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Original Research Article

The Relationship and Malaria Distribution Map in Ambon City, Indonesia 2014

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ABSTRACT

Malaria is still a problem of Indonesian people especially in the region of east Indonesian, province of Maluku, Ambon city which is still classified Malaria high endemic area. The study aims to investigate the relationship between physical conditions of houses, the breeding of mosquitoes, the habit of going out at night, the use of insecticide mosquito nets, and the use of mosquito repellent and the occurrence of malaria. The research was a cross sectional study where the population consisted of 1.588 people and the sample consisted of 254 people that selected using purposive sampling method. The data were analyzed using bivariate statistic test with chi square and multivariate with logistic regression. The results indicated that the factors of physical condition of houses (p=0.000), the use of mosquito repellent (p=0.000) have a relationship with the occurrence of malaria, while the habit of going out at night (p=0.619) and the use of insecticide mosquito nets (p=1.000) do not have a relationship with the occurrence of malaria. The distance to health centers and the occurrence of malaria cannot be analyzed. The result of regression logistic multivariate indicates that the physical condition of houses is the most dominant factor affecting the occurrence of malaria (wald = 52.466 and p =0.000).

Key words: Malaria, breeding of mosquitoes, mapping, GIS

INTRODUCTION

Malaria is one of the parasitic diseases that are widespread throughout the world although it is generally found in areas located between 600 North latitude and 400 South latitude of the equator. Malaria is found throughout most parts of the world, especially in countries with tropical and sub-tropical climates. Malaria is still a public health problem in Indonesia. (Arsin, 2012). WHO says that in 2009 there were 1.1 million cases of clinical malaria in Indonesia and in 2010 increased to 1.8 million cases of Malaria Parasites with incidence (API) in the past year (2009-2010) 24 per 1000 population to reach the level of malaria deaths 1.3%. In malaria control, WHO target and the roll back malaria partnership is to reduce malaria morbidity by half in 2010 with the aim to achieve the MDGs by 2015 Particular attention should be given to pregnant women and children. Physical environmental health factors, chemical, biological, and socio-cultural influence on

the spread of malaria in Indonesia. Other factors are genetic constitution and the different ethnic of population and the varied demographic characteristics. The ability of the persistence of malaria in an area is determined by various factors including the presence of the malaria parasite, the Anopheles mosquito, humans who are susceptible to malaria infection, environment and climate (Friyaraiyatini, et al., 2006). The existence of public housing has an open condition of the house without a ceiling, mounted ventilation without wire netting and perforated walls condition is one of the risk factors of malaria incidence. This is because mosquitoes are very easy to get into the house that the situation is not covered as there is a whole wall. The results of the study (Lamaka, 2009) at the Tanjung Ubun Health Centre, found that home conditions are not protected incidence of malaria is a risk factor with a large risk of 2.41 ($p = 0.0001$).

Malaria appears as a result of the interaction agent (Plasmodium), the transmission process and the host (humans and Anopheles mosquitoes) are all influenced by the environment (Suharjo, 2009). Malaria infection and the development of an agent is entered into the infected host and both physical and socio-cultural environment has a very important role in the distribution of malaria. Research conducted by Arsin (2006) found that rainfall associated with malaria incidence. Where heavy rainfall caused many puddles that appear suddenly used by mosquito as breeding sites (breeding place).

Anopheles mosquito breeding habitats are puddles either freshwater or brackish water should always be in touch with the ground. Anopheles mosquito breeding places brackish water found in estuaries and covered marshes. Research conducted by (Kazwaini, 2006) found that the anopheles mosquito breeding places such as lagoons become potential mosquito breeding places for mosquito breeding good with clear or cloudy conditions. Rivers, rice fields, canals and stagnant water around the garden as a potential Anopheles breeding place. Research conducted by (Boewono, 2004) found that the puddles, ditches and swamps around the garden with a pool of water in the form of specifications trench to a depth of 5-25 cm, 1 m wide, clear water and lots of leaf litter potential as Anopheles mosquito breeding places. Then, socio-cultural effect on the incidence of malaria such as: habit out of the house until late at night, where the vector is *eksofilik* and *eksofagik* will facilitate contact with mosquitoes. The level of communities' awareness about the dangers of malaria will affect people's willingness to eradicate malaria such as environmental health, use netting, wire netting installed at home and use mosquito repellent. Various human activities such as dams, road construction, mining and construction of new settlement / resettlement often results in favorable changes in malaria transmission environment (Husin, 2007).

