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# Factors associated with dengue fever prevention practices in endemic area

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**ABSTRACT**

Prevention practices and the factors that influence them are essential for controlling the spread of dengue hemorrhagic fever (DHF) and effective strategic planning. This study aimed to determine the factors associated with the practice of preventing dengue fever in communities in endemic areas of Kubu Raya Regency, West Kalimantan Province, Indonesia. This study was an observational study with a cross-sectional design. The research sample was 379 households in endemic areas using a questionnaire. Collecting data was using a questionnaire with interviews. Bivariate analysis employed Chi-square test, multivariate analysis using logistic regression. Most of the respondents practiced fewer prevention; variables related to dengue fever prevention practices were income, education, knowledge about dengue prevention and health education (mass media). Regression analysis showed that the variables of education, knowledge about dengue prevention, and mass media education were related to the practice of preventing dengue fever. This study indicated that in preventing dengue fever, strategies must be developed to cultivate prevention practices and increase prevention campaigns using mass media and focus on areas with low education and knowledge in dengue prevention.



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## 1. INTRODUCTION

The degree of public health is influenced by four factors: environmental factors, behavioural factors, health service factors, and heredity factors [1]. Efforts to improve public health continue to be improved, among others, through the prevention and eradication of infectious diseases, which are still a public health problem. One of these problems is dengue fever [2]. Dengue fever is a fever that most often attacks children aged less than 15 years, and adults are characterized by symptoms of high fever and rupture of blood vessels which causes a decrease in the platelets of a patient, causing a fatal shock [3]. Data worldwide shows that Asia ranks first in the number of dengue fever sufferers [4].

Kubu Raya regency has nine sub-districts, 20 health centres, and three hospitals. The trend of the larva free index of Kubu Raya regency has decreased, namely in 2018 by 64% and in 2019 by 52%, however it is still below the program target [5]. Larva free index is used to determine the density of *Aedes sp.* mosquitoes by calculating the percentage of larva free houses or buildings divided by the number of places inspected times 100%. Kubu Raya regency ranked the second highest number of cases, namely 350 cases (12.51%) out of 2,798 total cases in West Kalimantan. The density of *Aedes sp.* mosquitoes is strongly related to the incidence of dengue hemorrhagic fever (DHF) [5]. The incidence of dengue fever or incidence

rate (IR) in Kubu Raya regency has an increasing trend from year to year, namely 22.1 in 2016, 34.7 in 2017 and increased relatively high to 64.8 in 2018 per 100,000 population with cases. The highest is the working area of the Ambawang River Health Center, which is 222 cases per 100,000 population [6].

Dengue fever is a disease that can be prevented. Prevention is essential to control the spread of dengue fever infection. One way to avoid it is to control the breeding of vector mosquitoes carrying the dengue virus. In Indonesia, vector control targets are integrated into the "3 M Plus" program, which requires the community to periodically detect and eradicate mosquito nests, namely closing (closing water containers), draining (cleaning water containers), and utilizing/recycling used goods that have the potential to become landfills rubbish. Meanwhile, "Plus" includes sowing larvicide powder, raising larvae-eating fish, planting mosquito repellent trees, using mosquito repellent, using mosquito nets, and installing wire netting [7].

Previous research has revealed many factors that influence the practice of preventing dengue fever, including studies in Malaysia and Indonesia which show low income, low education, low knowledge and even age and gender are associated with low levels of dengue fever prevention [8], [9]. However, several other studies reveal that education does not have an essential role in preventive behaviour [10], [11]. Good prevention practices in the community are needed to prevent or minimise dengue fever cases successfully. Understanding prevention practices in the general public about dengue fever and the factors that influence it provide valuable information for effective strategic planning and involving the community in controlling dengue fever, especially in dengue-endemic areas and tropical climates such as in the Kubu Raya regency, West Kalimantan province, Indonesia.

## 2. RESEARCH METHOD

This was analytic observational research with a cross-sectional design. The study was carried out in August-September 2021. The study was located in the Ambawang River Health Center work area, with the highest prevalence of dengue hemorrhagic fever cases. The population in this study were 7,129 families in the Ambawang River Health Center work area, which consisted of six villages, namely Ambawang Kuala, Ampera Raya, Central Java, Durian, Mega Timur, and Sungai Malaya. The research sample was 379 households selsected by the proportional random sampling technique. Sampling in each region was determined by the number of subjects from each region and is taken randomly. Collecting data was using a questionnaire with the help of Kobo Collect application. Data was analysed thorugh bivariate analysis with Chi-square test, and multivariate analysis with logistic regression test. This research has been approved by the Ethics Committee of the University of Muhammadiyah Pontianak with No. 048/KEPK-FIKES/KET/2021.

