# Environmental Factors Increase Incidence of Dengue Fever in Indonesia

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***Abstract****: Dengue fever is an increasing public health problem in South Sulawesi, Indonesia. The Dengue endemic area and dengue fever cases occur for the last 3 years is Maros regency. The important question is what environmental factors related with dengue fever incidence based on clean water management, and waste management in Maros regency. Type of analytic research with cross sectional study approach. The number of samples in this study was 112 respondents. Data collection through interview using questioner. Data analysis using chi square statistical test. The result showed there is no relation of incidence of dengue fever disease with water management with p value = 0.501, waste management with p value = 0.000 have relationship with dengue fever incidence. Therefore, it is hoped that the related parties should improve health education and provide waste bins.*

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## I. Introduction

Health is a basic need for everyone. The concept of prevention and maintenance of health is not paid attention by all parties, especially by health workers, so that disease problem is not solved properly like infectious diseases. Low public health status can affect some aspects of human life[10]. The incidence of infectious diseases has increased in recent years. One of the infectious diseases where the incidence rate is still high, and the treatment has not been fully successful is dengue fever. Dengue is an acute mosquito-borne viral infection that places a sufficient socioeconomic and environmental factors and disease burden on many tropical and subtropical regions of the world. Dengue transmission is a complex phenomenon influenced by living conditions, poverty, social inequalities, illiteracy[7], and mobility. The dynamics of dengue fever transmission sensitive to changes in environmental conditions as well as environmental factors[5]. Dengue fever characterized by sudden high fever without any obvious cause, lasting for 2-7 days, bleeding manifestation and positive tourniquet test[6].

In Indonesia and other countries, efforts to control DHF have not been effective and have failed in some degrees[11], and a main reason was the failure to mobilize all the community, a lack of knowledge, attitude and behaviour. Several problems may be related to the increase in dengue in the urban areas of large cities in Indonesia, like supply of household piped water, open water containers, along with other receptacles such as tyres, cans, and flower vases, create breeding sites for Aides aegypti. Environmental methods to control Ae. Aegypti and Ae. Albopictus and vector contact include source reduction, solid waste management, and improve house design[17]. Environmental management that aims to reduce, remove, and displace breeding sites from urban areas is recognized as a key mechanism to control dengue transmission[15]. Furthermore, poor waste management could lead to various diseases, infections and these include fly transmitted diseases like mosquito borne diseases such as dengue haemorrhagic fever[12].

South Sulawesi Province is one of the provinces that incidence of dengue fever is still high and one of dengue endemic areas is Maros Regency. The incidence of dengue fever over the last 3 years in Maros District has increased. Data from Maros District Health Office in 2014 dengue incidence as many as 449 cases and 2 cases died, in 2015 as many as 397 with 1 case died, and in 2016 the incidence of dengue as many as 628 and 1 person who died[9], there is still no discovery of effective drugs and vaccines for dengue disease.

Eradication of dengue fever is a way of vector control to prevent the occurrence of transmission of dengue disease. The campaign eradication of mosquito breeding has been promoted by the government in this case the Ministry of Health with a 3M slogan, which drains of water reservoirs, closes the water reservoirs and buries the used goods that can become mosquito breeds[6]. In addition to mosquito eradication activities, other efforts in vector control to prevent the occurrence of dengue fever is done by avoiding contact with mosquitoes. This prevention can be done with attention to family habits such as clean water management, and waste management, to reduce the likelihood of occurrence of cases of dengue fever. Understanding risk factors of infection is vital for targeting control interventions[8]. Arsin Research. A. A[1]said that a significant relationship was observed between environmental conditions, water storage (TPA), water accessibility, community

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knowledge and attitudes, quality of residence and family income with dengue cases in Makassar. However, efforts to tackle the DHF epidemic in Indonesia are still far from satisfying. Various obstacles faced such as budget limitations, infrastructure limitations, and lack of data and information[2].

Based on morbidity rate, there is a possibility that dengue fever may occur year by year if there is no dengue control effort to improve the environment. Therefore, the authors are interested in conducting research on the relationship of environment factors with the incidence of dengue fever in Maros Regency.

## II.  Material And Methods

The type of research used is analytic study with cross sectional study to know the relation of environmental factor with dengue fever case in Maros regency, where independent and dependent variable are observed at the same time. The population in this study is the generalization area consisting of objects / subjects that have certain qualities and characteristics established by the researchers then drawn conclusions[14]. Sampling is done by Probability Sampling is sampling which gives equal opportunity for each element (member of population) to be selected as sample[14].

**Study design:** Cross sectional study

**Study Location**: The sample is part of the house in Maros Regency with one of the family members have suffered from dengue fever.

**Study Duration**: Januari to maret 2018

**Sample size**: 112 houses

**Sample size calculation**: The sample size is calculated using the formula: n = N. Z2. P. q / d2. (N-1) + Z2. P. q and the total sampling is 112 houses.