Based on data from the department of Disease Control and Environmental Health in Ambon City Health Department, cases of malaria in the city of Ambon in 2010 recorded 8,257 clinical malaria and malaria positive cases were 3,490 by Annual Parasite Incidence (API: 2.18%), In 2011 increased of 5,592 cases and 1,662 were malaria cases, with 4.73% API. in 2012 a decline into 6648 clinical malaria cases and 1,660 malaria positive cases with API 4.49, while in 2013 a decline into 5845 clinical malaria cases and 1,588 positive malaria cases with 4.14% API (Ambon Health Department Until 2012). The data processing Malaria in Ambon is still limited in the form of tabular and graphic analysis. Mapping is one way of data collection in an attempt to environmental management and

is part of an area-based disease management. One way to map the spread of malaria is by using a geographic information system (GIS). GIS provides spatial data information / spatial so that it can be used as a means of supporting efforts to control or prevention of malaria. This study aims to determine the relationship between environmental factors with the incidence of malaria and malaria distribution map in the City of Ambon.

MATERIALS AND METHODS

Location and Design Research

This study was conducted in 22 health centers in the city of Ambon. Observational study design with a cross sectional study design.

Population and Sample

The population in this study was all cases of malaria in 2013 in all health centers Ambon City. The study sample totaled 254 respondents.

Methods of data collection

Primary data collected from interviews and observation of the environmental Malaria patient's home, points coordinates are the location of malaria cases by using the Global Psitioning System (GPS).

Secondary data collected from patients with malaria data from the City Health Office and Health Center Ambon Ambon City, Map basic research area that is obtained from the relevant authorities (Bakosurtanal, Bappekot, BNPS and BPS)

Methods of Data Analysis

Editing data directly to correct the mistakes in filling out the questionnaire, coding is done by giving the code on all the variables that exist in the questionnaire, and Computer Data Entry to complete inputted through SPSS.

RESULTS

Malaria is caused by a specific infectious agent by the plasmodium parasite-mediated anopheles mosquitoes which can spread from a single source of infection to humans. Environmental health factors such as physical, chemical, biological, and socio-cultural influence on the spread of malaria. Therefore, the purpose of this study was to analyze the relationship between the factors that allegedly closely associated with the incidence of malaria. Some of the factors mentioned is the physical condition of the house, where mosquito breeding, habits go out at night, the use of insecticide-treated nets, use insect repellent spray and distance health centers.

Physical Condition Home

The assessment of Physical condition of the house based on of flooring materials, walls, roofs, windows, and lighting conditions, the presence of ventilation and ventilation with wire gauze. The results showed that among respondents with comparable physical condition is good and not good, were 127 people (50%). Results of statistical analysis of the relationship with the Chi Square test obtained p value of 0.000 ($p < 0.05$) indicating that there is a relationship between the physical condition of the occurrence of physical condition malaria. Research of house physical condition with malaria incidence in Ambon city is seen in Figure 1.

Mosquito Breeding Places

Distance of mosquito breeding sites is the presence of stagnant water that has potential as a place to live and breed mosquitos' malaria which is within close proximity ≤ 500 m and far > 500 m from the residence. The results showed that the general location of the respondents were <500 m from mosquito breeding sites were 227 people (89.4%) and the location of the respondent's house > 500 m by 27 people (10.6%). Results of statistical analysis of the

relationship with the Chi Square test obtained p value of 0.000 (p <0.05) indicating that there is a relationship between the incidence of mosquito breeding places of malaria. The study results of the mosquitoes breeding places with the incidence of malaria in the city of Ambon shown in Figure 2.

