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Article

Study on the Implementation of the Dengue Hemorrhagic Fever Vector Control Program in the Working Area of the Pare Health Center Kediri Regency

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Abstract

The main problem in controlling *dengue* in Pare District is the inconsistent and inconsistent implementation of the Mosquito Nest Eradication program and the lack of comprehensive counseling to the community. In addition, monitoring of larvae that do not meet standards also contributes to the increase in *dengue* cases. The purpose of the study is to examine the implementation of the *dengue* control program in the Working Area of the Pare Health Center, Kediri Regency. The type of research is qualitative descriptive. The location of the research was carried out in the Working Area of the Pare Health Center, Kediri Regency. The research informants were divided into two, namely key informants and supporting informants with a total of 22 informants. Sampling was carried out using purposive sampling. The data collection technique uses interviews and observations. The data obtained were analyzed descriptively. The results of the research are the *Dengue* Vector Control Program at the Pare Health Center including Standard Operational Procedure, counseling, control of physical, biological, chemical, and integrated methods in the good category. Meanwhile, efforts to report and evaluate *dengue* vector control are in the category of lacking. The conclusion of the study shows that efforts to control *dengue* vectors in the Working Area of the Pare Health Center are still not optimal and need to be improved, both in terms of the implementation of various control methods, compliance with SOPs, and a better evaluation system. Suggestions for the Pare Health Center to increase preparedness for epidemiological investigations, counseling, periodic Mosquito Nest Eradication, as well as the implementation and socialization of the household mosquito breeding ground eradication program. Periodic evaluations such as efficacy and resistance tests need to be carried out.

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Intruduction

Vector and zoonotic infectious diseases, such as malaria, *dengue* fever, filariasis, chikungunya, Japanese encephalitis, rabies, leptospirosis, bubonic plague, and schistosomiasis, remain a public health problem in Indonesia. These diseases are characterized by high rates of illness and mortality as well as the potential for extraordinary events that can have an impact on the economic losses of the

community[1]. *Dengue* Hemorrhagic Fever (DHF) is an acute infection caused by the *dengue* virus, characterized by fever, signs of bleeding, thrombocytopenia, and increased blood concentrations that can lead to plasma leakage[2].

Pare District, Kediri Regency, is an endemic area for *dengue* fever with an increasing trend of cases from 2020 to 2022. In 2020, 22 cases of *dengue* were recorded, increasing to 31 cases in 2021, and 45 cases in 2022[3]. At the district level, the total cases of *dengue* were 338 cases with 9 deaths in 2020, 274 cases with 3 deaths in 2021, and 365 cases with 4 deaths in 2022. In East Java Province, *dengue* cases were recorded at 8,567 cases in 2020, decreasing to 6,760 cases in 2021, but increasing to 13,236 cases in 2022. In Indonesia, *dengue* cases in 2020 reached 108,303 cases with 747 deaths, decreased to 73,518 cases with 705 deaths in 2021, but increased to 143,266 cases with 1,237 deaths in 2022[4].

The implementation of the *dengue* vector control program at the Pare Health Center follows the Circular Letter and Instruction of the Regent of Kediri regarding the Implementation of Mosquito Nest Eradication in a simultaneous, quality, and sustainable manner. Efforts include Mosquito Nest Eradication, Periodic Larval Monitoring, Epidemiological Investigation, and the One House One Jumantik program. Monitoring and coaching for the Operational Working Group Mosquito Nest Eradication *Dengue* is carried out to form a working network in efforts to overcome *dengue* at the lower level. Jumantik cadres are also given counseling every year regarding *dengue* vector control activities. Recent research shows that *dengue* vector control can be done well through increased information and counseling to the community involving cross-sectors of the local government and health center staff[5]. The implementation of regulary larva monitoring that does not meet the standards can be a factor in the increase in *dengue* vectors. The one house, one jumantik movement program has an effect on the larvae-free rate and the number of *dengue* cases[6].

The main problem in the implementation of the *dengue* vector control program in the Pare Health Center Working Area is the high incidence of *dengue* which has not been significantly suppressed. Although the control program has been implemented, challenges in terms of limited resources, suboptimal community participation, and ineffective coordination between institutions are still the main obstacles. This situation demonstrates the need for a thorough evaluation of the effectiveness of existing programs and the identification of new, more innovative strategies to address these issues. Although there are various programs and approaches in controlling *dengue*, implementation in the field is often inconsistent and ineffective. In addition, counseling activities are closely related to the improvement of community knowledge, expertise, attitudes, and behaviors. A low level of knowledge can reduce a person's motivation to engage in prevention efforts. In this case, jumantik cadres can be a good medium for counseling, but information does not always reach the entire population[7].