**Subjects and selection method:** The population in this study is the generalization area consisting of objects / subjects that have certain qualities and characteristics established by the researchers then drawn conclusions[14]

**Procedur methodology**

The primary data environmental factors like water management and waste management were obtained by interviewing respondents through questionnaires. The additional data in the form of a picture of the research area and demographic obtained from the sub district office research sites and primary health care

**Statistical analysis**

The questionnaire has been tested for validity and reliability before used for research. Data processing is done by SPSS version 23.0. The data environmental factors with dengue fever were analysed by univariate and bivariate using chi square test with α = 0.05.

## III. Results

Descriptive characteristic of the analysed sample is shown in table no 1. The gender is highest in male 61.9% of respondents and the lowest female as much as 38.1% of respondent. The highest number of age group is 41-50 years (32.1 % of respondents) and the lowest 31-40 years (10.7). The highest occupation of private employees as much as 64 respondents (57.1%) and the lowest civil servant was 4 respondents (3.6%). Highest level of education is moderate and high school (46.4% of respondent) and the lowest is low of education 7.1%. Most of the respondents (65.3%) have income monthly < 3 minimum wage than > 3 minimum wage (42.8%) and the highest of family member 4-6 person was 53.6%.

**Table no 1.** Socio-Demographic Characteristic of Respondent (N=112)

| Variable | Frequency | Percentage |
|---|---|---|
| Gender distribution Male | 52 | 61.9 |
| Female | 32 | 38.1 |
| Age distribution 21-30 | 20 | 17.9 |
| 31-40 | 12 | 10.7 |
| 41-50 | 36 | 32.1 |
| 51-60 | 28 | 25.0 |
| 61-70 | 16 | 14.3 |
| Occupation Traders / Entrepreneurs | 32 | 28.6 |
| Private employees | 64 | 57.1 |
| Civil servant | 4 | 3.4 |
| Retire / IRT | 12 | 10.7 |
| Level of education Low | 8 | 7.1 |
| Moderate | 49 | 43.8 |
| High | 55 | 49.1 |
| Monthly income | | |

| | | |
|---|---|---|
| < 3 minimum wage | 64 | 57.1 |
| > 3 minimum wage | 48 | 42.9 |
| Member of Family | | |
| 1-3 | 44 | 39.3 |
| 4-6 | 68 | 53.6 |
| >6 | 8 | 7.1 |
| Water management Good | 87 | 77.7 |
| Poorly | 25 | 22.3 |
| Waste management Good | 41 | 36.6 |
| Poorly | 71 | 63.4 |
| Dengue fever incidence Suffered from dengue fever | 61 | 54.5 |
| Not suffer from dengue fever | 51 | 45.5 |

Association water management with dengue fever incidence. Table no 2 shows that from 112 respondents do water management and suffer dengue fever 56.3% and not suffering 43.7%. do poor water management and suffer dengue fever was 48% and not suffer from dengue fever 52%. Dengue fever disease is one of the commonly classified diseases as water related Insect Vector Diseases is the vector that spread of disease has a breeding ground in the water. The vectors of this dengue disease are Aides aegypti, Aides albopictus, and Aedes Scutellaris. Aedes mosquito is the main vector of transmission of dengue fever. One of the breeding places of Aides aegypti is a water reservoir like a bathtub, a water barrel, which if not closed and often not drained is the most favoured place by mosquitoes to breed.

**Table no 2.** Association Water Management With Dengue Fever Incidence

| Water Management | Dengue Fever Incidence | | | | N | % | Nilai P |
|---|---|---|---|---|---|---|---|
| | Suffer Dengue Fever | | Not Suffer | | | | |
| | n | % | N | % | | | |
| Good | 49 | 56.3 | 38 | 43.7 | 87 | 100 | |
| Poorly | 12 | 48.0 | 13 | 52.0 | 25 | 100 | 0.501 |
| Jumlah | 61 | 54.5 | 51 | 45.5 | 112 | 100 | |
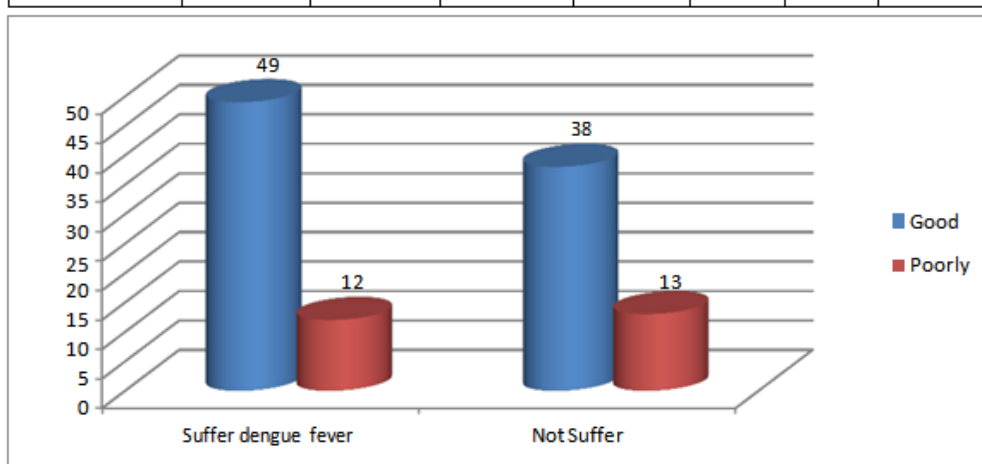


