Knowledge, Attitudes and Practices on Community with Dengue Haemorrhagic Fever in Mataram, West Nusa Tenggara

Pengetahuan, Sikap dan Praktik Masyarakat dengan Demam Berdarah Dengue di Mataram, Nusa Tenggara Barat

Nur Alvira^{1*}, Tri Baskoro Tunggul Satoto², Tri Wibawa³, Roger Frutos⁴, Sylvie Maguin⁵, I Kadek⁶, Ali Wardana⁷

¹Study Program of Public Health, Faculty of Health Science, Respati University of Yogyakarta
Jalan Laksda Adisucipto KM 6,3, Depok, Sleman, Daerah Istimewa Yogyakarta, Indonesia

²Department of Parasitology, Faculty of Medicine, Gadjah Mada University of Yogyakarta

³Department of Microbiology, Faculty of Medicine, Gadjah Mada University of Yogyakarta

^{4,5}University of Montpellier UMR 5214, IES 860, rue Saint Priest Bâtiment 5-CC 05001 34095
Montpellier Cedex 5

⁶Department of Health Center in Mataram City

⁷Health Training Center in NTB

*E_mail: irha011185@yahoo.com

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ABSTRACT

Dengue Haemorrhagic Fever (DHF) is a major health problem in Mataram. Even though there have been many prevention efforts, the rates of morbidity and mortality tend to increase. This condition shows that the indicators of Knowledge, Attitude, and Practice (KAP) about DHF in the community are still low. This study aims to prove the factors KAP in the community with DHF in Mataram City. The research conducted in October-November 2018 used a case-control study. The sampling technique used proportional stratified random sampling. The KAP data were collected by interview using questionnaires and observation using a structured checklist. Data analysis used a simple and multiple logistic regression test ($\alpha = 5\%$). Factors related to DHF transmission in Mataram are the communities' habit of raising livestock, does not have a temporary landfill, low knowledge about DHF, lots of garbage around the house and the determinant factor is a routine mobilization to endemic areas (OR = 17.019). DHF reduction in Mataram City can be carried out through integrated cross-sectoral vector control activities as through waste management; build livestock pens according to health standards and provide education, especially for community living in endemic areas.

Keywords: mobilization, waste, livestock, knowledge, Dengue Haemorrhagic Fever

ABSTRAK

Demam Berdarah Dengue (DBD) masih menjadi penyakit endemik di Kota Mataram. Meskipun telah banyak upaya pencegahan dilakukan, namun jumlah kasus dan kematian cenderung meningkat. Kondisi ini menunjukkan bahwa indikator Pengetahuan, Sikap, Praktik (PSP) tentang DBD pada masyarakat masih rendah. Penelitian ini bertujuan untuk membuktikan faktor PSP pada masyarakat dengan DBD di Kota Mataram. Penelitian yang dilaksanakan pada Bulan Oktober-November 2018 menggunakan studi kasus kontrol. Teknik pengambilan sampel menggunakan proportional stratified random sampling. Data PSP diperoleh dari interview menggunakan kuesioner dan observasi dilakukan dengan menggunakan form observasi terstruktur. Analisis data menggunakan uji regresi logistik sederhana dan berganda ($\alpha = 5\%$). Faktor yang berhubungan dengan penularan DBD di Mataram adalah kebiasaan masyarakat memelihara ternak, tidak memiliki tempat pembuangan sampah sementara, rendahnya pengetahuan tentang DBD, banyak sampah di sekitar rumah dan faktor determinan adalah mobilisasi rutin ke daerah endemis (OR = 17,019). Penurunan kasus DBD di Kota Mataram dapat dilakukan melalui kegiatan pengendalian vektor terpadu lintas sektor seperti pengelolaan sampah, membangun kandang ternak yang sesuai standar kesehatan dan memberikan edukasi terutama untuk masyarakat yang tinggal di daerah endemis.

