



2nd ICHMS & 2nd LSC

PROCEEDING

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The 2nd International Conference of Medical and Health Sciences (ICMHS) and The 2nd Life Sciences Conference (LSC) 2016

*"Towards a Better Quality of Life
through Interdisciplinary Research"*

Yogyakarta, 9th-10th December 2016
The Alana Hotel and Convention Center

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**The 2nd International Conference of Medical & Health Sciences
and
The 2nd Life Sciences Conference 2016**

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Committee of ICMHS & LSC 2016

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|---------------------------------------|---|
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| Partner | Dr Zahid Iqbal, Ph.D |
| Secretary | Winnie Setyonugroho, S.Ked, MT, Ph.D |
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**Chair person of The 2nd International Conference of Medical and
Health Sciences and The 2nd Life Sciences Conference 2016**



Welcome to Jogja, sugeng rawuh!

For the second time, the Faculty of Medicine and Health Sciences Universitas Muhammadiyah Yogyakarta is going to conduct the 2nd International Conference of Medical and Health Sciences (ICMHS) this December in vibrant Yogyakarta, Indonesia. This year we are going to collaborate with the Life Sciences Society of Pakistan for their 2nd Life Sciences Conference (LSC) with Dr. Zahid Iqbal as the general secretary.

This year's conference theme "Towards a better quality of life through interdisciplinary research" will be celebrating an era of seamless interdisciplinary integration and collaboration in scientific innovations with the involvement of more extensive topics and disciplines in the conference. We aim to exhibit the products of that kind of approach in solving challenges, improving the quality of life, and creating sustainable developments. We are happy to announce that our conference is filled with Invited speakers from Pakistan, United States of America, Uni Emirates Arab, Malaysia and Indonesia. Presentations will be conducted in oral as well as poster that covers topics from medicine, public health, dentistry, pharmacy, biomedical to agriculture. To put more credibility to the conference we are collaborating with Isra Medical Journal and the Asian Journal of Agriculture and Biology to publish selected papers from the event. Other paper will be published in the ISBN Proceeding book.

The last but not least, enjoy the conference, start networking and sharing ideas, and let immerse yourself to the heritage cultural ambient of Jogja, sumonggo!

Yogyakarta, 1st December 2016

dr. Iman Permana, M.Kes, Ph.D.

**The 2nd International Conference of Medical & Health Sciences
and
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**Dean of Faculty of Medicine and Health Sciences,
Universitas Muhammadiyah Yogyakarta**



Assalamu'alaikum Wr. Wb.

Science, especially in the areas of health and life growing more rapidly. We need to work together in the research of various disciplines to the advancement of science and to provide benefits to human life.

After successfully organized international scientific meeting last year, the Faculty of Medical and Health Sciences Universitas Muhammadiyah Yogyakarta, held the second scientific meeting ICMHS along with "2nd Life Sciences Conference". In this second scientific meeting, FKIK UMY collaborates with various researchers, among others from Pakistan, Malaysia, and the United States. Taking the theme "Towards a better quality of life through interdisciplinary research" we hope to establish cooperation with various parties to be able to contribute ideas to the civilization of human life.

Finally, we congratulate the scientific meeting in the city of Yogyakarta Indonesia. Enjoy the beautiful city of Yogyakarta with priceless historical relics. We hope that this meeting can run smoothly and provide benefits to the advancement of knowledge.

Wassalamu'alaikum Wr. Wb.

Yogyakarta, 1st December 2016

dr. Ardi Pramono, M.Kes, Sp.An.

**The 2nd International Conference of Medical & Health Sciences
and
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Rector of Universitas Muhammadiyah Yogyakarta



Assalaamu'alaikum Wr. Wb.

Ladies and Gentlemen,

Welcome to the 2nd International Conference on Medical and Health Science in conjunction with the 2nd Life Sciences Conference 2016

Welcome to Yogyakarta City of Tolerance

Our Faculty of Medicine and Health Sciences has been doing such international conference almost every year for the last ten years. This and other previous conferences are the things that supporting our vision as an excellence and Islamic university, a young and global university. We will always try to keep monitoring the development of science through sending more lecturers to do the sabbatical leave overseas, doing international research collaborations and also the international conference. Each department should do this strategy of internationalization so that each department has its own network. Faculty of medicine and health science is one of the most progressive units in implementing this strategy by inviting international experts on a regular basis. This program will certainly strengthen our vision.

