Several environmental factors related with endemicity status of dengue haemorrhagic fever

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Abstrak

Latar belakang: *Faktor lingkungan mempengaruhi kejadian Demam Berdarah Dengue (DBD). Tujuan penelitian ini untuk mengidentifikasi faktor-faktor lingkungan yang berkaitan dengan status endemisitas DBD di Gunungkidul.*

Metode: *Data dikumpulkan dengan studi potong lintang pada bulan Oktober-Desember 2010. Sampel rumah dipilih dengan multistage sampling. Sampel penelitian terdiri dari 155 rumah masing-masing daerah sporadic dan non-aporadik DBD. Data yang dilakukan dengan observasi langsung meliputi tipe rumah, jarak antar rumah, tinggi tanaman, luas tanaman, dan rimbunan tanaman. Risiko relatif (RR) diperhitungkan menggunakan Stata 9.*

Hasil: *Rimbunan tanaman, tipe rumah, dan jarak antar rumah merupakan tiga faktor lingkungan dominan terhadap status endemisitas DBD. Jika dibandingkan daerah dengan area dengan rimbunan tanaman yang jarang, daerah dengan rimbunan tanaman sinambung merata memiliki risiko 2,5 kali menjadi endemis DBD [95% interval kepercayaan (CI) = 1.95-3.13]. Selanjutnya, area dengan jarak antara rumah yang sangat dekat dibandingkan dengan jarak antar rumah 10 m atau lebih memiliki risiko lebih tinggi menjadi daerah endemik.*

Kesimpulan: *Semakin rimbun tanaman di sekitar rumah dan semakin dekat jarak antara rumah mempertinggi risiko status endemik DBD.* ***(Health Science Indones 2012;1:27-30)***

Kata kunci: *status endemisitas, DBD, lingkungan*

Abstrack

Background: Epidemiologically, environmental factors also affect the incidence of Dengue Haemorrhagic Fever (DHF). The purpose of this study was to identify environmental factors related to the endemicity status of DHF in district of Gunungkidul, Yogyakarta.

Methods: A cross sectional study has been done in endemic and sporadic area. Collected data conducted in October-December 2010. Samples of house were selected by multistage sampling. Samples of this study consisted of 155 houses of each area. Data collected by observation survey. The data were house type, distance between houses, plants height, plants area, and hedge plants. Relative risk (RR) was estimated using STATA 9 software.

Results: Our final model suggested that there were three risk factors (hedge plants, house type, and distance between the houses) were dominant risk factors for endemicity status of DHF. Compared with rare hedge plants area, area with hedge plants evenly continuous had 2.5 times risk to be endemic DHF [adjusted relative risk (RR) = 2.47; 95% confidence interval (CI) = 1.95-3.13]. In term of house type, compared with temporary housing, semi-permanent as well as permanent houses were less risk to be endemic DHF area. In addition, compared with the area with distant between houses (10 m or more), the area with medium, near, as well as very near distant between houses had higher risk to be endemic area.

Conclusion: More continuous hedge plants, and the closer the distance between the houses, increasing the risk of endemicity status of DHF. ***(Health Science Indones 2012;1:27-30)***

Key words: DHF, endemicity status, environment

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Research had shown that Dengue Haemorrhagic Fever (DHF) has been found in all provinces in Indonesia. District of Gunungkidul, Yogyakarta, is one of the endemic districts in the province of Yogyakarta. In 2009 and 2010 the number of cases was increasing. The number of dengue cases in 2010 up to July reached 875 and the number of deaths was 12 people. 42.72% of cases occurred in the age group 6-10 years. The number of endemic villages increased from 26 villages in 2008 to 39 villages in 2009.[1]

Various factors influence the incidence of dengue haemorrhagic fever in the region among other factors the patient (host), the suspected vector, environmental conditions, the level of knowledge, attitudes, and behaviors as well as the mobility of people, different for each region and changeable.Epidemiologically, factors other than host or patient (age, immune status and genetic history), and the virus agent factors, environmental factors also affect the incidence of DHF. Ecological approach to the epidemiology of dengue in different geographical circumstances needs to be done.

Ecological surveys in Lao PDR, z June 2000, indicated that environmental differences, which include differences in vegetation and the presence of predators vector differences, also influence the differences in parameters related to the incidence of entomology DHF. [2]

By obtaining information on the ecological factors that affect endemicity status of DHF, expected to be planned for dengue control activities more efficiently and effectively adapted to the area's condition.

The purpose of this study was to identify environmental factors related to the endemicity status of DHF in district of Gunungkidul, Yogyakarta, including house type, distance between houses, plant height, plant area of land cover, hedge plants.

METHODS

A cross sectional study has been done in endemic and sporadic area in Gunungkidul Regency in Yogyakarta Province. Data collection was performed in October-December 2010. Research areas of endemicity status purposively selected and calculated based on the status from 2007 to 2009. Endemic areas is area where were cases of DHF for 3 consecutive years. Sporadic area is area where every year there are no cases of DHF for 3 consecutive years.