Kata kunci: mobilisasi, sampah, ternak, pengetahuan, Demam Berdarah Dengue

INTRODUCTION

Dengue Hemorrhagic Fever (DHF) is recognized in the WHO region namely America (PAHO), Southeast Asia (SEARO), and the Western Pacific (WPRO).¹ Indonesia ranked first in SEARO in 1990-2015 based on Incidence Rate (IR) and Case Fatality Rate (CFR).² The incidence Rate (IR) in Indonesia in 2016 increased (77.96/100,000 population) compared to the previous year (50.83/100,000 population). This rate is still very far from the national target ($< 49/100,000$ population) and several provinces in Indonesia experienced an outbreak.³ The city of Mataram is an endemic area because even though the incidence rate in Mataram is below the national target, the region has experienced an increase of cases up to 95.88% in the last 2 years (IR 10.68/100,000 in 2015 with CFR 0%, become IR 20.92/100,000 residents with CFR 0.75% in 2016).⁴

The incidence of DHF occurs due to demographic factors, urbanization, migration, and population mobility caused a significant increase in dengue cases.^{5,6} Other influential factors are climate change, environmental changes, and transmission of DHF cases that indicate spatial and temporal patterns.⁷ Social and economic factors play an important role in the incidence and prevalence of DF and DHF. The results of research conducted in Aceh shows that the level of education, occupation, marital status, income, socio-economic status (SES), and life in the city associated with the level of knowledge. Occupation, SES, and history of DF were associated with attitude. Education, occupation, socioeconomic status, and residence associated with prevention practices.⁸ This condition is also associated with the quality of the urban environment that is unhealthy because of unplanned urbanization well, that's potential for increasing the dengue vector breeding.⁹

Socio-economic and socio-cultural factors that affect the density of *Aedes aegypti* mosquitoes and transmission of diseases are unhygienic behavior and unhealthy conditions of the house. Long levels of population density

and water storage for daily needs have the potential to become a potential place for the breeding of *Aedes aegypti*, thus increasing the transmission of dengue infection.¹⁰ The results of research in Cimahi City show that there is a significant relationship between education, economic status, knowledge, facilities, and infrastructure, providing counseling, and larva inspection with the behavior of respondents in eradicating mosquito breeding places.¹¹

Several research results indicate that the predictor variables associated with DHF transmission are not homogeneous and unstable. These factors are related to the behavior of people of various races and ethnicities, making it difficult to assume that epidemiological change is a single factor. Shah et.al stated that dengue epidemics over a period of four years (2004-2007) showed that the incidence of dengue fever was mostly among ethnic Malayu, however, the incidence of cases among non-citizens showed a tendency to increase. Although the factors related to ethnicity have high complexity, the analysis of variables related to the specific conditions of a region on vector distribution and the incidence of dengue cases can be a useful tool to produce spatial and temporal data on the preparation of DHF outbreak prevention scenarios.¹²

DHF is a major health problem in Mataram. Even though there have been many prevention efforts, the rates of morbidity and mortality tend to increase during 2014-2016 and the distribution of areas with endemic status is more than 50%.¹³ Like a coastal area, assimilation of the population due to a large number of migrants from other regions also occurred in Mataram. Sasak became the majority ethnic group of Mataram residents, followed by the Balinese, Bayan, Dompu, Donggo, Bima, Chinese, Malay, and Arabic tribes.¹⁴ The number of ethnicities can influence the Knowledge, Attitudes, and Practice (KAP) in the community, thus causing problems in efforts to prevent and treatment of DHF. The aim of this research was to explore and identify KAP factors

related to Community to DHF in Mataram City. Therefore, understanding local KAP is very important to design a DHF prevention strategy that is appropriate to the local context of an area.

