

## RELATIONSHIP BETWEEN FAMILY MOBILITY AND THE INCIDENCE OF DENGUE HEMORRHAGIC FEVER AT SLEMAN REGENCY, YOGYAKARTA, INDONESIA

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**Abstract:** Dengue hemorrhagic fever is a public health problem in the world. Transmission of dengue through *Aedes* mosquito, so that the incidence is locally limited to the distance of flying. A role of mobility towards dengue spreading have not been consistent. This study aims to provide information about the role of family members' mobility in dengue incidence by using observational study with *case control* design. Case group are families whose members have suffered from dengue in 2014-2016 and control groups are their neighbors. There were 114 people for case and 116 for control group which is divided into two locations namely Sleman and Gamping. Data on DHF patients and their addresses were obtained from Health Office, and mobility obtained through questionnaires then analyzed using *chi square* to determine the role of mobility in DHF incidence. The results show that there is no significance relationship between family mobility and the incidence of DHF. In Gamping,  $P_{\text{high - low}}$  is 0.307 and  $P_{\text{moderate - low}}$  is 0.523. In Sleman,  $P_{\text{high - low}}$  is 0.685 and  $P_{\text{moderate - low}}$  is 0.438. It was concluded that the mobility of family members was not a risk factor for dengue infection.

**Keywords:** family mobility, DHF incidence, risk factor

## INTRODUCTION

Dengue hemorrhagic fever is still a public health problem both in the world and in Indonesia.<sup>1,2</sup> (Ditjen PP & PL Depkes RI, 2010). Dengue virus infection can be fatal, although the case fatality rate decreases in Indonesia and the incidence is increasing and widespread.<sup>3,4</sup>

Indonesia is a country with the second highest dengue cases among 30 countries in the world.<sup>5</sup> In 1968, DHF was first reported in Indonesia, there were 58 cases in the city of Surabaya, but in 2009 158,912 cases were reported in almost all provinces in Indonesia.

DHF transmission through the bite of the *Aedes* mosquito<sup>6</sup>, so that the incidence of DHF is locally limited to the distance of flying mosquitoes vector. *Aedes aegypti* flying distance is only around 50-100 meters so it is estimated that transmission through mosquito bites only occurs in locations with a radius as far as flying distance.<sup>6</sup> However, it is also believed that there is a role of population mobility in the spread of DHF, both through the movement of viruses with human and vector movements.<sup>7</sup>

Most studies on the role of mobility in the incidence of DHF are aimed directly at patients, but there is no examined the role of mobility of family members living in one house. It is assumed that family members who have high mobility can carry the dengue virus obtained from the high endemic areas they visit and then transmit it to family members at home.

This study wants to provide information about the role of family mobility in the incidence of dengue in society. It is expected that the results of this study can support the need to watch out for the presence of family members who have high mobility as a risk factor for dengue infection for other family members.

## RESEARCH METHOD

This is an observational study, using *case control* design. The study was conducted in two DHF endemic subdistricts

in Sleman Regency. The study population was the people of Sleman Regency. This research using purposive sampling method, obtained a sample of 56 people for the case and 66 people for control in Sleman Subdistrict and 58 people for the case and 58 people for control in the Gamping Subdistrict. There were 238 participants totally involved in this study. Case group criteria are families that have family members who have been affected by dengue for the 2014-2016 period. The control group is the neighboring family of DHF patients who have almost the same characteristics. Study participants were excluded if the questionnaire was incomplete or did not return the questionnaire.

Retrieval of questionnaire data was done by filling out questionnaires and direct interviews by visiting participants' houses. Data collection is done after obtaining approval from the Ethics committee, and also obtaining informed consent. This research has received the approval of the FKIK UMY ethics committee no. 172 / EP-FKIK-UMY / III / 2018.

Data on dengue patients in 2014-2016 along with their addresses were obtained from the Sleman Regency Health Office, used as a basis for visiting participants' homes. The questionnaire contains questions about the mobility of each family member. Daily mobility is weighted according to distance and destination. If family members carry out daily activities outside the village or  $\pm > 10$  km, they are given a weight of 3. If family members carry out daily activities outside the home but are still in one village or 1-10 km, then are given weight 2. If they have activities outside the house  $< 1$  km, it is given a weight of 1, and is given a weight of 0 if there is no daily activity outside the house. The number of family mobility scores is the accumulation of the number of weights  $\times$  scores for all family members. Quantification of family mobility is intended to describe the infection possibility from outside the house.

Family mobility data are classified into 3 categories, namely low, medium and high, then analyzed using *chi square* to determine the significance of the role of mobility in the incidence of DHF. High category if the score is  $\geq 7$ ; moderate if the score is 4-6; low if the score is 0-3.

## RESULTS AND DISCUSSION

The study was conducted in Gamping Subdistrict representing a high endemic area in Sleman Regency and Sleman Subdistrict representing a moderate endemic area. The characteristics of the respondents in Gamping Subdistrict are presented in Table 1 and respondents from Sleman Subdistrict are presented in Table 2.