International conference on medicine and health sciences is a smart choice to offer our lecturers access to the most recent development of the subjects. The participants will also gain the same knowledge and latest information on medicine and health sciences. As everyone knows that the development of science and technology are faster today compared to the previous period. Information technology, computer, and other development havefastened the transformation of medicine and health science into the different and more complex stage.

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Cellular technology, for instance, can be used for several functions including those that directly impacts our daily life. There is no long distance call anymore today because cellular phone can do everything we need to contact other people far from where we stand anytime anywhere. People will finally innovate cellular phone for the sake of personal health services. We will in the future using our simple cellular phone to detect our body temperature, blood pressure, even how much fat we have in our body and how much it is supposed to be. We may also be able to check the health of our body without leaving our house and order medicine without going into the drug store. Everything is almost possible as long as we think hard for the better of people in the future. Enjoy the conference and don't forget to visit our rich tourist destinations, mountains, beaches or caves (underground waterways).

Thank you

Wassalaamu'alaikum Wr. Wb.

Prof. Dr. Bambang Cipto, MA

**The 2nd International Conference of Medical & Health Sciences
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Keynote Speech

**by Head of Provincial Health Office Special Region of Yogyakarta
in International Conference
of Medical and Health Sciences and Life Sciences Conference**

The Alana Hotel and Convention Center, Yogyakarta, December 9-10, 2016

The honorable:

- Rector of Muhammadiyah University of Yogyakarta,
- The Dean of Medical and Health Sciences Muhammadiyah University of Yogyakarta,
- The chairman of organizing committee of the international conference of medical and health,
- Distinguished guests and colleagues.

Assalamu'alaikum Warahmatullahi Wabarakatuh,

First of all, we thank God for His blessings that today we may attend the International Conference of Medical Health Towards a Better Quality of Life Through Interdisciplinary Research in Yogyakarta.

My distinguished colleagues,

In Indonesia National Long Term Development Plan (2005-2024), the Indonesian Ministry of Health have determined a paradigm shift that have governed health services in health development plan. There has been a shift from Curative Health Services to Preventive and Promotive Health Services.

Recently, Indonesia suffers from a triple burden of diseases as health development challenges. The triple burden of diseases are: 1) the backlog of common infections, undernutrition, and maternal mortality; 2) the emerging challenges of non-communicable diseases (NCDs), such as cancer, diabetes, heart disease; and 3) mental illness, and the problems directly related to globalization, like pandemics and the health consequences of climate change.

Dear colleagues,

Here are some data that show several health problems in Indonesia:

1. Maternal mortality rate in 2015 is 4,809 cases, infant mortality rate in 2015 is 22,267 cases;
2. Regarding to children under the age of five, the national stunting rate is 37.2% which consists of 18% for very short dan 19.2% for short (Riskesdas 2013);

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3. HIV testing coverage is 14% dan antiretroviral (ARV) therapy coverage is 65.58% (Directorate General of Disease Control and Prevention Ministry of Health, 2015);
4. Tuberculosis (TB) notification rate in 2015 is 73.5% and tuberculosis treatment success rate is 72% (Directorate General of Disease Control and Prevention Ministry of Health, 2015).

Distinguished guests,

Indonesia Health Development Program in 2015-2019 strengths in improving human quality life through Health Indonesia Program with family approach. The Indonesian Ministry of Health issued The Minister of Health Regulation (Permenkes) No. 39 Year 2016 as a Guideline of Implementation of Health Indonesia Program with Family Approach. This program has 12 main indicators as markers of a family health status. Currently, many health programs have been implemented by Indonesian Ministry of Health, Provincial Health Offices, and District Health Offices. However, many health problems, some as mentioned above, still become health burdens. We may ask a question whether the programs that we conducted have answered the health problems we have in Indonesia.

It would be better if all health programs that we implement based on scientific health research, especially interdisciplinary research. The research should be related to detection, prevention, and treatment of diseases or problem solving for better health.

