



Analysis of Factors Associated with Endemicity of Dengue Hemorrhagic Fever in Two Villages of Baranti District

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Abstract

Dengue Hemorrhagic Fever cases in Indonesia reported from 2000 to 2004 fluctuated, in 2000 there were 45,710 cases with a total of 472 deaths, in 2001 it increased to 46,790 cases with a total of 493 deaths, in 2002 there were 40,377 cases, and in 2003 the number of dengue cases there were 50,131 cases, the number of deaths was 289 cases, most recently in March 2004 the number of dengue fever cases was 26,015 cases with the number of deaths being 389 cases. The aim of the research is to analyze factors related to the endemicity of Dengue Hemorrhagic Fever in two sub-districts of Baranti District. This research method is Observational research with a Cross Sectional Study design looking at the relationship between endemic and non-endemic factors causing the incidence of Dengue Hemorrhagic Fever in two sub-districts of Baranti District. The population and sample in this study are houses and heads of families who are located or domiciled in endemic and non-endemic sub-district areas. Data collection was carried out by interviewing residents' activities using questionnaires. Observations were carried out to obtain data on larval density, number of containers, waste management using observation sheets. How to check for larvae in water. The container was shaken after a few minutes. The presence of larvae was checked using a flashlight and Calculation of larval density for House index, Container Index and Breteau index. The results of the research showed that in endemic areas the percentage of larvae found in containers in houses was 42 houses (68.9%), and no larvae were found in 205 houses (46.9%), in non-endemic areas the number of larvae found in containers in houses was 19 houses (31, 1 %) and containers were not found in 232 houses (53.1 %). Probability (p) < 0.05 indicates a relationship between containers in the house and larval density in dengue endemic and non-endemic areas.

Keywords: Analysis of Factors, Associated, Endemicity, Dengue Hemorrhagic Fever

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1. Introduction

Dengue Hemorrhagic Fever (DHF) is still a public health problem in Indonesia which tends to increase in the number of cases, the wider the spread in line with increasing activity and population density (Ministry of Health of the Republic of Indonesia 2000).

All regions of Indonesia are at risk of contracting dengue fever, because both the virus that causes it and the mosquitoes that transmit it have spread widely in residential areas and public facilities throughout Indonesia. Based on survey results until 2005, dengue fever had become an endemic problem in 122 level II regions, 605 sub-districts and 1800 villages/sub-districts in Indonesia (Nawi, 2005).

DHF is an infectious disease caused by the dengue virus and transmitted by the *Aedes aegypti* mosquito, which is characterized by sudden fever lasting 2 to 7 days accompanied by a reddish face. Complaints such as anorexia, headaches, muscle and bone pain, joint pain, nausea and vomiting are often found. Some sufferers complain of painful swallowing with hyperemic pharynx found on examination, but coughs and colds are rarely found. Usually abdominal pain is also felt in the epigastrium and under the ribs. High fever can cause febrile seizures, especially in babies (MOH RI, 2004).

1. Factors associated with the presence of *Aedes aegypti* larvae

a) Human factors related to the transmission of Dengue Hemorrhagic Fever include: Age, level of vulnerability, ethnicity/race, socio-economic conditions, population density, and population activity. The breeding place for *Aedes aegypti* is in man-made water containers in and around the house, including bathtubs, jars, toilets, drums, flower vases that trap ants on table legs, old tires, etc.

b) Breeding Habitat

The breeding place for the *Aedes Aegypti* mosquito is clean standing water in a container that is contained and does not come into contact with the ground. The breeding places can be differentiated as follows:





- 1) Water storage place, namely a place to store water for daily needs such as: jars, bathtubs, drinking water storage places, toilet tanks, buckets and so on.
 - 2) Not a water storage place (Non TPA), such as pet drinking places (birds, chickens, etc.), used goods (used tires, used cans, bottles, broken plates/glasses), vases/flower pots, etc.
 - 3) Natural Water Storage Places such as holes in trees, stone holes, leaf midribs, coconut shells, shells, brown shells, bamboo pieces, etc. These containers are generally found outside the house.
- c) Environmental factor.
- Environmental factors that influence the occurrence of Dengue Hemorrhagic Fever are: poor environmental sanitation, housing density, rainfall, and breeding places for the *Aedes aegypti* mosquito.
2. Environmental influence on the presence of *Aedes aegypti* larvae.
- The existence of the *Aedes aegypti* mosquito in nature is influenced by the physical and biological environment, the type of landfill, the habit of closing the landfill and the frequency of draining the landfill.
- a. Influence of the physical environment.
- There are various physical environments, for example the layout of the house, type of container, altitude and climate. The distance between one house and another also influences the presence of larvae, because the closer the house is, the easier it is for mosquitoes to spread to neighboring houses.
- b. Influence of air temperature.
- The average temperature for mosquito growth is 250 C.
- c. Influence of air humidity.
- Air humidity will cause the influence of water vapor in the mosquito's body which causes the mosquito's body fluids to dry out. Evaporation is one of the enemies of mosquitoes.
- d. Influence of rain/season.