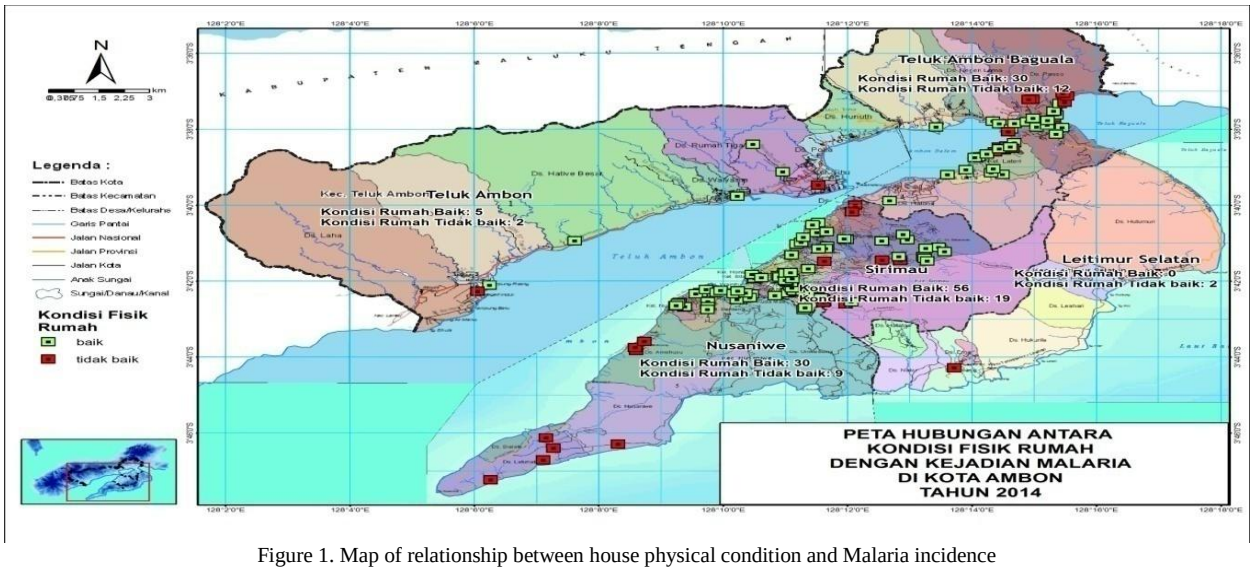

Figure 1. Map of relationship between house physical condition and Malaria incidence

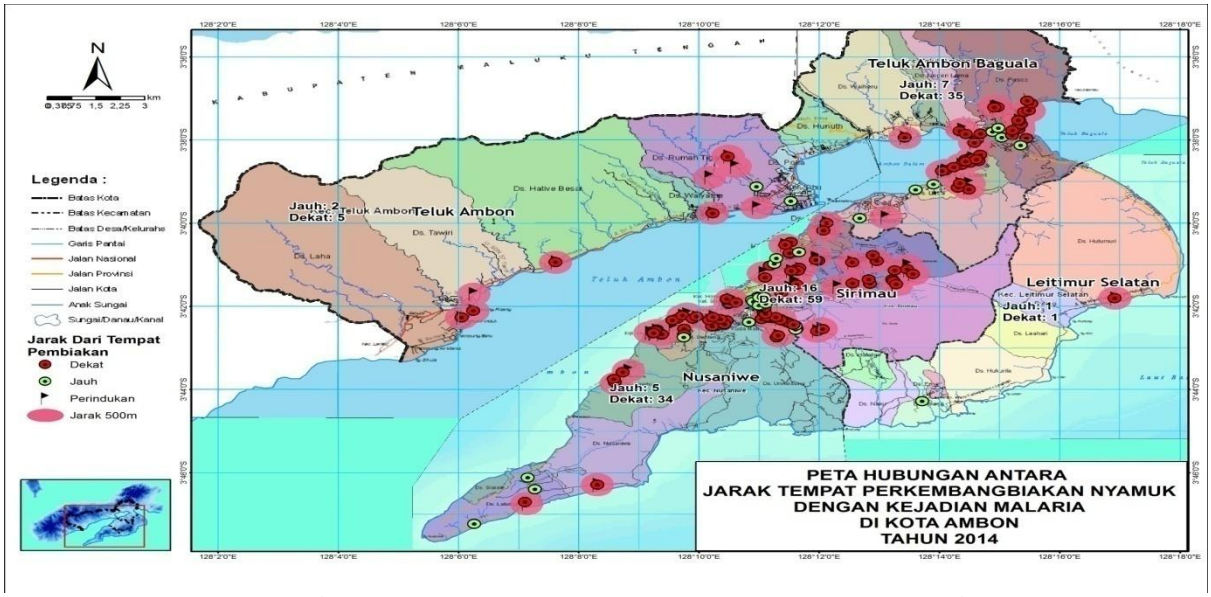

Figure 2. Map of relationship between the mosquitoes breeding places with the incidence of malaria

Habits of Go Out at Night

Habits of go out at night is a habit of a person often activities outside the home (outdoors) after sunset until late night. The results showed that in general, people have a habit of going out as many as 250 people (98.4%) and who do not have the habit of going out of 4 people (1.6%).

