OP-12

EPIDEMIOLOGY ANALYSIS OF VECTOR CONTROL TOWARDS ENDEMIC AREA OF DHF (DENGUE HEMORRHAGIC FEVER) IN BANYUMAS REGENCY

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ABSTRACT

The increase of endemic areas from 29 into 41 caused Banyumas, in December 2008, was stated as an outbreak after 685 inhabitants suffered dengue fever which, nine them were died. It might be because of the lack of effective vector control of mosquitoes and misperception on dengue fever handling. This research was aimed to analysis the vector control towards dengue fever endemicity epidemiologically in Banyumas regency.

This research was an observational analysis with crossectional design. The population was all houses in Banyumas regency and the sample was the houses in sub-district of Sokaraja by grouping an endemic village and non-endemic one. The free variable of this research was endemicity and bound variable were CI (Container Index), HI (House Index), BI (Breteu Index). The analysis was used person-correlation test.

The result of the research showed that in the endemic area, there were higher percentage of positive of *Aedes aegypty* (61,1%) compared to non-endemic (14,7%). It also could be observed for the containers, that in the endemic area the water containers appear more positive *Aedes aegypti* (65,5%) compared to non endemic (34,5%). The statisticsbased test resulted that there was a positive correlation between the existence larva's in the water container and the endemicity. It means that the more a container has positive *Aedes* larvas the higher endemicity level in certain area (r:0,465), that will also consider to the amount of positive *Aedes* larvas that affected the level of endemicity (r: 0,408).

The conclusion of the research was that both areas (endemic and non endemic) had the high level risk to be infected by high level dengue fever, although there was different risk level to both of areas. There was also a positive correlation between the existence of larvas in the water container and the endemicity. It also could be concluded that the more high amount of positive area *Aedes* larvas in most houses, the higher the level of endemicity in that area. The suggestions for the people either in the endemic and non endemic areas, it suggested to be more active in the effort to exerminate omit the dengue fever, that was the trial to exerminate mosquito's nest or *Aedes aegypti* and also need to do regular larva inspection.

Key word: Vector Control CI (container index), BI (breteu index), HI (house index), Endemicity

INTRODUCTION

Background of the problem

Dengue fever is a disease of international concern which reached 50 million cases per year around the world. The prevalence of dengue fever is still quite high in Indonesia. There were 71 patients' per-100.000 people in 2007, while the death because of the

disease reached 1,010 percent per-100 patients, and 12 provinces has been declared as an area of Extraordinary Condition (*KLB*) of dengue fever (Anonymous, 2004). *KLB* or extraordinary condition is a condition where the number of patient/death increases rapidly; it is caused by a disease in a particular area. In fact, there are many areas with extra ordinary condition where the areas are also categorized as endemic. The condition must be our concern.

Endemic is a condition where a disease, especially its frequency or its number in a certain area, exists in a long time. Endemic condition is one indicator of epidemiology measurements relates to the frequency of disease. In December 2008, Banyumas was set as the area of extraordinary condition (*KLB*) of dengue fever. There were 685 residents stricken by the disease, nine of them were died. Whereas in 2002, Banyumas became a pilot area of disease prevention programs of Dengue Hemorrhagic Fever (DHF). Head of Disease Eradication and Environmental Health Office (Health Office) Banyumas said the endemic area of dengue hemorrhagic fever (DHF) in Banyumas, Central Java, increases almost doubly. Increase in endemic areas in Banyumas regency from 29 villages to 41 villages is possibly because of the lack of effective mosquito vector control, as well as the wrong view in solving the dengue fever problem. Most people assume that the eradication of mosquitoes through fumigation or fogging is a major step to combat dengue fever, but more important is the routine PSN activity, as a form of vector control. (Ayyubi, S, 2008)

Problem Formulation

The increasing number of endemic region/village in Banyumas from 29 to 41 villages and the extraordinary conditions in December 2008 after 685 of its residents stricken by dengue fever, and the national index of dengue cases in this regency has passed a national index of dengue cases; it is 43/100 thousand of residents. Meanwhile solving effort which has been done leads to the eradication of the vector, but in fact, vector control is more important. So it needs to be studied epidemiologically, the vector control of dengue fever endemicity.

Library Review

1. Definition of Dengue Fever

   Dengue Hemorrhagic Fever (DHF) is a disease caused by dengue virus and is transmitted through the bite of Aedes Aegypti mosquito. The disease can attack anyone and can lead to death (Chin, 2006).