METHODS

This case-control study was conducted in three districts in Mataram City during October-November 2018. The population in this study were all-household at the research location with a sample calculation using the Lemeshow et al. formulas to test the hypothesis of two sample test of proportions (two-sided test).¹⁵ There were 90 cases and 90 controls with a total sample of 180 households. The sampling technique used was proportional stratified random sampling, with sub-samples of households in three sub-districts namely Pagutan, Pagutan Barat, and Salagalas. Case criteria are patients who have just been diagnosed in the last three months with a list of cases from the medical record data of DHF patients based on the Epidemiological Investigation (PE Form) and the hospital's early warning report (KDRS Form). Control criteria are not sick with DHF, the nearest neighbor of the case with a maximum distance of 100 meters and match the age, sex between controls and cases.

Knowledge, Attitude, and Practice (KAP) data were collected by interview using questionnaires on published research^{16,17} and observation using a structured checklist a total of forty-eight questions. The practice factors including are insecticide use (5 items), mosquito net (7 items), mobilization to an endemic area (9 items), temporary trash shelter and cleanliness around the house (5 items), physical control: frequency of water container cleaning, frequency of garbage disposal and frequency of close the container (3 items) larvicidal use (3 items), livestock raising behavior (5 items), and habit of hanging clothes (1 item). Knowledge (5 items) and attitude (5 items) are assessed by answering cause, mode of transmission, symptoms, mosquito bites, re-infection, breeding sites,

and practice measures. Knowledge was classified as good when 80% or more score, moderate when 60-80% score and low when less than 60% score. Attitude score was classified using a similar range as for the classification of knowledge.¹⁷

Univariate analysis is presented in the frequency distribution, percentages, or proportion and was summarized using tables. Bivariate and multivariate analysis using simple and multiple logistic regression tests with the aim of KAP on Community with Dengue Haemorrhagic Fever in Mataram,. The results of simple logistic regression analysis are used to select variables that match the criteria as candidates for the control model of local DHF outbreaks in Mataram City with a p-value less than 0.25.¹⁸ The analysis was continued by multiple logistic regression tests with the backward method to find out the predictor variables in the physical environment and vector density associated with DHF transmission, the strength of the relationship between these variables, and the model or formula for predicting dengue transmission in Mataram City. Model quality assessment was carried out to determine the discrimination value based on the Area Under Curve (AUC) with the Receiver Operating Curve (ROC) method, whereas the model calibration using Hosmer and Lemeshow.¹⁹ This study is part of a study approved for ethics by the Faculty of Health Science, Respati University of Yogyakarta, with Protocol Number: 167.1/UNRIYO/PL/VII/2018 in July 2018.

RESULTS

Most cases in Mataram City had a history of DHF once (96.7%) and 3.3% twice. patients who are male and female have almost the same proportion, aged 5-11 years old with an education level graduating from elementary school (25.6%) and preschoolers (33.3%), and the majority are ethnic Sasak (61.1%) and Bali (27.8%)

Measurement of KAP with DHF incidence including insecticide use, mosquito net, mobilization to endemic area, temporary

trash shelter, cleanliness around the house, physical control (frequency of water container cleaning, frequency of garbage disposal, and frequency of close the container), larvicidal

use, livestock raising behavior, the habit of hanging clothes, knowledge, and perception of DHF (Table 1).

Table 1. Knowledge-Attitude-Practice (KAP) with DHF in Mataram City according to Simple Logistic Regression