Results of statistical analysis of the relationship with the Fisher's Exact test obtained p value of 0.619 (p> 0.05) indicating that there is no relationship between habits go out at night with the

incidence of malaria. The results of the study habits go out at night with the incidence of malaria in the city of Ambon shown in Figure 3.

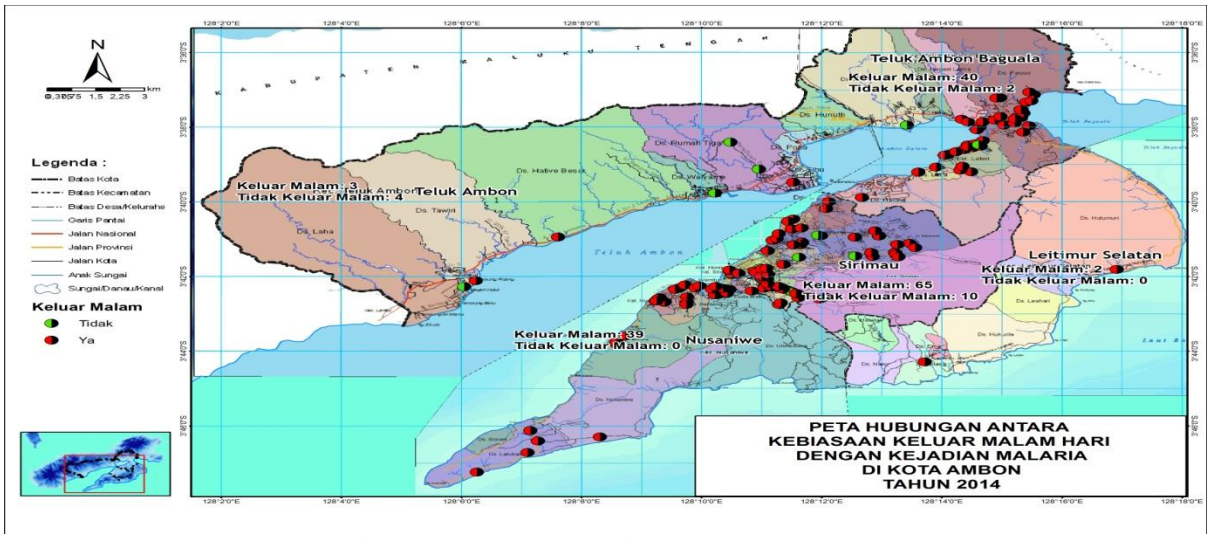

Figure 3. Map of Relationships between habit of go out at night with the Malaria incidence

The use of insecticide-treated nets

The use of netting is a custom made by respondents to avoid contact or bite of the Anopheles mosquito during sleep by using insecticide-treated nets. The results showed that in general, people do not use insecticide-treated nets during the night sleep. Respondents who routinely use insecticide-treated nets were 54 people (21.3%) whereas those who did not use a mosquito net was 200 people (78.7%). The results of the analysis of the relationship with the statistical test (chi-square) p value of 1.000 (p> 0.05), and thus Ho is accepted which means that there is no relationship between the use of insecticide treated bed nets to malaria incidence. The results of the study with the use of insecticide-treated nets and malaria incidence in Ambon seen in Figure 4.