## 3. RESULT AND DISCUSSION

Knowledge questions are a maximum of 10 questions, including knowledge about dengue mosquito vector habitat and about "3M plus" prevention. Respondents were categorized as less, moderate and good. It is categorized as insufficient if the respondent's score is 0-5 (<50%), categorized as moderate if the respondent's score is 6-7 (60-70%), categorized as good if the respondent's score is 8-10 (80-100%). While prevention practices include questions about the practices carried out in avoiding mosquito bites and eradicating mosquito nests. The number of dengue hemorrhagic fever prevention practice questions is 14 practices, categorized as insufficient if the respondent's score is 0-7, categorized as moderate if the respondent's score is 8-10 (60-70%), categorized as good if the respondent's practice score is 11-14 (80-100%).

About 51.7% of respondents are male while 32.5% are aged 31-40 years. Hence, 55.4% of them have no education, 57.8% work as entrepreneurs, 69.7% have an income of 2,433. 000/below the minimum wage, 64.4% have received Health Education through mass media (newspaper, TV/radio), 45.9% have moderate knowledge of DHF prevention, and 51.9% have DHF prevention practices that need improvement. More details can be seen in Table 1.

Income is less than the minimum wage for work, education is not in junior high school, never received health education from the mass media, and the respondents have less knowledge of dengue fever, indicating a tendency for fewer prevention practices. Chi-square test analysis showed that income was related to the practice of preventing dengue fever (p-value=0.001), education was related to the practice of preventing dengue fever (p-value=0.000), and mass media health education was related to the practice of preventing dengue fever (p-value=0.000), knowledge of DHF prevention is less related to DHF prevention practices (p-value=0.000). More details can be seen in Table 2.

Table 1. Gender, age, education, occupation, income, health education, mass media, knowledge and practice of preventing DHF among respondents

| Characteristics | n=(379) | % |
|---|---|---|
| Gender | | |
| Man | 196 | 51.7 |
| Woman | 183 | 48.3 |
| Age (years) | | |
| 18-30 | 110 | 29.0 |
| 31-40 | 123 | 32.5 |
| 41-50 | 94 | 24.8 |
| 51-60 | 37 | 9.8 |
| >60 | 15 | 4.0 |
| Education level | | |
| No education-junior high school | 210 | 55.4 |
| Senior high school-college | 169 | 44.6 |
| Occupation | | |
| Unemployed | 49 | 12.9 |
| Farmers | 28 | 7.4 |
| Private sector employe | 33 | 8.7 |
| Enterpreneur | 219 | 57.8 |
| Goverment | 11 | 2.9 |
| Laborer | 39 | 10.3 |
| Income | | |
| ≤2,433,000 | 264 | 69.7 |
| >2,433,000 | 115 | 30.3 |
| Mass media health education | | |
| Never | 135 | 35.6 |
| Newspaper/TV/radio | 244 | 64.4 |
| DHF prevention knowledge | | |
| Not enough | 125 | 33.0 |
| Moderate | 174 | 45.9 |
| Good | 80 | 21.1 |
| DHF prevention practices | | |
| Not enough | 227 | 59.9 |
| Moderate | 121 | 31.9 |
| Good | 31 | 8.2 |

Table 2. Relationship between income, education, health education mass media, knowledge of DHF prevention and DHF prevention practices

| Variable | Prevention practice | | | | p-value | Crude OR (95%CI) |
|---|---|---|---|---|---|---|
| | Not enough | | Medium and good | | | |
| | n | % | n | % | | |
| Income | | | | | | |
| ≤2,433,000 | 173 | 65.5 | 91 | 34.5 | 0.001 | 2.148 (1.375-3.353) |
| >2,433,000 | 54 | 47.0 | 61 | 53.0 | | |
| Education | | | | | | |
| No educaion–junior high school | 165 | 78.6 | 45 | 21.4 | 0.000 | 6.328 (4.017-9.968) |
| Senior high school - college | 62 | 36.7 | 107 | 63.3 | | |
| Health education (mass media) | | | | | | |
| Never | 120 | 88.9 | 15 | 11.1 | 0.000 | 10.243 (5.659-18.540) |
| Mass media (Newspaper, television/radio) | 107 | 43.9 | 137 | 56.1 | | |
| Knowledge of DHF prevention | | | | | | |
| Not enough | 110 | 74.9 | 15 | 12.0 | 0.000 | 8.587 (4.745-15.540) |
| Medium and good | 117 | 46.1 | 137 | 53.9 | | |

The results of the multivariate regression test of the variables that influence the behaviour of preventing DHF are respondent's education, information on DHF prevention, and knowledge of DHF prevention. The strength of the relationship from the largest to the smallest was information on DHF prevention (AOR=8.059), knowledge of DHF prevention (AOR=7.237), and education (AOR=6.440). The results of the probability calculation are that if education is lacking, mass media health education is lacking, and knowledge of prevention of dengue fever is less likely to have poor DHF prevention behaviour it is 98%. More details can be seen in Table 3.