Some studies emphasize the technical aspects of vector control, such as the use of insecticides and fumigation techniques, but pay less attention to the social and cultural aspects that affect community participation in vector control programs. Studies in the Philippines show that social and cultural factors play an important role in determining the success of the vector control program[8]. This study aims to fill this gap by examining the implementation of the *dengue* vector control program at the Pare Health Center, Kediri Regency, and providing recommendations for more effective and sustainable program improvements.

Materials and Method

Research subject. The subjects of this study are those who meet one of the following criteria, someone who is involved in the implementation of the *dengue* vector control program in the Work Area of the Pare Health Center, someone who has enough information about the *dengue* vector control program in the Work Area of the Pare Health Center through counseling activities, someone who has been targeted in the implementation of the *dengue* vector control program in the Work Area of the Pare Health Center.

The subjects in this study are health workers and the community in the working area of the Pare Health Center, Kediri Regency. Health workers include *dengue* disease control program holders and health promotion personnel. The community that is the subject of the study includes health cadres and people who have suffered from *dengue* in 2024.

Research design. This research is a type of qualitative descriptive research, which is a type of research that produces discoveries that are not obtained using statistical procedures.

Instruments. The research instruments used in this study to obtain data are questionnaires and observations. The assessment criteria in this study use the Guttman scale. The questionnaire has been tested for validity and reliability. The validity test results obtained are R results > R table (0.514). The reliability test result of the Cronback Alpha constant value is 0.976. Assessments are given with a score of 1 for correct answers and 0 for incorrect answers. The category used is good if $x > (\frac{2n}{3})$, and less if $x \leq (\frac{2n}{3})$, where x = assessment score and n = total number of questions.

Method of collecting data. The data collection used is interviews and observations. The interview was conducted by asking oral questions to the resource persons regarding the implementation of the *dengue* vector control program in the Working Area of the Pare Health Center. Direct observation related to the implementation of the *dengue* vector control program in the Working Area of the Pare Health Center

Data analysis. The data that has been collected is analyzed by data. The analysis is carried out descriptively, namely with data describing actual facts about the object being researched and presented in the form of a narrative to facilitate reading.

Research Ethics. This research has been declared ethically feasible according to 7 (seven) WHO 2011 standards published by the Health Research Ethics Commission of the Health Polytechnic of the Ministry of Health Surabaya.

Results

Data on the standard operational procedures for controlling *dengue* vectors in the 2024 Pare Health Center Work Area can be seen in the following table 1:

Table 1

Results Of Interviews and Observations of Informants Related to *Dengue* Vector Control

Variable	Criterion	Interview		Observation	
		Number of People	Percentage	Number of People	Percentage
Standard Operating Procedures	Good	21	95	-	-
	Low	1	5	-	-
	Total	**22**	**100**	**-**	**-**
Educations	Good	12	59	4	40
	Low	10	41	6	60
	Total	**22**	**100**	**10**	**100**
Physical/mechanical	Good	12	55	4	40
	Low	10	45	6	60
	Total	**22**	**100**	**10**	**100**
Biology	Good	13	59	7	70
	Low	9	41	3	30
	Total	**22**	**100**	**10**	**100**
Chemical	Good	22	100	8	80
	Low	0	0	2	20

	Total	**22**	**100**	**10**	**100**
Integrated	Good	21	95	6	60
	Low	1	5	4	40
	Total	**22**	**100**	**10**	**100**
Reporting and Evaluation System	Good	0	0	-	-
	Low	22	100	-	-
	Total	**22**	**100**	**-**	**-**

