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Positive Deviance Approach; an Efforts to Reduce the Incidence of Dengue Hemorrhagic Fever (DHF) in Pangkep Regency

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Abstract: This study aimed to determine the effect of positive deviance approach on reducing the incidence of Dengue Hemorrhagic Fever (DHF) in Pangkep Regency. This studi used mix-method design to identify positive deviance behavior in preventing DHF and intervene by applying the positive deviance to the community in Pangkep Regency. The number of samples for quantitative data was 126 respondents and qualitative data was 12 informants. Data collection was conducted through Focus Group Discussion (FGD) and interviews. The research data were analyzed using logistic regression test and McNemar tests. The results showed the most influential factor in DHF incidence was positive deviance. Positive deviance behavior to prevent DHF were used long-sleeved clothing, use oil, and planting medicinal plants in the yard. The results of the intervention showed there was a significant influence of intervention using a positive deviance approach to increasing the planting of medicinal plants in the yard to prevent DHF, and there was a decrease in the incidence rate of DHF in Pangkep Regency. Positive deviance approach could be used as an effort to prevent and control DHF.

Keywords: DHF; Behavior; Positive Deviance; Prevention

1. INTRODUCTION

Tropical diseases are still a public health issue. Global warming and temperature changes lead to increasing incidence of tropical diseases, such as Dengue Hemorrhagic Fever (DHF), malaria, and tuberculosis. [1,2,3,4] In the recent decades, the number of cases and areas infected of DHF tended to increase and widespread. About half of the world's population is now at risk of being infected with the dengue virus. There are an estimated 100-400 million dengue

infections each year. Nearly 75% of the global population exposed to DHF is in the Asia-Pacific region. [5]

DHF is caused by dengue virus infection that are transmitted through mosquito bites of the genus Aedes in especially Aedes aegypti or Aedes albopictus. [6] Incidence of DHF is influenced by ecological factors such as rainfall, temperature, and humidity.[7] Detection and mapping of serotypes in an area can be a strategy to monitoring of dengue virus transmission. [8]

Pangkajene Regency is one of the dengue endemic areas in South Sulawesi. The highest incidence rate (IR) of DHF disease in South Sulawesi in 2019 was Pangkep Regency which is 153.49 per 100000 population, this number tends to increase from previous years. Pangkajene District is the area with the highest IR in Pangkep Regency. [9] This fact is interesting to study to examine the factors that might contribute to the increase of DHF incidence rate.

Many efforts have been made by various parties to control DHF. However, so far it has not succeeded in solving the problem of DHF. Behavior is the biggest factor affecting a person's health, including incidence of DHF. Therefore, it is necessary to carry out the right strategy to reduce the incidence of DHF, one of them is by using a positive deviance approach that focuses on the behavior of the local community.
Some research results related to the prevention of DHF show that factors can prevent a person from being bitten by Aedes aegypti mosquito are using long-sleeved clothing, using repellent, using mosquito nets while sleeping, the installation of mosquito gauze on ventilation holes and windows, and planting mosquito repellent plants such as citronella and lavender.[10,11,12,13,14]

Based on the background description, the researchers are interested in studying the effect of a positive deviance approach on the incidence of DHF in Pangkajene District, Pangkep Regency.

2. METHODS

Research Location and Design

The research site is located in Jagong Village and Mappasaile Village, Pangkajene District, Pangkajene and Kepulauan Regency, South Sulawesi Province. The research was conducted from June to September
2020. This analytical research uses a mix-method research design with concurrent embedded type. Mappasaile Village. The sampling technique for quantitative data of 126 respondents and qualitative data of 12 informants using purposive sampling. The informants in this study were the DHF Manager of Pangkep District Health Office, the Head of Pangkajene City Health Center, the DHF Manager of Pangkajene City Health Center, the Head and Secretary of Jagong Village and Mappasaile Village, the posyandu cadres, the members of community empowerment institution and public figures in Pangkajene District.

Data Collection

This study used primary and secondary data. Primary data collection of research conducted through interviews and Focus Group Discussion (FGD). Secondary data in the form of DHF incidence data in the Pangkep Regency from 2017 to 2020 were obtained from the Pangkep District Health Office. The stages of this research were determining the most influential factors in DHF incidence, then identifying positive deviance in preventing DHF, then

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intervening by applying one of the positive deviance behaviors that have been identified through FGD, and the final stage is monitoring the results of the intervention.

Data Analysis

Bivariate analysis used chi-square test to determine the relationship of positive deviance and sociodemographic factors (gender, age, and education level) with the incidence of DHF. Multivariate analysis used logistic regression to determine the most influenced variable on the incidence of DHF, and McNemar's test was conducted to see differences in positive deviance behavior before and after the intervention using the positive deviance approach.