Previous research did not find a link between income level and dengue prevention behaviour. In contrast to the results of research in Malaysia on 2,512 respondents aged 18-60 years, respondents who have low incomes are associated with low dengue prevention practices [10], [12]. Another study also found something similar where high socioeconomic groups showed better prevention practices [13]. In this study,

low income or less than the minimum wage standard is related to the community's ability to meet needs in an effort to avoid mosquito bites, such as mosquito netting on the windows of the house, and mosquito repellent lotion and so on. Greater focus should be given to low socioeconomic areas in future health campaigns, considering that groups of people with low socioeconomic status actually have a lot of time and opportunity to practice dengue prevention, especially in rural areas, especially for housewives who have a lot of free time. Previous research did not find a link between education level and dengue prevention behaviour [10].

Table 3. Multivariate analysis of regression factors associated with DHF prevention behavior

| Variabel | B | p-value | Adjusted odd ratio | (95%CI) of AOR |
|---|---|---|---|---|
| Income | 0.134 | 0.652 | 1.143 | 0.639-2.047 |
| Education | 1.862 | 0.000 | 6.440 | 3.739-11.092 |
| Health education (mass media) | 2.087 | 0.000 | 8.059 | 4.138-15.697 |
| DHF prevention knowledge | 1.979 | 0.000 | 7.237 | 3.664-14.296 |

However, this study found a link between the level of education and the prevention behaviour of dengue fever, where lower education was more at risk of having poor dengue prevention behaviour. Several other studies have also shown results that education contributes to determining the behaviour of preventing DHF [14]. The level of education can be a major determinant of knowledge of the disease and its transmission, as well as attitudes and practices, especially those involving the integration of community efforts for dengue control [15]. People with a higher level of education and maturity according to age are important factors to increase public awareness about dengue prevention [16], [17].

This study shows the level of knowledge related to the behaviour of preventing DHF. This study is in line with several previous studies [18]-[20]. Research in Jamaica found knowledge is an important predictor of vector control practice [21]. DHF prevention efforts that are still lacking need to be improved with the level of understanding of dengue prevention. Good prevention practices are based on good knowledge of prevention, and there is a need for information and communication education to the community [22], [23]. Efforts to increase knowledge are not only knowledge about prevention but also need public knowledge about its transmission and sources of DHF vector breeding [24]. Improving DHF prevention practices requires increased supervision and education to more effectively control vectors and promote prevention methods that involve community participation [25].

Health education with mass media in this study is related to the behavior of preventing dengue. This study is in line with research Sayavong proactive health education through appropriate mass media and community clean-up campaigns will strengthen and encourage community participation, especially in terms of handling mosquito larvae in neglected places [26]. TV/Radio is the main effective source of information for dengue prevention by increasing health promotion activities through campaigns to eliminate misconceptions and gaps in knowledge about dengue fever [27]. Besides TV/radio, a study also revealed that cellular SMS could also be used for intervention because it is effective and can improve dengue fever prevention practices in the community [28]. Health education through mass/social media with its strengths can overcome knowledge gaps that can increase efforts to prevent dengue which is carried out through various health programs [29]. In addition to media-based health education in the community, the results of Ahbirami's research, 2020 also suggest the importance of school-based health education to increase knowledge and practice of dengue prevention, especially the prevention of dengue transmission in schools [30].

The findings from the multivariate analysis showed that the mass media's education, knowledge and health education were significantly related to the practice of preventing DHF. The highest odds ratio (OR) is health education through mass media. These findings provide the basis for making health education messages related to dengue prevention to the target or community who have low education or low knowledge about dengue prevention practices in order to increase the prevalence of dengue prevention practices so as to prevent transmission from mosquitoes carrying the dengue virus.

## 4. CONCLUSION

The results of this study indicated that the factors related to the practice of preventing dengue fever are income, education, mass media health education, and lack of knowledge of dengue prevention. Based on multivariate analysis, the factors that most strongly influence the practice of preventing DHF are education, health education, mass media, and knowledge about DHF prevention. The strategy in preventing dengue fever is to cultivate prevention practices and increase prevention campaigns using mass media. It should focus on people in the areas with low education and low knowledge about dengue prevention.

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