The samples of house were selected by multistage sampling. Samples of this study consisted of 155 houses of each area. Data collected by observation survey. All subjects were observed by trained surveyor selected from local officer.

The data were house type, distance between houses, plants height, plants area, and hedge plants. House type classified into temporary, semi permanent, and permanent based on materials making up the wall. Distance between houses was measured using observation to distance between the subjects with the nearest neighbor's house. Then classified into far (over 10.5 meters), medium distance (5.5-10 meters), near (2.5-5 meters), and very near (0-2 meters). Plant height was classified by an average height of plants around the house subjects (include trees, shrubs, grass) with a limit per house was the house land limits or boundaries to the house or yard neighbors. Plant height classified into 5-12 meters, 3-4 meters, and 0.5-2 meters. Plant area was measured by observed ground cover plants that grow around the home yard (include grass, and other short plant has height less than 10 centimeters). Plant area was classified into 0-50% of yard and more than equal to 50% of yard. Hedge plants were observed to the space under the plant parts were covered up the ground, then classified into rare, no continuous unequal, and continuous uniformly. Relative risk (RR) was used to estimate endemicity risk using STATA 9 software. This study received ethical clearance from Ethics Committee of Universitas Gadjah Mada.

RESULTS

Table 1 shows that most of plants height were 3-4 meters [(84+57/141) =45.5%], and plant area were 0-50% [(106+106)/212=68.4%]. In addition, area with plant height 3-4 m was less likely to be endemic for DHF. However, sporadic and endemic areas were similarly distributed with respect to Plant area and Plant height of 0.5-2 m,

Table 1. Several environmental factors and risk of endemicity status of DHF

	Endemicity status		Crude relative risk	95% confidence interval	p
	Sporadic (n=155)	Endemic (n=155)			
Plant height					
5-12 m	38	54	1.00	Reference	
3-4 m	84	57	0.69	0.48-1.00	0.050
0.5-2 m	33	44	0.97	0.66-1.45	0.895
Plant area					
0-50%	106	106	1.00	Reference	
51% or more	49	49	1.00	0.71-1.40	1.000

Our final model (Table 2) suggested that there were three risk factors (hedge plants, house type, and distance between the houses) were dominant risk factors for endemicity status of DHF.

Compared with rare hedge plants area, area with hedge plants evenly continuous had 2.5 times risk being endemic DHF. In term of house type, compared with temporary housing, semi-permanent as well as permanent houses were less risk to be endemic DHF area. In addition, compared with the area with distant between houses (10 m or more), the area with medium, near, as well as very near distant between houses had higher risk to be endemic area.

Table 2. Relationship between hedge plants, house type, distance between houses with endemicity status of DHF

	Endemicity status		Adjusted relative risk*	95% confidence interval	p
	Sporadic (n=155)	Endemic (n=155)			
Hedge plants					
Rare	72	46	1.00	Reference	
No continuous unequal	79	57	1.22	0.92-1.63	0.161
Uniformly continuous	4	52	2.47	1.95-3.13	0.000
House type					
Temporary	0	9	1.00	Reference	
Semi-permanent	29	25	0.57	0.36-0.90	0.016
Permanent	126	121	0.51	0.34-0.75	0.001
Distance between houses					
Far (>10 m)	38	4	1.00	Reference	
Medium (5.5-10m)	38	23	3.47	1.34-9.00	0.011
Near (2.5-5 m)	42	65	6.33	2.55-15.74	0.000
Very near (0-2 m)	37	63	6.45	2.59-16.07	0.000

*Adjusted each other among risk factors listed on this Table

DISCUSSION

Limitations of the study on the environmental surveys carried out not only based on observations made with the measurement of certain measuring devices. Prior to the survey, a trial was conducted.

Endemicity of area was determined by the presence or absence of any dengue cases which transmitted by mosquitoes. Area Optimal microclimate in support mosquito breeding such as a temperature of 25° C - 27° C and humidity of 60%.[3] According Mardihusodo (2006, cited by Pasca Wati in 2009) optimal natural moisture to mosquito embryo survival ranged from 81.5 to 89.5%.[4] Light also affects the development of mosquitoes, especially when choosing a place to lay eggs.[5] Aedes aegypti like the lighting is less standing water (protected).[3] Based on experimental studies, the development of mosquito habitats like containers that are in the dark than in the open container.[6]

Continuous hedge plants may lead containers, which can become mosquito breeding habitat, to be protected, so it has a micro climate that can support the development of mosquito-borne dengue fever. Maintenance of plants around the house is one of the mosquito control efforts need to be done. To lower the status of dengue endemicity, not enough to reduce the crop or trees around the house that is not too dense. But should be accompanied eradication mosquito breeding is good and right and are routinely performed together. The potential places for mosquito breeding habitat needs to be addressed. Without the

breeding habitat that supported the optimal microclimate mosquito life cycle cannot take place, thus reducing the risk of dengue transmission. Another study in Banyumas (East Java) noted that plants around the house was one of risk factors affected DHF's incidence.[7]

In conclusion, more continuous hedge plants, and the closer the distance between the houses, increase the risk of endemicity status of DHF.

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