Based on table 1, the results of interviews related to standard operating procedures for controlling DHF vectors at the Pare Health Center in 2024 showed 95% with good criteria. The results of interviews related to *dengue* vector control through counseling at the Pare Health Center, Kediri Regency in 2024 showed good with a percentage of 59%. The results of observations related to *dengue* vector control through counseling at the Pare Health Center, Kediri Regency in 2024 showed less with a percentage of 60%. The results of interviews related to physical/mechanical control of DHF vectors at the Pare Health Center in Kediri District in 2024 showed good with a percentage of 55%. The results of observations related to physical/mechanical control of DHF vectors at the Pare Health Center in Kediri District in 2024 showed good with a percentage of 40%. The results of interviews related to biological *dengue* vector control at the Pare Health Center in Kediri District in 2024 showed good with a percentage of 59%. The results of observations related to biological *dengue* vector control at the Pare Health Center, Kediri Regency in 2024 showed good with a percentage of 70%. The results of interviews related to chemical control of DHF vectors at the Pare Health Center, Kediri Regency in 2024 showed 100% good category. The results of observations related to chemical *dengue* vector control at the Pare Health Center in Kediri District in 2024 showed 80% good. The results of interviews related to integrated *dengue* vector control at the Pare Health Center in Kediri District in 2024 showed 95% good. The results of observations related to integrated *dengue* vector control at the Pare Health Center in Kediri District in 2024 showed 60% good category. The results of interviews related to the reporting system and evaluation of the results of *dengue* vector control at the Pare Health Center in Kediri District in 2024 showed a 100% lacking category.

Discussion

The Pare Health Center implements Standard Operating Procedures (SOP) for *dengue* vector control with a result of 95% with good criteria and 5% with poor criteria. The shortcomings are mainly in epidemiological investigations and larval examinations in schools. This SOP is important to improve the performance of the institution, as implemented in the regional technical implementation unit Harapan Raya Health Center based on the guidelines of the Ministry of Health of the Republic of Indonesia in 2015, although it has not been fully implemented[9].

The implementation of epidemiological investigations at the Pare Health Center has not been completely good, often not carried out within 24 hours of receiving a case report, which is contrary to national guidelines in 2017. The main obstacles include delays in reporting from health facilities and the limited number of health workers as well as the dual duties of officers. According to research, *dengue* cases are often recorded in hospitals first, causing delays in epidemiological investigations[10].

The implementation of larval surveys in schools, especially if the sufferers are students, is also not optimal. Schools are vulnerable places for *dengue* transmission if they are not supervised and eradicated from mosquito nests[11]. Several schools in the Pare Health Center work area have carried out periodic larval monitoring with the participation of teachers and students. According to other studies, without epidemiological investigations in schools and workplaces, *dengue* virus transmission

could increase. Without epidemiological investigations in schools and workplaces, *dengue* virus transmission could increase[9]. Related research shows that rapid case reporting and timely epidemiological investigation are essential in controlling the spread of *dengue*. A study in Thailand found that a quick response within 24 hours of a reported case can reduce the incidence of *dengue* by up to 40%[12]. In Vietnam, a periodic larval monitoring program in schools involving students and teachers has significantly reduced the incidence of dengue fever[13].

To improve this activity, the Pare Health Center needs to increase public awareness to immediately report dengue cases, carry out epidemiological investigations in schools, and increase cross-sector collaboration between education, health, and the local community. Education and awareness raising for students and teachers are very important to support efforts to eradicate mosquito nests.

The implementation of the dengue vector control program at the Pare Health Center through counseling showed good results of 59% of interviews and 40% of observations of families with dengue during the last three months of 2024. Although counseling is claimed to be routinely carried out by jumantik cadres during family empowerment and welfare organization associations and recitation events, some informants stated that they had never received counseling about dengue.

Health counseling has proven to be effective in increasing public awareness and understanding of dengue prevention. Based on research[14], health counseling increases dengue prevention measures by 92%. Counseling carried out before the transmission season and involving the community as the subject of self-prevention is very important[15]. However, counseling at the Pare Health Center has not been properly conveyed to the community. The inactivity of health workers and jumantic cadres as well as public indifference to the dangers of dengue are the main obstacles. Limited resources such as funds, trained personnel, and infrastructure facilities also cause limited scope and intensity of counseling.

The control of dengue vectors in the Pare Health Center through Mosquito Nest Eradication cover, bury and recycle Plus activities based on interviews showed good results of 55%, but observations showed that 45% of the activities had not been implemented. Mosquito Nest Eradication cover, bury and recycle Plus, which includes cleaning bathtubs, closing water reservoirs, and recycling used goods, is considered effective in preventing dengue if carried out simultaneously and continuously[2]. However, observations show that the elderly tend not to implement cover, bury and recycle. Clean water is often stored in unsealed containers, becoming a breeding ground for *Aedes aegypti* mosquitoes. Cadres and health center officers provide education and larvicide to help this community. Unfortunately, recycling activities for used goods are still low, and many people do not know the " one house one cadres for mosquito breeding ground eradication movement".