Knowledge-Attitude-Practice (KAP)	Frequency				OR	CI 95%	P-Value
	Case		Control				
	n	%	n	%			
Insecticide use							
Did not use	42	46.7	38	42.2	1.197	0.665-2.157	0.652
Used	48	53.3	52	70.0			
Mosquito Net							
Did not use	87	96.7	86	95.6	1.349	0.293-6.206	1.000
Used	3	3.3	4	4.4			
Mobilization to endemic areas							
Yes	87	96.7	60	66.7	14.50	4.323-49.685	0.000
No	3	3.3	30	33.3			
Temporary trash shelter							
None	21	23.3	3	3.3	8.826	2.528-30.816	0.000
Present (Indoor and Outdoor)	69	76.7	87	96.7			
Cleanliness around the house							
Lots of garbage found	68	75.6	40	44.4	3.864	2.046-7.295	0.000
No trash found	22	24.4	50	55.6			
Physical Control (frequency of water container cleaning, garbage disposal, and close the container)							
Once a week	36	40.0	17	18.9	1.431	0.795-2.576	0.296
More than one week/none	54	60.0	73	81.1			
Larvicidal use							
Did not use	64	71.1	53	58.9	1.718	0.925-3.194	0.118
Used	26	28.9	37	41.1			
Habit of raising livestock							
Present	47	52.5	12	13.3	7.105	3.406-14.819	0.000
None	43	47.8	78	86.7			
Habit of hanging clothes							
Yes	68	75.6	64	71.1	1.256	0.647-2.436	0.613
No	22	24.4	26	28.9			
Knowledge of DHF							
Low	88	97.8	75	83.3	8.800	1.949-39.724	0.001
Good	2	2.2	15	16.7			
Perception of DHF							
Negative (≤ 0.008)	61	67.8	34	37.8	3.465	1.875-6.402	0.000
Positive (≥ 0.009)	29	32.2	56	62.2			
Total	90	50.0	90	50.0			

The results show that KAP with the incidence of DHF based on p-value < 0.05 ; OR and confidence interval > 1 , are mobilizing in endemic areas (OR = 14.50); there is no temporary trash shelter (OR = 8.826); found lots of garbage in around the house (OR = 3.864); habit of raising livestock (OR = 7.105),

low knowledge of DHF (OR = 8.8), negative perceptions of DHF (OR = 3.465). Insignificant variables are the habit of using insecticides, mosquito nets, and hanging clothes, not doing physical control and larvicidal.

The low level of knowledge and public perception about DHF is a risk factor for DHF transmission. The results of the analysis on the question items indicate that the knowledge and attitudes of the community about mosquito breeding sites are still very low. The community mostly conducts physical control activities on controllable site (CS) type containers, while the public does not know containers with disposable site types, which have the potential to breed larvae. Community understanding that proper mosquito control through fogging causes the community to feel

less responsible for carrying out control activities independently in these places.

Multivariate analysis to determine the type of determinant of KAP factors associated with DHF (Table 2). The results of our simple logistic regression revealed the following independent variables with p-values less than 0.25: mobilizing in endemic areas, no temporary trash shelter, found lots of garbage around the house, the habit of raising livestock, low knowledge of DHF, negative perceptions of DHF and not use larvicida.

Table 2. Knowledge-Attitude-Practice (KAP) with DHF in Mataram City according to Multiple Logistic Regression

Variable	B	Sig.	Exp(B)	95,0% C.I.for EXP(B)	
				Lower	Upper
Mobilization to endemic areas	2.440	0.000	17.109	3.540	82.697
Does not have a temporary garbage collection	1.193	0.003	12.102	2.351	62.295
Found lots of garbage in around the house	1.804	0.028	3.333	1.378	42.060
Habit of raising livestock	2.121	0.000	16.790	5.461	51.624
Low knowledge of DHF	1.163	0.048	10.622	1.018	110.797
Negative attitude of DHF	.371	0.082	2.161	0.906	5.157
Constant	-6.334	0.000	0.007		

Notes: B= Koefisien Beta; Sig.= Signifikansi; Exp (β)= Eksponen Beta

Forward LR multiple logistic regression was applied. Multi-collinearity was check and not found. Found value of Hosmer and Lemeshow $0.085 > 0.05$ means that the model is able to predict the value of the observation or model is acceptable because it fit with the data observations. Classification table (overall correctly classified percentage = 78.6), area under the ROC curve (83.3%) was applied to check the model fit¹⁹

The results of the multivariate analysis showed potential factors related to DHF in the community are routine mobilization to endemic areas (OR = 17.109). Based on *Exp (B) value* and p-value, this factor is reinforced by the community habit of raising livestock (OR = 16.790), does not have a temporary garbage collection (OR = 12.102), low

knowledge of DHF (OR = 10.622), and found lots of garbage around the house (OR = 3.333).