Association waste management with dengue fever incidence. Table no 3 shows that from 112 respondents who waste management practice good and suffer dengue fever was 19.5% and not suffer 80.5%. whereas garbage management practice is not good and suffered dengue fever was 74.6% and not suffer from DBD (25.4%). This is because around the respondent's house there is no waste that can accommodate the water can be a breeding site of mosquito aedes agypti.

**Table no 3.** Association Waste Management with Dengue Fever Incidence

| Garbage Management | Dengue fever | | | | N | % | Nilai P |
|---|---|---|---|---|---|---|---|
| | Suffered | | Not Suffered | | | | |
| | n | % | N | % | | | |
| Good | 8 | 19.5 | 33 | 80.5 | 41 | 100 | |
| Poorly | 53 | 74.6 | 18 | 25.4 | 71 | 100 | 0.000 |
| Total | 61 | 54.5 | 51 | 45.5 | 112 | 100 | |
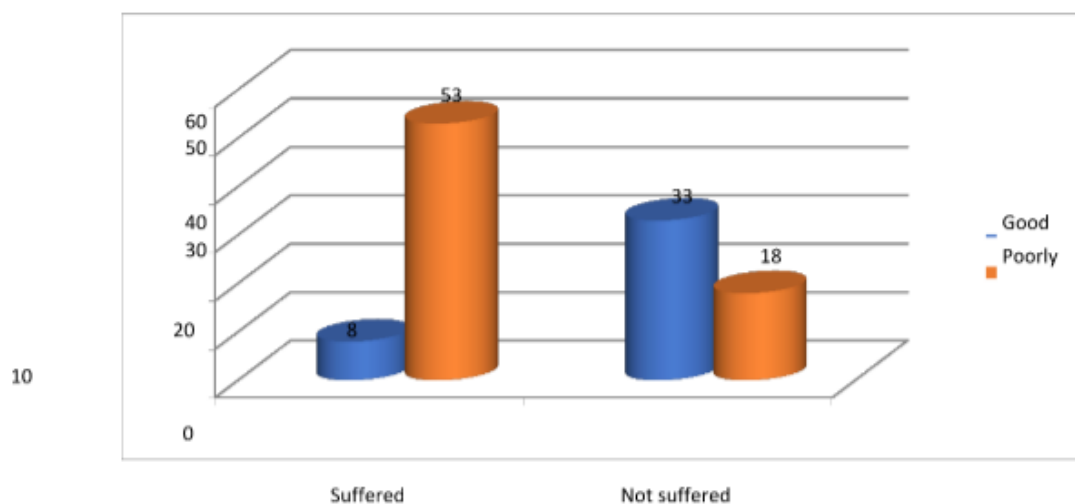


## IV. Discussion

The results of research that 112 respondents indicate the waste management of household good and suffering dengue fever was 19.5% because the community around indifferent to environment conditions was dirty. The people who dispose of trash, and do not process waste properly can become a puddle and breeding ground for the aedes agypti mosquito. besides that the community also does not have much time to clean surrounding environment because it is busy with its work Chi-square statistic test (p value) 0.000 is less than $\alpha = 0.05$ which means that there is correlation between waste management household and dengue fever incidence.

Waste is one of the health problems, because there is a relationship between health with the sanitary circumstances of a dirty home environment, which is caused by the littering of garbage disposal. This can be seen from the relationship between waste management with diseases transmitted by rats, flies, mosquitoes, worm disease, which is called the disease-based environment. One of the mosquito-borne diseases associated with garbage management is dengue disease whose number of events can increase due to the vector of diseases that live in the environment where the waste is not good in handling waste. Environmental sanitation aspects related to vector control Aedes aegypti include water supply and waste management

Waste management is the collection, transportation, recycling, or disposal of waste materials. Waste management is also done to restore natural resources. Waste management may involve solid, liquid, gas, or radioactive substances with specific methods and expertise for each type of substance. Vector control efforts refocused on environmental and health issues; increased community ownership of dengue vector management including broader community development activities such as solid waste management and recycling[16]. Proper waste disposal management is essential to sustain healthy living conditions in any environment[13].

A link between household wastes with Aedes productivity can be increase the risk of dengue epidemics if waste generation is continued without appropriate measures to limit addition to the environment[14]. Therefore, interaction between environmental factors with dengue fever remain to be elucidated and need futher exploration.

## V. Conclusion

Our study revealed that waste management household play important in the incidence of dengue fever than water management and the incidence of dengue fever of household. For effective control the dengue fever incidence (Aedes aegypti). Furthermore, important to increase about the knowledge, attitude, and behaviour of the community regarding dengue fever prevention.

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