Basic Health Research in 2023 states that the proportion of Mosquito Nest Eradication efforts on a household scale in East Java province is 18.2-72.5%. The Mosquito Nest Eradication efforts include larvacide activities, the installation of mosquito nets, and cover, bury and recycle efforts[16]. The lack of implementation of Mosquito Nest Eradication cover, bury and recycle Plus, especially in recycling used goods, increases the risk of dengue by up to 2.7 times[14]. Community participation in the examination and eradication of mosquito larvae is also not optimal. Age factors, low awareness, and limited resources are the main obstacles. Mosquito Nest Eradication cover, bury and recycle Plus activities, which should be carried out every week, are only carried out once a month, contrary to the standards set[17]. The active participation of the community in Mosquito Nest Eradication cover, bury and recycle Plus is very important. However, busyness, low awareness, and economic factors are often obstacles. The implementation of routine Mosquito Nest Eradication requires considerable human, financial, and logistical resources, which may not be available at the Pare Health Center. The one House one cadres for mosquito breeding ground eradication movement in the working area of Community Health Centre Pare, Kediri district, is still not achieving optimal effectiveness. Although the program has been implemented in several communities and is known by cadres and health workers, many people are not

familiar with the term. The main principle of the program is that each family has one member who is responsible for implementing the Mosquito Nest Eradication cover, bury and recycle Plus activities, maintaining environmental cleanliness, and recording the results of *Aedes* mosquito larvae monitoring in the Jentik Card. Kawua Village, Poso District implemented an intervention in order to overcome problems that occurred in the implementation of one house one jumantik program in the community. Interventions were carried out through one house one jumantik program socialization activities, mentoring through cross-sectors. Intervention efforts were carried out to increase community knowledge about DHF, one house one jumantik activities including mosquito nest eradication through cover, bury and recycle plus and the task of house jumantik. The intervention efforts implemented were proven to significantly increase knowledge and change community attitudes regarding the implementation of one house one jumantik[18]. Implementing the Mosquito Nest Eradication program once a week requires considerable human, financial, and logistical resources. It is suspected that the Pare Health Center Working Area does not have sufficient resources to carry out routine Mosquito Nest Eradication activities. The level of public health priorities can change depending on epidemiological conditions and the local situation. There is an urgent need to deal with other diseases or other urgent conditions that require resources that are usually allocated for the Mosquito Nest Eradication cover, bury and recycle Plus. The success of the Mosquito Nest Eradication cover, bury and recycle Plus program is also closely related to active community participation. The condition of each community is not always able to actively participate every week in Mosquito Nest Eradication activities due to several factors such as busyness, lack of awareness, or economic factors.

The dengue vector control program using biological methods at Puskesmas Pare showed good results at 59% based on interviews and 70% based on observations, with 30% of activities not yet implemented. Observations and interviews were conducted with families of DHF patients during the last three months of 2024.

Biological control methods use biological agents such as predators, parasites, and bacteria to suppress the mosquito populations of *Aedes aegypti* and *Aedes albopictus* mosquitoes in the pre-adult stage (eggs, larvae, and pupa). Research shows that betta fish (Betta splendens) are effective in significantly reducing the number of mosquito larvae, with larvae-eating fish considered the easiest and cheapest to apply[19]. However, 30% of the informants have not used biological methods for dengue vector control. Some of the reasons are a lack of knowledge about the effectiveness of biological methods, a preference for fogging methods that only kill adult mosquitoes, and concerns about the negative impact of keeping larvae predatory fish in waters used for hygienic purposes. Research Harsono[20] states that the use of larval predatory fish still requires facilities and guidance from the government and related sectors. Indonesian people are not yet independent in protecting themselves from dengue fever and still need counseling support.

The dengue vector control program with chemical methods at the Pare Health Center showed good results based on interviews (100%) and observations (80%) carried out on families with dengue during the last three months of 2024. Dengue vector control using chemical methods was carried out at the pre-adult and adult stages. Pre-adult control is carried out by larvacide, given to homes that are positive for larvae and homes of elderly people who have difficulty doing cover, bury and recycle. Education about abate doses was carried out by health workers with jumantik cadres.