Logistic regression results that can predict the risk of a family experiencing DHF with the equation and probability formula as follows:

$$\text{Equation (y)} = -6.334 + 2.440 (\text{mobilization to endemic areas}) + 1.193 (\text{don't have temporary trash shelter}) + 0.804 (\text{found lots of garbage around the house}) + 2.121 (\text{Habit of raising livestock}) + 1.163 (\text{low knowledge of DHF}) + 0.371 (\text{negative attitude of DHF}) = 1.387$$

$$\text{Probability (P)} = \frac{1}{(1+e^{-y})} = \frac{1}{(1+2,7^{-1,387})} = 0.799 \times 100 = 79.86\%$$

Notes:

P = Probability of an event occurring

e = Natural number = 2.7

y = Constanta

This means that a family who has the habit of mobilization to endemic areas, don't have temporary trash shelters, found a lot of garbage around the house, a habit of raising livestock, low knowledge and negative attitudes about DHF have a probability of experiencing DHF of 79.86%.

DISCUSSION

Most people in the city of Mataram have activities (mobilization) outside the area of residence, especially those who work/study, worship, and work in other areas with endemic status. Hindu religious communities practice worship in temples that are outside the residential area. The average activity outside the residence is carried out once a week with an activity duration of 8 hours/day and uses private vehicles such as motorcycles and cars.

This condition needs to be monitored because dengue disease can be transmitted through population mobility or this disease does not recognize the boundaries of government administrative areas.²⁰ DHF transmission usually spreads starting from a source of infection, then following the traffic of the population. The more crowded the traffic, the greater the possibility of dengue disease spreading.²¹ High population mobility generally occurs in urban areas with supporting means of transportation and information. The more crowded the traffic, the greater the possibility of dengue transmission.²² This condition according to the results of research in North Sumatra found that travel to endemic areas was associated with dengue infection.¹⁷ Pongsumpun and Tang used a mathematical model to the the risk of

infection to tourists visiting the dengue fever endemic region and found a significant association ($p < 0.05$).²³

Do not have a temporary trash shelter and found lots of garbage around the house are associated with DHF incidence. The type of waste found, such as plastic bottles, leftovers, used tires, and discarded plastic, which can be habitats place for dengue vector. Most cases have temporary shelters outside the house but in open conditions. A frequency of disposal of garbage of less than once per 5 days was higher in the case group compared with the control. Observations show that around the case house there was a lot of garbage found because the janitors did not manage the garbage disposal system. The control house, which is mostly located in a housing complex, has a janitor who picks up trash regularly. Another factor is a large number of gardens and vacant land near residential areas, so they tend to dispose of garbage in these places and the habit of collecting rubbish in dug pits for several days before being burn or piled up. Poor waste management provides a place for *Aedes* mosquitoes to breeding.²⁴ Similar findings were researched in North Sumatera¹⁷ and Thailand.²⁵ Waste management which is part of the Integrated Vector Management (IVM) strategy is generally one of the interventions in the prevention of DHF which involves the community through the 3R method namely reduce, reuse, and recycle waste.²⁶ However, unfortunately, this behavior is still very low, especially in urban communities due to limited land, lack of knowledge, attitudes, availability of information, as well as the less active role of

cadres, health workers, academics, and non-governmental organizations.

Low knowledge about vector breeding places will have an impact on the practice of dengue prevention, as actions based on knowledge are more effective than those without knowledge. In this study, low knowledge in the case group was higher than in the control group. Knowledge about preventive measures is the most unknown to the public compared to the knowledge of other DHF. This finding was supported by research in Kamphaeng Phet Province, where they found that increasing knowledge will improve practices to reduce the number of unprotected containers, thus reducing potential vector breeding places.²⁷ Increased community knowledge about dengue and prevention measures is needed because better knowledge provides awareness and the ability to practice preventive measures²⁸⁻³⁰ and this can be done if the community is involved in the control program.³¹