2. Causes of the Diseases

   Dengue virus includes the Flavivirus genus and it has 4 serotype types namely

DEN1, DEN 2, DEN 3 and DEN 4. Infection by one of serotypes will cause antibodies against the serotype, whereas the antibodies formed towards other serotypes is lacking, so it cannot provide protection against other serotypes. (Chin, 2006)

3. Ways of Transmission (Infection)

Someone whose blood contains the dengue virus is a source of transmission of the disease of dengue hemorrhagic fever (DHF). Dengue virus exists in the human blood for 4-7 days, starting 1-2 days before the fever. If the patient is bitten by the mosquito, then the virus in the blood will be sucked into the mosquito stomach. Furthermore, the virus will multiply and spread in various tissues of mosquito body including on its saliva glands. Approximately 1 week after sucking the blood of patient, the mosquito is ready to transmit to others (period of *ekstrensik* incubation). The virus will remain in the mosquito's body throughout its life; therefore the Aedes aegypti mosquito that has been sucked the virus will become transmitters of dengue virus throughout its life (Health Ministry, 1999).

4. Aedes Aegepty Morphology

a. Characteristics of Aedes Aegypti

Mosquito life cycle: egg → larva → pupa → mosquito. The growth from egg to mosquito is approximately 90-10 days. Every time female mosquitoes lay its eggs, it is approximately 100 items that are placed one by one on the vessel wall. The black eggs with a size 0.8 mm in dry place with no water can last up to 6 months. The eggs will hatch into larvae within two days after put into water.

b. Natures of Aedes Agypti Larvae

Larvae that hatch from the eggs will grow into a large, 0.5 to 1 cm long. Always move actively in water. Its movements are repeated from the bottom to the surface for breathing, then drop back down and so on. At break time, its position is almost perpendicular/ vertical to the surface of the water; usually it floats around the walls of water reservoirs. After 6-8 days the larvae will grow into pupae. The growth of Imago-Larva on optimal conditions takes 7 days. Its common Habitat is on the human-made containers: bathtub, jars, drums, old tires, ant traps, flower vase etc. It does not like a puddle of water directly lays on the soil.

c. Natures of Aedes Aegypti Pupae

Shaped like a coma, its movement is slow, often in surface water. After one

or two days mosquito pupae changed its self become new mosquito.

d. Natures of Aedes Aegypti Mosquito

It is black with brindle (white stripes on the entire body) and lives in and around the house, (schools, mosques, buildings and so on). It can fly up to 100 meters. Active female mosquitoes bite/suck the blood in the morning until late afternoon. Male mosquitoes could suck the flower /plant essence that contains glucose. Average age of the mosquito is two weeks, but some others can live from two until three months. Female Aedes mosquitoes suck human blood every two days, the protein from the blood is necessary for the maturation of eggs on its stomach. After sucking human blood, mosquitoes will find a place to perch for resting. The favored places for perching are some hanged objects: clothing, mosquito nets or vegetation near the place where it grow/multiply. Usually the places are rather dark and damp. After the rest period is completed, the mosquitoes will lay their eggs on the wall of tubs, jars, drums, cans, old tires filled with water. It usually swims under the water surface, and then the mosquitoes will seek the prey to suck the blood. (Health Ministry, 2004)

Symptoms and Diagnosis

Sudden high fever, with no obvious cause which lasts continuously for 2 to 7 days, bleeding manifestations which are characterized by: (Tourniquet test +, Ptechiae, echimosis, purpura, mucosal bleeding, epistaxis, gums bleeding, hematemesis and/or melena, liver enlargement). Shock, thrombocytopenia (100.000/µl or less), emokonsentrasi seen from the increase in hematocrit of 20% or more.

5. Prevention and Control of Dengue Fever Vectors

To prevent and to limit the dengue fever disease, every family needs to eradicate mosquito breeding nest of dengue hemorrhagic fever by *3M* (to drain, to cover, to bury), (WHO, 2000). Vector control is the effort made to reduce vector populations to prevent vector-borne disease or disorder caused by the vector. Objectives of dengue fever vector control are to lower density and vector population up to a particular index (the level that no longer dangerous to public health). Therefore, there is need for quantitative assessment of the number of vectors per-unit of area or per-unit of population. Assessment in this way besides

used as a predictive value is also useful for planning and evaluation of vector control programs. Some indicators that can be used are (Hasyimi & Soekirno, 2004):

1. Container Index/CI
   It is the percentage of water reservoirs / container that is positively used by aedes aegypty.
2. House Index/HI
   It is the percentage of houses that is positively found Aedes aegypti larvae.
3. Breteau Index/BI
   It is the number of containers that positively found the aedes aegypty larva or pupa in 100 homes. If the index breteau <5, dengue fever and will not be transmitted if > 50, the area in danger of transmission.