Rain affects it in two ways, namely causing an increase in air humidity and increasing the number of brooding sites.

1) Biological factors

There are aquatic plants in the pond (herbaceous plants).

2) Type of water reservoir.

Types of water storage containers used daily include jars, drums, plastic buckets and so on which consist of different materials. Differences in materials for making water reservoirs, such as rough surfaces, are very popular with mosquitoes for laying their eggs.

3) The habit of closing water reservoirs.

This relates to the opportunity for the *Aedes aegypti* mosquito to land and lay its eggs. In water reservoirs that are always tightly closed, the opportunity for mosquitoes to lay eggs is very small, thus affecting their presence in the water reservoir.

4) Frequency of draining water reservoirs.

Water reservoirs that are drained regularly will disrupt the continuity of the mosquito life cycle. With the mosquito life cycle lasting about one week, if you drain it every week regularly it will break the breeding cycle of the *Aedes aegypti* mosquito in the water reservoir used at home.

2. Research Method

This research is an observational study with a cross-sectional study design looking at the relationship between endemic and non-endemic factors that cause the incidence of Dengue Hemorrhagic Fever. The population is all houses in the sub-district area, 92 houses for endemic areas and 721 houses for non-endemic areas. The samples in this study were houses and heads of families who were located or domiciled in endemic and non-endemic sub-district areas. The sampling method is using an equalized stratified random system so that members of the selected population have the same chance of being selected as the sample.

3. Results And Discussions

a. Result

Descriptive Analysis





a) TPA

1. Container in the house

Table 1

Distribution of Containers in Homes based on
Endemic and Non-Endemic Areas in Baranti District

Indoor Containers	Territory Status				Jumlah	%
	Endemis		Non endemis			
	N	%	N	%		
There is	42	68,9	19	31,1	61	100
There isn't any	205	46,9	232	53,1	437	100
Total	247	49,6	251	50,4	498	100

Table 1 shows that the number of houses where larvae were found in the house was 61 houses (100%) and the number of houses where larvae were not found was 437 houses (100%). In endemic areas, the percentage of containers in houses where larvae were found was 42 houses (68.9%), and in non-endemic areas larvae were found in containers in 19 houses (31.1%). % and no larvae were found in 232 houses (53.1%).

2. Container outside the house

Table 2

Distribution of Outdoor Containers by Region
Endemic and Non-Endemic in Baranti District

Container outside the house	Territory Status				Amount	%
	Endemic		Non Endemic			
	n	%	N	%		
There is	25	69,4	11	30,6	36	100
There isn't any	222	48,5	240	51,9	462	100
Total	247	49,6	251	50,4	498	100

Table 2 shows that the number of houses where larvae were found outside the house was 36 houses (100%) and the number of houses where larvae were not found was 458 houses (100%).





In endemic areas, the percentage of larvae found in containers outside the house was 25 houses (69.4%), and larvae were not found in containers in 222 houses (48.5%), in non-endemic areas the number of larvae found in containers outside the house was 11 houses (30, 6 %) and no larvae were found in 240 houses (51.9 %).

3. Container Open/Close

Table 3

Distribution of Open/Close Containers based on Endemic and Non-Endemic Areas in Baranti District

Container Condition	Territory Status				Amount	%
	Endemic		Non Endemic			
	n	%	N	%		
Open	192	58,5	136	41,5	328	100
Close	55	33,1	115	67,6	170	100
Total	247	50,0	251	50,4	498	100

Table 3 shows that the number of houses with open containers is 328 houses (66.4%) and the number of houses with containers with lids is 170 houses (100%). In endemic areas, the percentage of houses with open containers is 192 houses (58.5%), and in non-endemic areas there are 136 houses with open containers (41.5%). and 115 houses with containers with lids (67.6%).