Ownership of livestock is related to the incidence of DHF in Mataram City. The majority of Sasak ethnic work is raising livestock because the son of the Sasak ethnic began to be introduced and given the responsibility of his father to raising livestock in the grazing fields. This condition has an impact on dengue transmission because plentiful livestock can increase the survival and number of mosquitoes. The community built a cage close to the house and less than 10 meters away. Several things, one of which is for livestock safety, cause placement of the cage. In addition, easy access to the maintenance process and the cage cleaning process. Limitations of community-owned land also factored into the cage built close to the house. Livestock kept in close proximity to humans can contribute to the higher transmission, as they attract mosquitoes into areas where they will encounter and feed on human hosts opportunistically.³² The parallel approach of insecticide-treated livestock (ITL) and managing the livestock as far from humans as possible is sufficient to reduce

malaria.^{32,33} Likewise, in the Macha region in the southern province of Zambia, livestock dramatically decreased the risk of *P. falciparum* infection at the house level, with an increasing distance between livestock such as cats, cattle, dogs, and goats.³⁴

The behavior of using insecticides on respondents has not directly prevented DHF. This could be due to the possible source of mosquito vector habitat. Thus, to support the prevention of dengue fever to prevent contact with vectors, in addition to using household insecticides, it is recommended eradicating mosquito nests, which includes physical control.³⁵ Prevention of contact with mosquito vectors with household insecticides will be successful if done correctly and with the right dose. Additionally, the respondents also reported that they have been using the same insecticide for over 6 months with the type of insecticide is a pyrethroid. Pyrethroid class insecticides are chosen because they work quickly in crippling target insects.^{36,37} Prolonged, repeated use of insecticide from the same group may lead to the development of insecticide resistance,³⁸ which in turn may explain non-association with DHF occurrence in this study.

Some of the implications of the results of this study can use as a basis for determining the priority of the DHF prevention program in Mataram City. First increasing the integrated and cross-sectoral vector control strategy, especially in areas with endemic conditions, such as transportation and processing of waste that can be used as breeding sites for dengue vectors through the 3R method, namely reduce, reuse, and recycle waste. In addition, health education is needed for the breeder community regarding the manufacture and maintenance of cattle sheds in accordance with health standards, especially the distance and cleanliness of the stables. Secondly, the knowledge and information about dengue vector breeding sites, especially the type of container that type disposable sites should get the attention and support of the health authorities.

CONCLUSION

KAP in the community with DHF in Mataram City are routine mobilization to endemic areas, the habit of raising livestock, does not have a temporary garbage collection, low knowledge of DHF, and found lots of garbage around the house.

RECOMMENDATIONS

Health Offices in Mataram City and Community Health Centers need to improve integrated vector control strategies and should be implemented across sectors with the community. The form of activities that can be carried out is a collaboration with the Animal Husbandry Office to provide knowledge, attitude, and practice on the community about making livestock pens that qualifies, so it does not become a potential site for the vector *Aedes* sp. to breed. Collaborate with the Sanitation Department to provide temporary landfills that are routinely transported by cleaners. In addition, it can collaborate with academics and non-governmental organizations to provide skills to the community about 3R, namely reduce, reuse, and recycle waste. An education campaign regarding dengue prevention with a more comprehensive strategy for behavioral change based on the communication and behavior impact method (COMBI). For other effective steps, it is important to increase the knowledge, attitude, and practice of the community about dengue prevention especially in endemic areas and since the incidence of dengue demonstrates seasonality and variation, then before mobilizing to endemic areas, people must protect their skin from mosquito bites according to epidemic activity and seasonal patterns. Improving epidemiological surveillance and vector control programs to prevent the transmission of inter-regional.

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AUTHOR CONTRIBUTIONS

All Authors conceived of the presented idea in this manuscript. TBT, TW: developed the theory, NAP: Analyzed data and co-wrote the manuscript, TW, RF: Verified the analytical methods, SM: Ensure the observation procedure of research variables, IKM, AW: verify the data. All authors discussed the results and contributed to the final manuscript: NAP, TBTS: wrote the manuscript with support from TW, RF, SM, IKM, AW.

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