My dear colleagues,

Being a province with speciality, Special Region of Yogyakarta placed Traditional Medicine as one of the priority programs in Provincial Medium Term Development Plan (2017-2022). We still encounter many challenges in developing Traditional Medicine, especially in providing services which are based on scientific evidence.

Distinguished colleagues,

We look forward to results of interdisciplinary research which would support health problem solving, especially by developing traditional medicine in Yogyakarta. We believe that collaboration in interdisciplinary research would improve quality of human life.

Finally,

Thank you for your attention. We wish you a successful conference.

Wassalamu'alaikum Warahmatullahi Wabarakatuh,

On behalf of
the Head of Provincial Health Office
Special Region of Yogyakarta

Drg. Pembajun Setyaningastutie, M.Kes

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**SPEAKER OF
INTERNATIONAL CONFERENCE**

Zahid Iqbal

Al-Nafees Medical College Isra University Islamabad Campus Islamabad, Pakistan
"One Health Program for Public Health Benefit"

Prof. Dr. Abdul Khaliq

Professor, Department of Agronomy, University of Agriculture, Faisalabad
"Role of Agriculture in Poverty Alleviation of Rural Areas"

Fitri Arofati

Universitas Muhammadiyah Yogyakarta, Indonesia
"Continuing Professional Development of Practicing Nurses in Indonesia"

Tri Wahyuliati

Universitas Muhammadiyah Yogyakarta, Indonesia
"Diabetic Neuropathy - A Chance Towards A Better Treatment"

Mohammad Khalid Ashfaq

University of Mississippi, USA
"Natural Products –Use or Misuse"

Muhammad Mukhtar

American University of Ras Al Khaimah, United Arab Emirates
"Emerging Biotechnologies and Genomic Medicines in Human Health and Well-Being"

Muhammad Sasmito Djati

Brawijaya University Malang, Indonesia
"Herbal Medicine a Holistic Approach: in case of food supplement formulation of Sauropusandrogynus and Elephantopuscaberto modulate immune and hormonal system in pregnant Salmonella typhi infected mice"

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REVIEWER

1. Dr. Zahid Iqbal, Ph.D (Isra University, Islamabad, Pakistan)
2. Prof. Dr. Abdul Khaliq (University of Agriculture, Faisalabad)
3. Dr. Mohammad Khalid Ashfaq, DVM, DTVM, MS, Ph.D (University of Mississippi, USA)
4. Dr. Muhammad Mukhtar, Ph.D (American University of Ras Al Khaimah, United Arab Emirates)
5. Dr. Ir. Muhammad Sasmito Djati, MS. (Brawijaya University Malang, Indonesia)
6. Fitri Arofiati, S.Kep., Ns., MAN., Ph.D (Universitas Muhammadiyah Yogyakarta, Indonesia)
7. Dr. SN Nurul Makiyah, S.Si., M.Kes (Universitas Muhammadiyah Yogyakarta, Indonesia)
8. dr. Iman Permana, M.Kes, Ph.D (Universitas Muhammadiyah Yogyakarta, Indonesia)
9. Dr. dr. Ikhlas M. Jenie, M.Med, Sc (Universitas Muhammadiyah Yogyakarta, Indonesia)
10. Dr. dr. Arlina Dewi, M.Kes, AAK (Universitas Muhammadiyah Yogyakarta, Indonesia)
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13. Dr. drg. Tita Ratya Utari, Sp. Ort (Universitas Muhammadiyah Yogyakarta, Indonesia)
14. Dr. dr. Tri Wahyuliati, Sp.S, M.Kes (Universitas Muhammadiyah Yogyakarta, Indonesia)
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18. Dr. dr. Sri Sundari, M.Ke (Universitas Muhammadiyah Yogyakarta, Indonesia)
19. Dra. Lilis Suryani, M.Kes (Universitas Muhammadiyah Yogyakarta, Indonesia)
20. Drh. Tri Wulandari K, M.Kes (Universitas Muhammadiyah Yogyakarta, Indonesia)
21. Dr. dr. Wiwik Kusumawati, M.Kes (Universitas Muhammadiyah Yogyakarta, Indonesia)
22. Sabtanti Harimurti, S.Si., M.Sc., Ph.D., Apt. (Universitas Muhammadiyah Yogyakarta, Indonesia)