Control in adult mosquitoes is carried out by fogging to avoid extraordinary incident. Fogging at the Pare Health Center is carried out within a radius of 200 meters from the patient's house, in the morning, and according to the prescribed insecticide dose. Before fogging, counseling to the public is carried out to inform the procedures that must be followed, such as closing doors and windows for 60 minutes after fogging. In addition to the implementation of counseling before fogging, Mosquito Nest Eradication activities need to be carried out beforehand. Fogging only kills adult mosquitoes that are

directly exposed to the insecticide, while eggs, larvae, and pupae remain unaffected. Therefore, the mosquito population will quickly recover in a short time if the breeding grounds are not eradicated. Research by Esu, et al., [21] shows that fogging without mosquito nest control does not have a significant impact in the long term on the reduction of dengue cases. In addition, repeated fogging can result in insecticide resistance in mosquitoes, as reported by Marcombe, et al.,[22]. To improve the effectiveness of dengue control, it is important to combine fogging with a comprehensive mosquito nest eradication program. Public education about the importance of mosquito nest eradication and effective practices must continue to be carried out. Governments and health workers need to ensure that every household has the awareness and skills to reduce mosquito breeding grounds in their environment.

Repeated fogging twice in a span of one week is not done. The Pare Health Center combines other control methods such as mosquito nest eradication, cover, bury and recycle, the use of mosquito nets, and fishing. Chemical methods using insecticides are popular in the community[2]. Research Sumaneli, et al., [23] stated that the inconsistency in the implementation of focus fogging was due to the delay in case reporting and lack of government supervision, causing an increase in dengue cases. Coordination with relevant sectors needs to be improved to address focus fogging delays.

The integrated dengue vector control program at the Pare Health Center showed good results based on interviews (95%) and observations (60%) in families with dengue during the last three months of 2024. The control of dengue vectors in the working area of the Pare Health Center combines physical, biological, and chemical methods. However, there are still people who have not implemented biological methods such as raising fish in water reservoirs or using household insecticides.

Integrated vector control involves cross-sectors such as education and religious fields. Mosquito nest eradication (Mosquito Nest Eradication) activities are carried out in schools by involving health workers, jumantik cadres, and local governments. However, not all people participate in the cross-sector mosquito nest eradication effectively. The issuance of Regional Regulations on dengue control can increase the success of integrated control[24]. Integrated control activities at the Pare Health Center involve environmental health workers, health promotion, and village midwives. Education on dengue control is carried out in posyandu and mosquito nest eradication activities, adjusting to the socio-cultural conditions of the community and local vector behavior. Dengue control requires cooperation across programs, related sectors, and community participation[2]. Successful dengue control requires multisectoral roles, support, and commitment[15]. Socialization of programs such as one house one jumantik movement can increase public knowledge and awareness[25].

The reporting and evaluation system of dengue vector control results at the Pare Health Center showed poor results based on interviews (100%). Vector density evaluation is carried out routinely by reporting larval density after mosquito nest eradication once a month. Each citizens association reports its vector density with a Larvae-Free Number. Monitoring of vector density involves health center officers and jumantik cadres, with cross-program roles such as health promotion workers and village midwives. The community also has a responsibility in monitoring vectors in their respective environments.

The disadvantage in this system is the lack of monitoring and evaluation of the use of insecticides. Monitoring of insecticide doses and types is not routinely carried out at least once a year, and efficacy evaluation and resistance tests to vectors are not carried out periodically as recommended. Widely and continuously applied insecticides and improper doses can increase the population of resistant *Aedes aegypty* mosquitoes[26]. Continuous use of insecticides for a long time can cause the number of susceptible insects to decrease, leaving only resistant or resistant insects. Immune insects will mate with other insects, producing offspring that are also resistant[27]. In addition to having an impact on the susceptibility of vectors, the use of pesticides that do not use accurate dosing methods can cause damage. The toxic and cumulative properties of pesticide compounds have the potential to pollute the

environment[28]. The importance of this evaluation is to avoid the resistance of *Aedes aegypti* mosquitoes to insecticides and reduce negative impacts on the environment.

Conclusions

Research related to the implementation of the dengue vector control program in the Pare Puskesmas Working Area showed several important findings. First, the Standard Operating Procedure for conducting epidemiological investigations has not been effective according to the 2017 Dengue Fever Prevention and Control Guidebook in Indonesia. Second, counseling methods through community organizations such as family empowerment and welfare organization and recitation have not been effective. Third, dengue vector control using physical/mechanical methods such as cover, bury and recycle and mosquito nest eradication Plus have not been fully implemented by the entire community, showing that the level of responsibility and awareness has not been maximized. Fourth, the use of biological methods in the form of larval predators has not been effectively implemented. Fifth, the implementation of two-cycle fogging is not in accordance with national guidelines. Finally, an evaluation system that includes the suitability of insecticide doses, efficacy tests, and resistance tests has not been implemented.

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Informed Consent Statemen
Informed consent was obtained from all subject involved in the study.

Conflicts of Interest
The authors declare no conflict of interest.

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