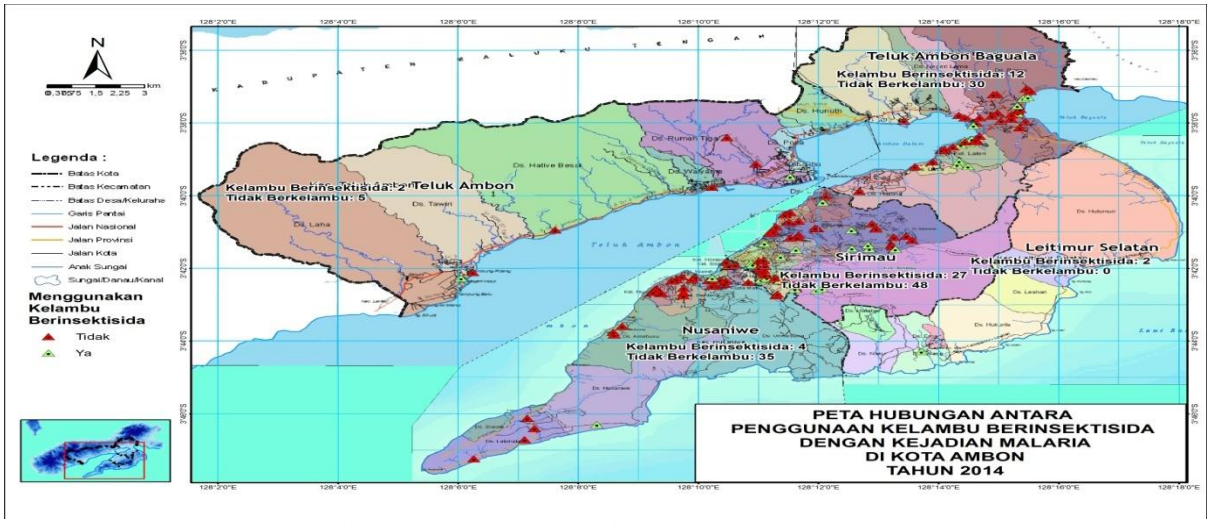

Figure 4. Map of relationship between the use of insecticide-treated nets and malaria incidence

The Use of insect repellent spray

The use of insect repellent spray is the way to avoid contact or bite of the Anopheles mosquito at night by using insect repellent spray. The results showed that respondents generally do not use anti mosquito spray at night with 221 people (87.0%), while those who use of anti mosquito spray were 33 people (13.0%). Result of the analysis of statistical tests (chi-square) p-value of 0.000 (p <0.05), and thus Ho is rejected which means that there is a relationship between the use of insect repellent spray with malaria incidence. The results of the study drug use with incidence of malaria mosquito spray in Ambon shown in Figure 5.

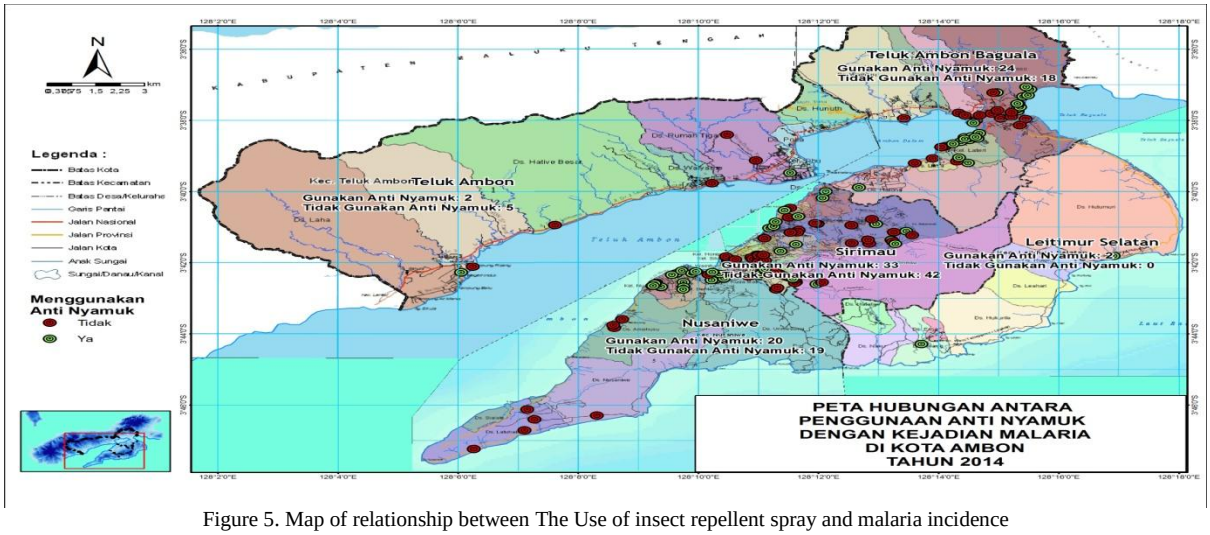

Figure 5. Map of relationship between The Use of insect repellent spray and malaria incidence

Distance of Public Health Centre

The distance of health centers i.e., the distance between the health centre and the Malaria patient's home measured in travel time. The results showed that the distribution of respondents by distance health centers to the location of residence of the respondents 100% affordable. While in this study result analysis Chi-square test cannot be performed between a variable distance to the health center the incidence of malaria, because of the distance variable health centers are one category that has the number of respondents 0.