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**SPEAKER OF
INTERNATIONAL CONFERENCE**

ICMHS-O-2-5

Malaria Occurrence Factor Analysis Based on Elevation of Sea Surface in the District of Ogan Komering Ulu, South Sumatra

Pademi Alamsyah^{1*}, Chairil Anwar², Dwi Setyawan³, Laila Hanum⁴

^{1,2,3,4} Environmental Science, Sriwijaya University, Palembang, Indonesia

*Email: pademialamsyah73@gmail.com

Abstract

Malaria is a public health problem in District of Ogan Komering Ulu South Sumatra. Annual Malaria Incidence (AMI) in 2012 cases of malaria 10 ‰, 2013 increased 26 ‰ and of 2014 decreased 17‰. The pattern spreading of malaria to the height of a place, closely related. The area at an elevation of above 1000 m above sea level the less found Anopheles mosquito. The aim to analyze the spatial distribution patterns of malaria incidence by area elevation of sea surface and mapping malaria risk zone. This ecological study, analyze the correlation between elevation and spreading of malaria case. The data and the data elevation of sea surface. The result show that $R^2=0.84$ mean 84% elevation GIS approach and Multiple Linear Regression analysis is a potentially useful tool. R Square on statistics regression models was 0.84, that 84% of malaria cases were influenced by the extent of the height of the sea surface in hectares. In value Significance F of 0.00 or below 0.05, then the regression can be used to predict the incidence of malaria. The result of statistical analyze showed $p= 0.00$; $F_{table}= 3.4$ showed the elevation factor influence to the incidence of malaria significantly. This study confirms that, elevation factor influence spread of malaria in District of Ogan Komering Ulu, South Sumatra province.

Keywords: malaria, spatial analysis, anopheles mosquitoes, geographic information systems (GIS), elevation of sea surface.

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INTRODUCTION

Malaria is a public health problem that is most serious in the world. In 2010, an estimated 219 million malaria cases (estimated to be between 154-289 million) occur worldwide and 660,000 (estimated between 490.000-836.000) people died, most of them are children.¹ Malaria incidence in the population of Indonesia in 2013 in five (5) provinces with the highest incidence of Papua (9.8%), East Nusa Tenggara (6.8%), West Papua (6.7%), Central Sulawesi (5.1 %) and Maluku (3.8%). Of the 33 provinces in Indonesia, 15 provinces have malaria prevalence above the national average, mostly in eastern Indonesia.²

South Sumatra Province in 2012 Figures Annual Malaria Incidence (AMI) of 6.80⁰/₁₀₀, in 2013 amounted to 6.85⁰/₁₀₀ and ⁰/₁₀₀ 5.39 in 2014, while data Annual Parasite Incidence (API) in 2012 amounted to 0,62⁰/₁₀₀, 2013 by 0:47⁰/₁₀₀, 2014 at 0.36⁰/₁₀₀. (South Sumatra provincial health office, 2014). According to the epidemiological surveillance of malaria in Ogan Komering Ulu for 3 (three) years from 2012 to 2014 experienced a significant change. Annual Malaria Incidence (AMI) in 2012 amounted to 10⁰/₁₀₀, 2013 increased 26⁰/₁₀₀, decreased in 2014 by 17⁰/₁₀₀.^{3,4}

The pattern of the spread of malaria to the altitude of a place has a close relationship. The deployment of more extensive pattern occurred in the region at an altitude below 1000 m above sea level and the less at altitudes above 1000 m above sea level. This is caused by the behavior of *Anopheles* spp Its like living in the lowlands.⁵

To evaluate the control and elimination of malaria strategies, techniques Geographic Information System (GIS) has been adopted to visualize and assess the risk of malaria distribution in space and time malaria in Mali, West Africa.^{6,7,8} Geography Information System (GIS) with spatial and temporal modeling method increasingly used for disease-based mosquito in terms of supervision and risk management, can also help to understand the distribution of disease in space and time.^{9,8} The functional capabilities of Geographic Information Systems (GIS) of the data obtained and stored, recorded and tampilanya displayed in accordance with the definition of Geographic Information System (GIS) that combined with all the elements necessary for problem-solving and analysis.^{10,7,8}

The purpose of this study was to analyze patterns of spatial distribution of malaria incidence by area elevation from sea level, and mapping of malaria risk zone by a factor elevation from sea level to formulate improvement strategies in malaria control programs in District of Ogan Komering Ulu, South Sumatra.