4. Clean Container / Moss

Table 4.

Distribution of Clean/Moss Containers Based on Endemic and Non-Endemic areas in Baranti District

Container Condition	Territory Status				Amount	%
	Endemic		Non Endemic			
	n	%	N	%		
Bersih	165	41,1	236	58,9	401	100
Lumut	82	84,5	15	15,5	97	100
Total	247	49,6	251	50,4	498	100

Table 4 shows that the number of houses with clean containers is 401 houses (100%) and the number of houses with containers that have moss is 97





houses (100%). In endemic areas, the percentage of houses with clean containers is 165 houses (41.1%), and the number of houses with containers containing moss is 82 houses (84.5%), in non-endemic areas the number of houses with clean containers is 236 houses (58, 9%) and the number of houses with containers containing moss was 15 houses (15.5%).

5. Number of containers

Table 5.

Distribution of Number of Containers Based on Endemic and Non-Endemic areas in Baranti District

Number of Containers	Territory Status				Amount	%
	Endemic		Non Endemic			
	n	%	N	%		
2 bah	30	66,7	15	33,3	45	100
3 bh	48	46,2	56	53,8	104	100
4 bh	59	60,2	39	39,8	98	100
5 bh	56	50,5	55	49,5	111	100
6 bh	28	33,7	55	66,3	83	100
7 bh	26	45,6	31	54,4	57	100
Total	247	49,6	251	50,4	498	100

Table 5 shows that the number of 2 landfills is 45 houses (100%), the number of 3 landfills is 104 houses (100%), the number of 4 landfills is 98 houses (100%), the number of 5 landfills is 111 houses (100%). %, the number of 6 landfills was 83 houses (100%), and the number of 7 landfills was 57 houses (100%). In endemic areas, the percentage of houses with 2 landfills is 30 houses (66.7%), the number of 3 landfills is 48 houses (46.2%), the number of 4 landfills is 59 houses (60.2%), the number of landfills is 5 there were 56 houses (55.5%), the number of 6 landfills was 28 houses (33.7%), and the number of 7 landfills was 26 houses (45.6%). In non-endemic areas, the percentage of houses with 2 landfills is 15 houses (33.3%), the number of 3 landfills is 56 houses (53.8%), the number of 4 landfills is 39 houses (39.8%), the number of landfills There were 55 houses (49.5%), 6 landfills were 55 houses (66.3%), and 7 landfills were 31 houses (54.4%).





b) Waste management

1. Garbage container close/open

Table 6

Distribution of open/closed waste containers in endemic and non-endemic areas in Baranti District

Trash Container	Territory Status				Amount	%
	Endemic		Non Endemic			
	n	%	N	%		
Open	201	63,2	117	36,8	318	100
Closed	46	26,1	134	74,4	180	100
Total	247	49,6	251	5040	498	100

Table 6 shows that the number of houses with open waste containers is 318 houses (100%) and the number of houses with open containers is 180 houses (100%). In endemic areas, the percentage of houses with open trash containers is 201 houses (63.2%), and the number of houses with closed containers is 46 houses (26.1%), in non-endemic areas the number of houses with open trash containers is 117 houses (36.8%) and the number of houses with closed containers was 134 houses (74.4%).

2. Landfill / non-landfill waste

Table 7

Distribution of landfilled/non-landfill waste in endemic and non-endemic areas in Baranti District

Trash Condition	Territory Status				Amount	%
	Endemic		Non Endemic			
	n	%	N	%		
Landfilled	160	53,0	142	47,0	302	100
Non-landfill un	87	44,4	109	55,6	196	100
Total	247	49,6	251	50,4	498	100

Table 7 shows that the number of houses with landfilled waste containers is 302 houses (100%) and the number of houses with non-landfill containers is 196 houses (100%). In endemic areas, the number of houses with landfilled waste containers is 160 houses (53.0%), and the number of houses





with non-landfill containers is 87 houses (44.4%), in non-endemic areas the number of houses with landfilled waste containers is 142 houses (47.0 %) and the number of houses with closed containers was 109 houses (55.6 %).