3. RESULTS

Qualitative

The result of the FGD related to positive deviance behavior in preventing DHF were found that community efforts to eradicate dengue vector mosquitoes are not new. The community has often received counseling on the importance of maintaining environmental hygiene. However, this is not yet a priority or a community habit. As quoted in the following FGD:

"...We are used to conveying it to the community through counseling. But the people who don't want to, and don't care ..."
(HH, Community empowerment institution)

"...Actually if it's in that community, if conveyed today, it will be held today. It's generally like that. Two three days later if it's not too noticed, so yeah, they're back to their old habits.."

(NAM, Community empowerment institution)

People also often dump rubbish in the river or pile up rubbish in front of the house. This garbage that becomes a place for mosquitoes to breeding. As quoted in the following FGD:

"...Usually, rubbish piled up in front of the house, there's a dog, so that rubbish is scattered,... It's also common for rubbish to be dumped on the beach ..."

(MSL, Public figure)
This is exacerbated by the habit of the community to collect rainwater and not routinely drain the water tanks. As quoted in the following FGD:

"...that natural conditions exist that prevent, sometimes also some support, especially coastal areas, there is very lack of water. So, in the rainy season, it's their habit that it holds water ..."

(AE, Head of Pangkajene City Health Center)

In preventing the transmission of DHF, informants also avoided mosquito bites by wearing long-sleeved clothing. In addition, there were also informants who used lemongrass oil to repel mosquitoes and planted family medicinal plants in their yard. As quoted in the following FGD:

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"...I don't sleep outside. In the room, there are no mosquitoes. If outside, I wear long sleeves ..."

(A, Public figure)

"...citronella oil can also repel mosquitoes"
(R, Posyandu cadre)

"...many people here also planting of family medicinal plants"

(H, DHF Manager of Pangkep District Health Office)

Based on the Focus Group Discussion (FGD) activity conducted on 12 informants in Pangkep Regency, it can be concluded that the behavior of the people affected by DHF is people who do not maintain the environmental hygiene, littering, and the community's habit of collecting rain water and not routinely draining water tanks. Meanwhile, the positive deviance behavior of people who are not affected by DHF is using long-sleeved clothes, using oils such as citronella oil, and planting family medicinal plants in the yard of the house.

Quantitative

4Table 1 shows that more respondents did *positive deviance* (69 people). Respondents who suffer from DHF more found in respondents who did not do positive deviance (70,2%). Chi-square test results obtained p-value=0,000, meaning there is a relationship between positive deviance with the incidence of DHF. Based on gender, most of the respondents were male (72 people). Respondents of both male and female genders tend to suffer from DHF with a proportion that is not too significant, namely 31,9% dan 35,2%. Chi-square test results obtained p-value=0,703, meaning that there is no relationship between gender of respondents with the incidence of DHF.

Table 1: Distribution of Respondents Based on Study Variables and the Incindence of DHF

Study Variables	The Incidence of DHF				Total		*p-value*
	Yes		No				
	n	%	n	%	n	%	
Positive Deviance							
No	40	70,2	17	29,8	57	100	0,000*
Yes	2	2,9	67	97,1	69	100	
Gender							
Male	23	31,9	49	68,1	72	100	0,703
Female	19	35,2	35	64,8	54	100	
Age							
Productive	12	21,1	45	78,9	57	100	0,008*
Not Productive	30	43,5	39	56,5	69	100	
Level of Education							
Low	39	41,1	56	58,9	95	100	0,001*
High	3	9,7	28	90,3	31	100	

**Chi-Square Test*

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From 126 respondents, more respondents are not productive age (69 people). Respondents who suffer from DHF more on respondents who were not of productive age (43,5%). Chi-square test results obtained p-value=0,008, meaning there is a relationship between the age of respondents with the incidence of DHF. In terms of education level, the majority of respondents have a low level of education (95 people). Respondents who suffer from DHF more on respondents who have a low education level (41,1%). Chi-square test results obtained p-value=0,001, meaning that there is a relationship between the education level of respondents with the incidence of DHF. (Table 1).

Table 2 : Multivariate Analysis (Logistic Regression Test)

Variable	B	SE	Wald	Sig.	Exp (B)	95% CI for Exp(B)	
						Lower	Upper
Positive Deviance	4.239	0.790	28.789	0.000	69.342	14.740	326.206
Age	0.258	0.706	0.134	0.714	1.295	0.325	5.164
Level of Education	1.067	0.994	1.151	0.283	2.906	0.414	20.400

Table 2 presents the results of the logistic regression test analysis. Positive deviance is the variable that has the most dominant influence on incidence of DHF, after accounting for age variable and level of education variable, with p-value=0.000 dan Exp(B)=69.342 CI 95% from 14.740 to 326.206). That is, respondents who did not do positive deviance were at risk of DHF 69,342 times compared to respondents who did positive deviance prevention of DHF prevention.