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MATERIALS AND METHODS

This research was a descriptive study using a quantitative approach. The study design was ecological studies that use data elevation of sea surface according the subdistricts to compare the frequency of malaria in the same period of time in different areas.

Study area. Place of research conducted in District of Ogan Komering Ulu, South Sumatra Province which geogafis is in a position between 103° 40' East Longitude up to 104° 33' east longitude and 3° 45' latitude south up to 4° 55' South Latitude or located the Central Traffic lane Trans Sumatra, Lampung province that connects the Bengkulu Province has a tropical climate and damp with temperatures varying between 22° C-31° C.

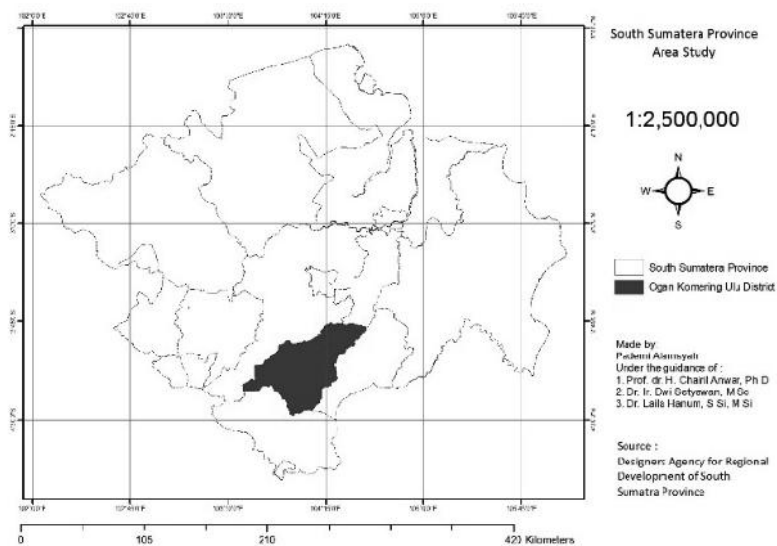


Figure 1. Study area in District of Ogan Komering Ulu, South Sumatera

Research Data Collection Methods. Spread malaria of data in the capture of South Sumatra Provincial Health Office by way of examination in 2012-2015, to check the accuracy of the data, the data malaria in comparison with the existing data in the Health Department of Ogan Komering Ulu reported by subdistricts by 12 (twelve) subdistricts. The data used in this research is data malaria cases in 2016 in Ogan Komering Ulu according to the subdistrict. Data elevation of sea surface is taken from the map data and regional spatial plans Ogan Komering Ulu years 2012-2032 were taken from the Public Works Department of Human Designer works and the Regional Development Agency, to the data increased the area, population data and social data taken from Board of Research, Development and Statistics in Ogan Komering Ulu.

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Malaria incidence data were secondary data obtained from the District Health Office, then the data area of elevation of sea surface obtained from the Agency for Regional Planning and Development District OKU and Public Works Cipta Karya. The data have been collected and analyzed are presented in tables and maps. Presentation of data in the form of a map used for spatial approach in malaria cases in the form of malaria endemic areas of analysis and endemicity of malaria cases with potential mosquito breeding territories which later overlapping the data base elevation from sea level.

Analysis of spatial data. Spatial has the sense of something that was limited by space, communication and or transformation, while spatial data indicating the position, size and possible topological relationships (shape and layout) of an object on the earth's surface.^{10, 6, 7} Because this study used data format vector (point, line, polygon) then in analyzing the spatial use extraction method to retrieve or extract the spatial information of a feature, then analyzed by means of an overlay to address issues on to appear in the research.

