The availability of facilities and infrastructure at the Taman Bacaan Health Center already exists but there are still several items that are not yet available such as k abate and a set of bags containing PE tools:

“.....The program director also manages infrastructure, including leaflets for counseling, flashlights, stationery, and protective clothing like safety suits. Larvicide (Abate) powder is one of the sufficient materials. Free Abate powder was given to each home that was inspected.” (S1).

These puskesmas already have the required facilities and infrastructure including ambulances, dengue fever manuals, dengue management books, implementation manuals, jumantik technical manuals, flashlights, PPE, abate, and ATK. Lab facilities and infrastructure include microscopes, Sahli hemometers, HB pipettes, erythrocyte pipettes, leukocyte pipettes, counseling facilities, and infrastructures such as DHF leaflets, DHF flipcharts, and DHF posters.

## **Process program PSN**

### **Nest eradication**

Larvae eradication involves the monitoring and eradication of locations that have the potential to be breeding grounds for mosquito larvae in the working area of the puskesmas. Furthermore, those involved in eradicating mosquito nests are the community, jumantik cadres, and puskesmas. The process of eradicating larvae includes 3M plus activities such as closing, burying, and draining locations that have the potential for breeding mosquito nests. The obstacles faced by the puskesmas during the process of eradicating mosquito nests were the lack of community participation and awareness:

“.....The community, health professionals, and larvae monitoring officers are the parties involved. As part of their efforts, they visit water reservoirs to support the 3M Plus initiative. Lack of public awareness is the challenge.” (P1).

The interviews also revealed that for now there were no sanctions for people who do not carry out mosquito nest eradication activities at both the village and governmental levels. Thus, the community is less able to independently eradicate mosquito larvae in their area:

“.....If we choose not to take part, there are no penalties. But as cadres, we constantly advise the people to maintain a clean environment so that dengue-carrying mosquitoes cannot nest there.” (J1).

### **Health counseling**

The health counseling activities were conducted by puskesmas and the material provided was in the form of dengue disease prevention, 3M Plus activities, and eradication of mosquito nests. Health counseling activities were performed simultaneously with PE activities, while the obstacles experienced in this process were gathering the community and community participation:

“.....We (the community health center) provide health education along with PSN and DHF presentations that will eventually be shared with the public. The challenge currently is bringing the community members attending this activity.” (P4).

Every time a DHF case report was received by the community health center, the program manager visited the patient's house to carry out PE and PSN activities, as well as provide the residents with health education. Health counseling is provided when the DHF program manager finishes conducting PE activities, by providing leaflets and education on how to control DHF.

### **Product program PSN**

#### **Coverage of inspected houses (minimum 80%)**

Successful program implementation was indicated by the percentage of the houses inspected, which in this case, had not reached 100%:

“.....Because there are still occurrences of dengue fever, the program's goals have not yet been accomplished. The criteria for success can be seen in the rising percentage of larva-free days and the reducing percentage of DHF days. While less than 80% of homes are now being assessed, the current success is a reduction in dengue cases.” (P2).

## **4. Discussion**

The mosquito nest eradication program targets the communities and empowers them through the one house one jumantik movement<sup>10</sup> to undertake activities to reduce the incidence of DHF and increase the health status of the community.<sup>10</sup> The present study results were in line with Winardi's research (2016) which states that the target of the mosquito nest eradication program is the community through the 3M plus movement.<sup>11</sup> Faizah's research (2018) also states that the community is the target of the mosquito nest eradication program by empowering them to help launch the program.<sup>6</sup> The target of the mosquito nest eradication program is the community by empowering

through 3M plus activities to help reduce mosquito breeding places to reduce the incidence of dengue cases.

A well-run and successful program will depend on human resources.<sup>12</sup> The human resources involved in the mosquito nest eradication program at the four puskesmas in Palembang City include the DHF program manager, the health program manager, and the surveillance program manager assisted by jumantik cadres and the community. These DHF program managers have an average educational background in bachelor of nursing, with a cross-sectoral team, namely the health program manager and the surveillance program manager having an undergraduate education background in public health.

The health workers, both at the district and puskesmas levels, should have a minimum educational qualification of diploma in the health sector.<sup>10</sup> The health workers as communicators must provide clear information to the community to increase their knowledge and awareness to change their attitudes and behavior.<sup>10</sup> Based on research by Wilujeng (2016), those involved in the implementation of the mosquito nest eradication program are program managers assisted by health cadres.<sup>13</sup> In line with research conducted by Anita (2015), the DHF program manager at the puskesmas is assisted by jumantik cadres.<sup>14</sup> The health workers as facilitators must provide facilities, increase awareness and encourage community participation to support mosquito nest eradication activities for successful program implementation.