3. Larval density

Table 8

Distribution of Dengue Hemorrhagic Fever Endemicity Areas Based on the number of larvae in household containers in Baranti District

Larval Density	Territory Status				Amount	%
	Endemic		Non Endemic			
	n	%	N	%		
Tall	50	73,5	18	26,5	68	100
Low	197	45,8	233	54,2	430	100
Total	247	49,6	251	50,4	498	100

Table 8 shows that the number of houses with a high larval density is 68 (100%) and the number of houses with a low density is 430 (100%). High density in endemic areas was 50 houses (73.5%) low was 197 (45.8%), non-endemic high density was 18 houses (26.5%). Low density was 233 houses (54.2%).

b. Discussion

1) Relationship of Water Storage Sites to endemic and non-endemic areas for Dengue Hemorrhagic Fever.

The results of descriptive analysis regarding water reservoirs inside the house/outside the house, open/closed, clean/moss and the number of containers per house in both endemic and non-endemic areas show different percentages. The results of the research showed that in endemic areas the percentage of larvae found in containers in houses was 42 houses (68.9%), and no larvae were found in 205 houses (46.9%), in non-endemic areas the number of larvae found in containers in houses was 19 houses (31, 1 %) and containers were not found in 232 houses (53.1 %).

a. Larval density





To determine the level of larval density in relation to endemicity in dengue hemorrhagic fever areas, observations of the presence of larvae in containers are carried out both in the house and outside the house, apart from that the larvae free rate (ABJ) can be measured by observing the House Index, Container Index, and Breteau Index in endemic areas.

2) Relationship between waste management and density of dengue fever larvae.

To find out how big a role waste management plays in Dengue Hemorrhagic Fever larvae density, observations were made of the existence of waste containers, both closed/open and buried/unfilled. The results of observations of closed/open waste containers in 55 houses can be described as: High larva density was found in open waste containers, namely 55 (17.3%) compared to closed waste containers, 13 (7.3%), while low larva density was found in waste containers. 263 (82.7%) open and 167 (92.6%) closed waste containers. Based on the results of statistical tests, it was found that there was a relationship between closed/open waste containers and dengue fever larvae density, taking into account the value $(p) = 0.002$, which was smaller than 0.05, meaning there was a relationship between closed/open waste management and larval density.

3) Relationship between population activities and endemic and non-endemic areas for Dengue Hemorrhagic Fever.

The results of descriptive analysis of population activities based on endemic and non-endemic areas show different percentages. The results of the study showed that in endemic areas of Dengue Hemorrhagic Fever based on high population activity there were 120 people (82.8%) and low population activity as many as 127 people (36.0%), in non-endemic areas high population activity was 25 people (17, 2 %), and low population activity of 226 (64.0 %). Population activity is related to the type of work they do and increasingly smooth transportation that connects areas within the city and between cities.





4. Conclusion

a. Based on the objectives and results of the research as well as discussion regarding the analysis of factors related to the endemicity of Dengue Hemorrhagic Fever in two sub-districts in Baranti District, Kendari City, it can be concluded as follows:

1. Water Storage Place (TPA) is a factor that is significantly related to Dengue Hemorrhagic Fever larvae density in endemic and non-endemic areas, Baranti District, Kendari City, calculation results: Containers in the house $X^2 = 262.097$ $p = 0.000$, containers outside the house $X^2 = 172.793$ $p = 0.000$, open container $X^2 = 236.887$ $p = 0.000$, closed container $X^2 = 68.124$ $p = 0.000$, clean container.
2. Waste management is a factor that is not related to the density of Dengue Hemorrhagic Fever larvae in endemic and non-endemic areas of Baranti District. The calculation results of.
 - a. Larval density is a factor that is significantly related to the incidence of Dengue Hemorrhagic Fever in endemic and non-endemic areas of Baranti District. Calculation results $X^2 = 18.042$ $p = 0.000$.
 - b. Population activity is a factor that has a significant relationship and is a very close factor among the three factors above in relation to the incidence of Dengue Hemorrhagic Fever in endemic and non-endemic areas of Baranti District. Calculation results $X^2 = 89.980$ $p = 0.000$.

5. Compliance with ethical standards

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Disclosure of conflict of interest





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This research collaboration is a positive thing for all researchers so that conflicts, problems and others are absolutely no problem for all writers.

Statement of informed consent

Every action we take as authors is a mutual agreement or consent.