Multiple regression analysis of data. Multiple linear regression analysis was a linear relationship between two or more independent variables (X_1, X_2, \dots, X_n) with the dependent variable (Y). This analysis to determine the direction of the relationship between independent variables and the dependent variable whether each independent variable associated positive or negative and to predict the value of the dependent variable when the independent variables increase or decrease. In this study will analyze the malaria incidence factor as the dependent variable and elevation from sea level as independent variables that have been classified, the risk was very high with an altitude range between 0-500 m above sea level, high risk 500-1000 m above sea level, the risk of being 1000-1500 and low risk of 1500-2000 m above sea level, this study was expected to determine that each of the variables have different effects in different locations.

Mathematical models in this research is to use the regression equation is:

$$\bar{Y} = a + b_1X_1 + b_2X_2 + \dots + b_nX_n$$

Where :

\bar{Y} = Y predicted value

X = Independent variable

a = Intercept

b = Regression coefficient = Y value increased by b units for each increase in the value of X by one unit

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To find the value of a and b using the following formula:

$$a = \bar{Y} - b\bar{x}$$

where \bar{Y} = mean Y
 \bar{x} = mean X

$$b = \frac{[n \sum xy] - [(\sum x)(\sum y)]}{[n \sum x^2 - (\sum y)^2]}$$

RESULTS AND DISCUSSION

Table 1. The spread of malaria incidence in District of Ogan Komering Ulu in 2016 by way of Examination

| No | Sub district | population | Large territory | Way of examination | | Malaria positive | Malaria clinical | The incidence of malaria |
|----|------------------|------------|-----------------|--------------------|-----|------------------|------------------|--------------------------|
| | | | | mikroskop | RDT | | | |
| 1 | Baturaja Barat | 26308 | 9960 | 56 | 50 | 6 | 100 | 106 |
| 2 | Baturaja Timur | 88921 | 9207 | 464 | 93 | 16 | 541 | 557 |
| 3 | Lengkiti | 29530 | 74003 | 26 | 0 | 0 | 26 | 26 |
| 4 | Lubuk Batang | 32146 | 53645 | 988 | 299 | 5 | 1292 | 1927 |
| 5 | Lubuk Raja | 32054 | 22034 | 131 | 112 | 15 | 228 | 243 |
| 6 | Muara Jaya | 7475 | 37384 | 18 | 10 | 0 | 28 | 28 |
| 7 | Pengandonan | 10417 | 4596 | 92 | 10 | 0 | 102 | 102 |
| 8 | Peninjauan | 48408 | 50033 | 22 | 11 | 1 | 32 | 33 |
| 9 | Semidang Aji | 29674 | 44016 | 51 | 14 | 4 | 61 | 65 |
| 10 | Sinar Peninjauan | 23312 | 11394 | 242 | 106 | 4 | 344 | 348 |
| 11 | Sosoh Buay Rayap | 14003 | 22518 | 80 | 0 | 0 | 80 | 80 |
| 12 | Ulu Ogan | 9378 | 23460 | 4 | 36 | 0 | 40 | 40 |
| 13 | Kabupaten | 351626 | 362249 | 2174 | 741 | 51 | 2874 | 2925 |

Source: Health Department of Ogan Komering Ulu District

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The spread of malaria in District of Ogan Komering Ulu. Microscopic examination is an examination of the gold standard, the method is fast and cheap. Microscopic examination conducted by two methods, namely the examination of blood clots thick and the preparation of a blood thinner. However, microscopic examination has limitations in terms of the diagnosis of mixed infections, infections in the state of parasitaemia, and untrained health workers Laboratory.^{11,12} Another way to see the Plasmodium parasite in the blood was using rapid diagnostic test (RDT). The working mechanism of this test is based on the detection of antigens from the malaria parasite lysis in the blood. The method used is immuno liquid chromatography which will migrate to the surface of nitrocellulose membranes. This test is based on the "capture antigen" in the peripheral blood by monoclonal antibodies against a malaria antigen conjugated with dye. Monoclonal antibodies second/third was applied to the nitrocellulose strip as immobile phase. If the blood of people with malaria contains specific antigen, the antigen-antibody complexes will migrate to the mobile phase along a strip of nitrocellulose and will be bound by the monoclonal antibody immobile phase so as to form a colored line.^{2,5}