DISCUSSION

The results showed that among respondents there were the same number of good physical condition and not good with 127 people (50%) each. Result analysis of the relationship with Chi Square statistical test obtained p value of 0.000 (p <0.05) indicating that there is relationship between the physical condition of the incident malaria. This study results are consistent with research conducted (by Frits, 2004) who found that the presence of a statistically significant relationship between the respondents with a physical condition of the building houses a risky perch, rest and malaria mosquitoes bite as the capability of transmitting malaria with OR = 3.07.

In contrast to the research results obtained by (Lamaka, 2009), and (Maricar, 2005) that stated that the physical condition of the home is not a risk factor for malaria incidence. The distance of adjacent homes or within approximately 500 m to the forest or river as breeding places of mosquitoes associated with malaria incidence. The

results showed that in general the location of the respondents were <500 m from mosquito breeding sites with 227 people (89.4%) and the location of the respondent's house > 500 m by 27 people (10.6%). The results of this study are consistent with research conducted by (Javan, 2006), (Supardi, 2008) who stated that there is a statistically significant relationship where mosquito breeding places of residence of respondents with malaria incidence.

The habit of going out at night is an effective time to the occurrence of infection. Female Anopheles mosquito bites a human or animal for the development of their eggs. Results of statistical analysis of the relationship with the Fisher's Exact test obtained p value of 0.619 (p> 0.05) indicating that there is no relationship between habits go out at night with the incidence of malaria. The results of this study are consistent with research conducted by (Munawar, 2005) and (Sunarsih, et al., 2009) showed that people who have the habit of going out at night is the risk of malaria with 3.82 times greater than those who not go out at night. The use of mosquito nets is done to avoid mosquito bites. The results showed that in general people do not use insecticide-treated nets during the night sleep respondents routinely use insecticide-treated nets with 54 people (21.3%) whereas those who did not use a mosquito net were 200 people (78.7%). The results of the analysis of the relationship with the statistical test (chi-square) p value of 1.000 (p> 0.05), and thus Ho is accepted which means that there is no relationship between the use of insecticide treated bed nets to malaria incidence. The results of this study showed that the inverse relationship is not consistent with the hypothes are of the study. The results of this study differ from the study (Husin, 2007) stating that sleeping habits using mosquito nets at night has a significant relationship with the incidence of malaria in health centers of *Sukamerindu Serut River District*, where Malaria risk of people who do not use a mosquito net during the night 5.8 times compared to those in the habit of using a mosquito net during night's sleep. Different from the research by (Munawar, 2005) at the health center of region of Banjarmangu Sigeblog I Banjarnegara district, Central Java, where people who sleep at the night do not use malaria mosquito nets had 8.09 times to risk of Malaria that those who use mosquito nets at night.

The use of mosquito repellent is a way to avoid contact or bite of the anopheles mosquitoes at night by using mosquito repellent, either in the form of mosquito repellent, spray, electric, or repellent. The results showed that respondents generally do not use anti mosquito spray at night were 221 people (87.0%), while those who use of anti mosquito spray were 33 people (13.0%). The results of the analysis of the statistical test (chi-square) p value of 0.000 (p <0.05), and thus Ho is rejected which means that there is a relationship between the use of insect repellent spray with malaria incidence. The results of this study are consistent with research (Erdinal et al., 2006) implied that there is a meaningful relationship, in contrast to the study conducted by (Harmendo, 2008) who found that there was no relationship between the habit of using mosquito repellent where p = 0.25. Distance health centers with shelter response are very influential to limit a person's ability and willingness to seek care, especially if the means of transport available is limited, communication is difficult, and in the area there is no hospital. The results showed that the distribution of respondents by distance health centers to the location of residence of the respondents 100% affordable. While in this study result analysis Chi-square test cannot be performed between a variable distances to

the health center the incidence of malaria, because of the distance variable health centers are one category that has the number of respondents 0.

CONCLUSIONS

This study concluded that the incidence of Malaria is the most widely spread in the village of *Batu Gajah* with 74 people (23.9%). There is a relationship of physical condition of the house, a breeding ground for mosquitoes; the use insect repellent spray with the incidence of malaria and most influential variables on the incidence of malaria is variable physical condition of the home. There is no relationship habits go out at night and the use of insecticide treated bed nets to malaria incidence. Distance health centers and the incidence of malaria cannot be analyzed in table 2 x 2. This study is expected to Government and Ambon City Health Department should develop a program of healthy homes in the community as well as to conduct program of prevention and eradication of malaria should be carried out continuously and integrated.

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