Table 3 : Differences in Positive Deviance Behavior Before and After the Intervention

Before	After		*p-value*
	No	Yes	
Planting of medicinal plants			0.004*
No	41	9	
Yes	0	76	
Planting of Citronella plants			0.001*
No	57	11	
Yes	0	58	

**McNemar Test*

Based on the results of the identification of positive deviance behavior of the community to prevent DHF in Pangkep Regency, intervention is carried out by applying one of the positive deviance behaviors, namely the planting of family medicinal plants through the provision of citronella plant seeds. Monitoring the results of the intervention obtained the results of the McNemar test analysis showed that there was a significant difference between planting of family medicinal plants, especially in planting citronella plants before and after the intervention ($p<0.05$) (Table 3).

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Table 4 : **Incidence Rate (IR) of DHF in Work Area of Pangkajene City Health Center, Pangkep Regency, from 2017 to 2020**

Year	Number of Cases (people)	Total Population	*Incidence Rate* (IR) per 10.000 population
January to December 2017	29	29584	9.80
January to December 2018	50	29863	16.74
January to December 2019	59	30815	19.15
January to September 2020	19	30815	6.16

* *Secondary Data (2020)*

Table 4 shows that *incidence rate* (IR) of DHF from 2017 to 2020 inclined to fluctuate. However, there was a significant decrease in the IR of DHF from 2019 (IR = 19.15) to 2020 (IR = 6.16).

4. DISCUSSION

This study shows that positive deviance is the variable that has the most dominant influence on incidence of DHF in Pangkep Regency. Respondents who did not do positive deviance had a risk of suffering from DHF 69,342 times compared to respondents who did positive deviance. The results of this study are in line with Arsunan's research, which found that there was a significant relationship between positive deviance and the incidence of malaria, which is a disease that is also transmitted to humans through mosquito bites such as DHF. [15,16]

Positive deviance approach is community-based approach driven by behavioral changes that have been successfully implemented to address many health and social issues.[17] The solution that found in a community are more sustainable than external solutions were brought into the community. The positive deviance behavior of the community to prevent DHF in Pangkep Regency that was identified through FGD is using long-sleeved clothing, using oil such as lemongrass oil, and planting medicinal plants in the yard.

Based on the results of the identification of positive deviance behavior, intervention is carried out through the positive deviance approach, namely procurement of medicinal plant seeds in the form of citronella seeds which are given to the people of Pangkep Regency to be planted in the yard of the house or in the house using pots. Monitoring the results of the intervention showed that there was a significant difference between the planting of medicinal plants, especially in planting citronella plants before and after the intervention.

Comprehensive and integrated planting of mosquito repellent plants is one of the potential methods in preventing DHF. This method is more environmentally friendly and cheaper both in terms of cost and application.[18] This plant in living conditions can be used as a mosquito repellent without being processed first. Some mosquito repellent plants that can be planted include citronella, lavender, zodia, geraniums and rosemary.[19] Citronella plant (*cymbopogon nardus*) produce essential oils containing citronellal and geranniol which are not liked and highly avoided by insects, including mosquitoes so that the use of these materials is very useful as a mosquito repellent. [20]

Planting medicinal plants such as Citronella plants to repel mosquitoes was reported in some studies. Farich's research shows that the planting of Citronella plants has a statistical effect on

entomologist indicators, namely increase in Maya Index numbers which are used to identify a high-risk environment as a breeding ground for the Aedes aegypti mosquito.[21] The results of this study are also not different from Aji's research which found a significant effect between planting citronella plants in the yard of the house with the presence of mosquito flicks Aedes aegypti on the environment of water shelters.[14]

There is a change in behavior in the community, especially the behavior of planting Citronella plants as a form of prevention of DHF is associated with the reduction of DHF cases in Pangkep Regency. This shows that positive deviance approach through the intervention of planting Citronella plants is one of the appropriate interventions as DHF control efforts in Pangkep Regency. The positive deviance approach can be an effective tool for changing community behavior in the context of preventing and controlling dengue in an area by strengthening the community.[17] Problems in a community can be solved better by identifying the behavior of those communities that have a positive impact and trying to strengthen their application by utilizing local wisdom.

5. CONCLUSION

Positive deviance is the most influential variable in the incidence of DHF in Pangkep Regency. Positive deviance behaviors to prevent DHF were using long-sleeved clothing, using oil, and planting medicinal plants in the yard. Positive deviance approach can increase the planting of medicinal plants in the form of citronella plants in the yard of the house to prevent DHF.

Positive deviance approach in community could be used as an effort to prevent and control DHF through the active role of health cadres or public figures to act as positive deviance actors in order to generate greater involvement from the community to implement DHF prevention behavior.

Ethical Considerations

Our study was not directly applied to human, hence ethical clearance was not required.

Conflict Of Interest

The authors declare no conflict of interest.

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