Table 1. Characteristics of Respondents in Gamping Subdistrict, Sleman Regency, Yogyakarta Province, Indonesia

No.	Characteristics of Respondents	Case Group		Control Group	
		n	%	n	%
1	Age (year)				
	0-14	30	15.07	8	5.16
	15-56	142	71.36	94	60.65
	$\geq 57$	27	13.57	53	34.19
2	Gender				
	Male	106	53.27	81	52.26
	Female	93	46.73	74	47.74
3	Type of Work				
	Student	56	28.14	19	12.26
	Employee/teacher	63	31.66	29	29.67
	Laborer	41	20.60	38	24.52
	Housewife/unemployed	39	19.60	52	33.55

Table 2. Characteristics of Respondents in Sleman Subdistrict, Sleman Regency, Yogyakarta Province, Indonesia

No.	Characteristics of Respondents	Case Group		Control Group	
		n	%	n	%
1	Age				
	0-14	41	21,24	60	26.09
	15-56	141	73,06	150	65,22
	$\geq 57$	11	5,70	20	8,69
2	Gender				
	Male	96	49,74	113	49,13
	Female	97	50,26	117	50,87
3	Type of Work				
	Student	54	27.98	63	28.77
	Employee/teacher	76	39.38	74	33.79
	Laborer	19	9.85	22	10.05
	Housewife/unemploy	44	22.79	60	27.39

Tables 1 and 2 show that DHF sufferers are more prevalent in productive adulthood (15-56 years). In terms of gender, there seems to be no significant difference between male and female sufferers. In terms of work, more DHF patients are from students and workers. However, DHF

sufferers from housewives/ non-working groups are quite high in Sleman Subdistrict.

Factors of mobility of family members' were analyzed to prove whether they affected the incidence of DHF or did not use *chi-square*. The results of the analysis in two Subdistricts are presented in Table 3 and 4.

Table 3. Results of *Chi-squares* Test for Family Mobility with DHF Events in Gamping Subdistrict, Sleman Regency, Yogyakarta Province, Indonesia

Mobility categories	Case Group		Control Group		Total		p	<i>Chi squares</i> OR
	n	%	n	%	n	%		
Low	36	31.0	45	38.8	81	69.8		comparison
Moderate	9	7.8	8	6.9	17	14.7	0.523	0.71 (0.14-2.02)
High	13	11.2	5	4.3	18	15.5	0.307	0.60 (0.23-1.58)

Table 4. Results of *Chi-squares* Test for Family Mobility with DHF Events in Sleman Subdistrict, Sleman Regency, Yogyakarta Province, Indonesia

Mobility categories	Case Group		Control Group		Total		p	<i>Chi squares</i> OR
	n	%	n	%	n	%		
Low	25	42,37	23	34,85	48	38,4		comparison
Moderate	27	45,76	32	48,48	59	47,2	0.438	0.73 (0.32-1.63)
High	7	11,86	11	16,67	18	14,4	0.685	0.81 (0.30-2.20)

Tables 3 and 4 show that the mobility of family members is not significantly associated with the incidence of DHF. This happened in all study areas, namely Gamping and Sleman Subdistricts. From the distribution, it appears that families in Gamping Subdistrict have higher mobility than families in Sleman Subdistrict. However, in general it appears that most family mobility in Sleman Regency is in the low and moderate category.

Characteristics of Respondents. Tables 1 and 2 show that DHF sufferers are more prevalent in productive adulthood (15-56 years). In terms of gender, there seems to be no significant difference between male and female sufferers. In terms of work, more DHF patients are from the class of students and workers. However, DHF sufferers from IRT / non-working groups are quite high in Sleman District.

The shift in the age of dengue sufferers from the age of children to adulthood in Indonesia has occurred since 1998.<sup>2,8</sup> There are a number of things that might be related to the shift in the age of the patient, namely (1) infection in adulthood is a secondary infection, because secondary infections will result in more severe clinical symptoms<sup>9</sup>, while primary infection is acquired when children do not cause clinical symptoms; (2) infections in adulthood related to high mobility in adulthood cause the possibility of infection from endemic areas visited.<sup>10</sup>

Regarding the distribution of dengue incidence by sex in adulthood, in several

countries in Southeast Asia shows that men are slightly more infected with DHF than women.<sup>11</sup> The estimated incidence of DHF is slightly higher in men related to high mobility in men than women. However, there is no significant trend between men and women in terms of dengue sufferers.

In terms of work, it appears that dengue sufferers are more prevalent in the class of students, students and workers. This is probably because the group has high mobility, so the possibility of being infected from other endemic areas is higher. Human productive age adults have high mobility related to work and education factors.<sup>12</sup> Sleman Regency, especially Gamping Subdistrict, is very close to the Capital of Yogyakarta Province, namely the Municipality of Yogyakarta, even including the agglomeration area of Yogyakarta City. Proximity to urban areas causes high population mobility towards and from the city of Yogyakarta, for economic and educational purposes. But in Sleman Subdistrict, DHF sufferers are also quite high in the household group. This is probably due to the Sleman Subdistrict which is relatively far from the city (Yogyakarta Municipality) so that the incidence of DHF in the area is endogenic, not an import case. However, this possibility must be further proven.

The results of statistical analysis prove that family mobility is not related to the incidence of DHF. These results prove that the mobility of family members does not

pose a risk for other family members to become infected with dengue. This shows that viruses that might be carried by family members who have high mobility are not able to cause transmission to other family members. But a person's mobility can increase the risk of infection for himself.<sup>13</sup>

It can be explained why there is no relationship between mobility of family members and the incidence of DHF, although it is proven to be associated with an increased risk of infection for mobility actors: (1) quantitatively the frequency of people who have high mobility and are infected is small, so it is not able to influence the overall incidence of DHF; (2) if people who have high mobility are infected, it is not easy to infect family members because viremia must occur, there must be susceptible mosquitoes and family members whose immunity is low.

## CONCLUSION

It is concluded that the level of family mobility is not a risk factor for DHF.

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