In Indonesia, dengue vector control has been done actually, because this is the most effective way to help breaking the chain of dengue transmission. An example result of the researches that has been done by Setiyabudi R & Hikmawati, I (2006) shows that there are differences in average egg which are put by Aedes aegypti mosquito in a dark container and in non-dark container, where the Aedes aegypti mosquito prefers spawn in a dark container rather than laying eggs in non-dark container.

Research Objectives

1. General Purpose: to analyze the epidemiology of vector control of dengue endemicity in Banyumas Regency.
2. Specific Objectives:
   a. Knowing the risk factors of Container Index/CI towards dengue endemicity.
   b. Knowing the risk factors of House Index/HI towards dengue endemicity.
   c. Knowing the risk factors of Breteau Index/BI towards dengue endemicity.

RESEARCH METHODOLOGY

Study Design

It is the type of observational analytic research with crossectional design.

Population and Sample

Population is all houses in Banyumas regency, while the sample is the homes in the sub-district of Sokaraja, by taking an endemic village and non endemic area. Based on the existing theory, the calculation of indicators for vector control carried out at least 100 homes, so the implementation will be carried out on 50 houses in endemic areas and 50 homes in non-endemic areas (Hasyimi & Soekirno, 2004).

Research variables

The variables of the study consists of: the independent variable is endemicity, while variable bound is CI (container index),

H (house index) I, BI (breteu index)

Data Analysis

The analysis of data research data uses personal correlation-test with 95% trust level.

RESULTS AND DISCUSSION

The results showed that based on the types of containers are mostly the bathtub (43.2%), according to the existence of larvae in the container is mostly negative (58.3%). Based on observations and interviews with residents who reside in the area, they use treated water for cooking, washing and bathing, there are only a few residents who use refill water, especially for drinking water needs, and all visited houses have water reservoirs for households needs.

The result of the research also showed that in the endemic area, there is higher percentage of positive result of aedes aegypty existence (61,1%) compared to non-endemic (14,7%). It also can be seen for the containers, that in the endemic area the water containers appear more positive aedes aegypti (65,5%) compared to non endemic (34,5%). The statistics based test result that there is a positive correlation between the existence larva's in the water container and the endemicity. It means that the more containers which have positive aedes larvas existence the higher endemicity level in certain area (r:0,465), that will also consider to the amount of positive aedes larvas that affect the level of endemicity (r: 0,408).

Research showed other result of aedes aegepty various habitat. Most of the mosquitoes prefer the artificial container. The female mosquitos of aedes aegepty will choose the place for laying their eggs based on the location, kinds, material, colour, shape, volume, container's cap and water source. The existence of the container influence mostly to the amount of the aedes aegepty. If there are many containers, it means there is increasing in amount of it because they can lying their egg in many places. However it also means that many areas threaten infected dengue virus which can cause extraordinary conditions. If it occurs constantly in those areas, we can categorize it as the endemic area. The elucidation needs to be given to the society in solving this problem. There are three steps to overcome this disease. The steps are to clean, to close the container and to bury the broken containers. Sungkar's Research (1994) shows that container made from cement has high death risk rather than container made from tile. Meanwhile Setyabudi R and Hikmawati's I (2006) research shows that there is difference amount of eggs between in the dark colour

container and bright color container. The amounts of eggs in dark color container are bigger than eggs in the bright color container.

The results showed that in non-endemic areas, larvae number was lower than in the endemic areas, it because the water supply in non-endemic areas is better, so the sanitation is also better. It is also supported by the eradication of mosquito breeding activity (*PSN*) which is done routinely. In the other hand, the density of population in endemic areas contributes or becomes one of factors for dengue disease transmission; because the higher number of a population, the easier aedes mosquitoes to transmit the virus from one person to other.

Population growth which does not have a specific pattern and unplanned/ uncontrolled urbanization are the factors that play a role in the re-occurrence of extraordinary conditions (epidemics). So we need to control the growth of aedes larvae that can be done in several ways, such as: physically with "3 M", chemically by using insecticides, in biologically with larvae-eating fish (*Kepala Timah* fish, *Gupi* fish, *Cupang* fish). We can also use *Bacillus thuringiensis var Israeliensis* (Bti). (Indonesian Health Ministry, 2004)

CONCLUSION AND SUGGESTION

The conclusion of the research is that both areas (endemic and non endemic) have the high level risk to be infected by dengue fever, although there is different risk level to both of areas. There is also a positive correlation between the existence of larvae in the water container (container index) and the endemicity ((r = 0.465). It also can be concluded that the more house amount of positive aedes larvas area, the higher level of endemicity in that area. The suggestions for the people who live in both endemic and non endemic areas is to be more active in the exterminating efforts of the dengue fever, these are the exterminating effort to exterminate aedes aegypti mosquito's nest and also the effort to do regular inspection of the aedes egypti larvae.

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