Facilities and infrastructure are the most important aspect of the implementation of the mosquito nest eradication program.<sup>10</sup> The availability of facilities and infrastructure can affect the success rate of the mosquito nest eradication program. The procurement of facilities and infrastructure to support mosquito nest eradication activities includes vests, briefcases, stationery, flashlights, plastic for larvae, and abate powder.<sup>10</sup>

In terms of quantity, the available facilities and infrastructure are following the DHF control module. These puskesmas should make an SOP specifically regarding the eradication of mosquito nests to facilitate program managers in conducting these activities. This was in line with Faizah (2018) in terms of the quantity of the facilities used following the DHF guidelines, but the quality is still poor, especially in PSN.<sup>6</sup> Each DHF program has supporting facilities and each activity must have an SOP which is a standard activity that must be performed sequentially to complete a job and if adhered to, it will bring consequences, such as smooth coordination, no overlapping, and the creation of a harmonious working relationship.

Prevention of dengue fever is highly dependent on vector control. Eradicating mosquito nests prevents mosquitoes from breeding and can be performed by draining the bathtub, closing water reservoirs, cleaning the yard, closing holes in trees, and cleaning stagnant water on the house roof.<sup>15</sup> Larvae eradication involves visiting people's homes and monitoring potential breeding locations.<sup>10</sup>

In line with the Director General of P2PL (2016) regarding the technical instructions for implementing PSN 3M plus with the one house one jumantik movement, the jumantik coordinator visits houses/buildings selected based on available data to talk about dengue disease, modes of transmission and prevention. Activities include checking places that have the potential to breed mosquitoes, such as flower vases, bird drinking containers, plastic bottle cans, tires, and used drums.<sup>10</sup> According to Amroni (2018), the obstacle to mosquito nest eradication activities is community participation as many people are too busy working.<sup>16</sup>

Health counseling increases community knowledge and awareness of DHF and can be conducted in dasawisma groups, social gatherings, meetings between RT/RW residents, and religious meetings.<sup>10</sup> At the Sukarami Health Center, Taman Bacaan Health Center, 23 Ilir Health Center, and Sei Selincah Health Center, health counseling was performed by the DHF

program manager assisted by the health program manager, surveillance, and health promotion program. Informal health counseling is provided in homes, RT/RW meetings, and in conjunction with epidemiological investigations and the eradication of mosquito nests.<sup>17</sup> The materials provide information about the prevention of dengue disease, 3M Plus activities, and eradication of mosquito larvae. The barrier to health education was community participation.

Technical instructions for implementing PSN 3M plus through the one house one jumantik movement, can be carried out in dasawisma groups, social gathering meetings, and meetings in the religious field.<sup>10</sup> The material presented is in the form of the importance of controlling DHF and how to prevent it. According to Wilujeng's research (2016), the most important step to eradicating mosquito nests is to provide intensive community health education.<sup>13</sup> Counseling must be performed continuously to encourage people to be more aware of the dangers of dengue and the importance of eradicating mosquito nests.

Product is a result that aims to measure, and assess program achievements, collect assessment descriptions of outputs and connect them all objectively to interpret the feasibility of a program.<sup>12</sup> In the case of mosquito nest eradication activities, this is the percentage of houses inspected.<sup>10</sup> Hence, the mosquito nest eradication program has not been achieved because there are still several dengue fever occurrences in the working area of the puskesmas, as well as the lack of community participation. The Sukarami Health Center, the Taman Bacaan Health Center, 23 Ilir Health Center, and Sei Selincah Health Center have not met the target of 80%. The obstacles such as wide work area coverage and not enough available DHF program managers hamper checking larvae in people's homes. Therefore, empowering cadres and the community can support in-house inspections, with incentives to participate because they work and earn money.

According to Amroni (2018), home inspections should be conducted periodically for 3 months<sup>16</sup> by the puskesmas assisted by cadres and residents to monitor potential mosquito breeding grounds. In line with Wilujeng's research (2018), which states that unchecked houses will increase mosquito larvae, this will also lead to the increased incidence of dengue fever.<sup>13</sup> The percentage of houses inspected should be at least 80%.

## 5. Conclusion

To date, the PSN in Palembang City has gone well but is constrained by budget, SOPs related to eradicating mosquito nests, and lack of community participation. The context component is the community through the empowerment of the 3M Plus movement. The two input components are human resources and infrastructure. The process components are larvae eradication and health education. The product component is the coverage of the houses inspected, which is less than 80% due to the large working area of the puskesmas and the lack of community participation.

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