References

1. Ambarawati, F. R., & Nasution, N. (2012). Smart Book for Nursing Care for Babies & Toddlers (I).
2. Horizons of Knowledge. Annisa, D., Hapsari, M., & Farhanah, N. (2015). Differences in the Clinical Profile of Dengue Hemorrhagic Fever (DBD) in Children and Adults. *Diponegoro Medical Journal*, 4(4), 582–591.
3. Adimidjaja, 05 2004 Dengue Fever.
4. Bella Danies Apsari, P. (2018). Description of Nursing Care for Children with Dengue Haemorrhagic Fever with Hypovolemia in the Cilinaya Room, Mangusada RSD Badung in 2018.
5. Chandra, A. (2010). Dengue Hemorrhagic Fever Epidemiology, Pathogenesis, and Its Transmission Risk Factors. *Aspirator: Journal of Vector Borne Diseases Studies*, 2(2), 110–119. <https://doi.org/10.22435/aspirator.v2i2.2951>.
6. Department of Health, 2000, Epidemiology News, Jakarta.
7. Ministry of Health, 2003, Prevention and control of Dengue Fever and Dengue Hemorrhagic Fever, Jakarta
8. Department of Health, 2004, Management of Dengue Hemorrhagic Fever in Indonesia, Jakarta.
9. Department of Health, 1997, Mobilizing the Community in eradicating Dengue Hemorrhagic Fever mosquito nests, Jakarta.
10. Republic of Indonesia Ministry of Health 2005, DBD Data for Provinces throughout Indonesia.
11. Department of Health, 2001, Environmental Sanitation in Vector Control, Jakarta.
12. Department of Health, 1989, Port Health Office Manual, Jakarta
13. Southeast Sulawesi Provincial Health Service, 2005, District/City DHF Data, Kendari.
14. Health Service, 2005, District DHF Data, Kendari.
15. Djaffar.H, 2000, Providing Clean Water, FKM Unhas Department of Public Health, Makassar.
16. Daud, A, 2000, Provision of Clean Water, FKM Unhas Department of Public Health, Makassar.
17. Bandung Institute of Technology, 1993, Waste Management and Technology Training, Bandung.





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18. Port Health, 2006, Development of Kendari port ship passengers in terms of epidemiological surveillance, Kendari.
19. Mukono, H, 2000, Basics of Environmental Health, Airlangga University, Surabaya.
20. Mukono, H, 2002, Environmental Epidemiology, Airlangga University, Surabaya
21. Masri, S, 1995, Population and environment, Jakarta.
22. Noor, N, 2000, Introduction to the Epidemiology of Infectious Diseases, Jakarta.
23. Nawi R, 2005, Epidemiological Surveillance of Dengue Hemorrhagic Fever in Developing Countries, UNHAS, Makassar.
24. Pratomo, H, 2003, Population Study of Dengue Hemorrhagic Fever (DHF) mosquitoes in Widodomertani Village, Jojakarta.
25. Postgraduate Program, 2005, Thesis Writing Guidelines, Unhas Makassar.
26. Rozanah, A, 2004, Biologist Observing Health and Environmental Problems.
27. Ritonga, AR, 2001, Population and the environment, Indonesian University, Jakarta.
28. Siswono, 2004, Tips for Warning of Dengue Fever.
29. Suparmanto, Pdkk, 2004, Improving Community-Based Dengue Hemorrhagic Fever (DBD) Management with a Health Education Approach.
30. Sungkar, S, 2005, Bionomics of Aedes Aegypti, Dengue Hemorrhagic Fever Vector, Journal Volume 55 pages 384- 387.
31. Syamrina.K, 2005, Analysis of factors related to the endemicity of Dengue Hemorrhagic Fever in the working area of the Kassi-Kassi Health Center and the Makassar City Intermediate Health Center.
32. Widodo, J, Herjanto, P, Hasan, M, 1993, Research Methods and Applied Statistics, Surabaya. .
33. Toalu, A., Tawil, M. R., Musfirah, M., Marpaung, M. P., Pannyiwi, R., & Halimatussa'diah, H. (2023). Content of E. Coli, Coliform and Iron (Fe) Bacteria with A Refill Drinking Water Treatment System in Tinggimoncong District. International Journal of Health Sciences, 1(2), 196–202. <https://doi.org/10.59585/ijhs.v1i2.84>
34. Yulis, D. M., Serli, S., Aulia R, R., Rosida, R., Andi Latif, S., & K, H. (2023). PKM Immunization of Measles at the Bontomarannu Health Center. Social Friends: Journal of Community Service, 1(2), 53–55. <https://doi.org/10.59585/sosisabdimas.v1i2.33>