From various studies suggest that the sensitivity and specificity of RDTs meet the criteria to be used as an alternative to the malaria parasite examination, both in diagnosing patients with *P. falciparum* or *P. vivax*.¹³ Research Widijanti, 2010 explained that the RDT diagnostic value of the malaria parasite to PvpLDH ie 94.7% sensitivity; a specificity of 100%, the WHO also explained that the RDT is the main alternative dipstick is based on the clinical manifestations of malaria, especially in places that do not have a qualified technician and microscopic means. In addition, RDT helpful in emergency departments in medical services, when an extraordinary event malaria, as well as in disadvantaged areas are not available clinical laboratory facilities.^{14,1,9}

Classification Annual Malaria Incidence (AMI). Indicators Annual Malaria Incidence (AMI) is a clinical malaria cases for a year in an area per 1000 inhabitants. These indicators are used to determine the level of malaria endemicity and big problems in a region. A region can be said to be endemic malaria is low if the known value of AMI < 10, intermediate 10-50, high endemic > 50 cases/1000 population.⁵ Based on these categories, then it is certain that the District OKU is a region with intermediate endemicity level (medium) based on indicators of AMI in 2016.

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Table 2. Annual malaria incidence by districts in OKU District

| No | Sub District | Population | Malaria | AMI | Ranks | Classification |
|----|------------------|------------|---------|-----|-------|----------------|
| 1 | Baturaja Barat | 26308 | 106 | 4 | 1 | Low |
| 2 | Baturaja Timur | 88921 | 557 | 6 | 1 | Low |
| 3 | Lengkiti | 29530 | 26 | 1 | 1 | Low |
| 4 | Lubuk Batang | 32146 | 1927 | 60 | 4 | High |
| 5 | Lubuk Raja | 32054 | 243 | 8 | 1 | Low |
| 6 | Muara Jaya | 7475 | 28 | 4 | 1 | Low |
| 7 | Pengandonan | 10417 | 102 | 10 | 2 | Moderate |
| 8 | Peninjauan | 48408 | 33 | 1 | 1 | Low |
| 9 | Semidang Aji | 29674 | 65 | 2 | 1 | Low |
| 10 | Sinar Peninjauan | 23312 | 348 | 15 | 2 | Moderate |
| 11 | Sosoh Buay Rayap | 14003 | 80 | 6 | 1 | Low |
| 12 | Ulu Ogan | 9378 | 40 | 4 | 1 | Low |
| 13 | Kabupaten | 351626 | 2925 | 10 | 2 | Moderate |

Source: Health Department of Ogan Komering Ulu District

District OKU in areas with high endemicity in the sub District Lubuk Batang with numbers 60 ‰ Annual malaria incidence population, followed by the District Sinar Peninjauan with Annual malaria incidence figures 15 ‰ resident in the category of intermediate endemicity. Distribution of the population is different each District will generate value Annual malaria incidence different although the incidence of malaria a higher districts but could have value Annual malaria incidence is lower.

Classification elevation of the sea surface. Classification division elevation from sea level is divided into 4 (four) classification that 0-500 m in classifying risk is very high, 500-1000 m above sea level high risk, moderate risk from 1000 to 1500 m above sea level, and from 1500 to 2000 m low risk, classification elevation of the sea surface in district of Ogan Komering Ulu may expose the state of breeding places and the anopheles mosquito habitat, altitude 0-500 m above sea level is the breeding place and habitat for most of the Anopheles mosquito breeding places spread almost throughout the northern region district, these conditions favor the spread malaria cases.

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Table 3. Classification broad influence elevation of sea level to the determination of malaria risk zones in the district OKU

| No | Sub District | Elevation of sea surface | | | | Total | Malaria |
|----|------------------|--|---|--|--|--------|---------|
| | | 1500–2000 m dpl Zona risk low | 1000–1500 m dpl Zona risk moderate | 500-1000 m dpl Zona risk high | 0-500 m dpl Zona risk Very high | | |
| 1 | Baturaja Barat | 0 | 0 | 0 | 9960 | 9960 | 106 |
| 2 | Baturaja Timur | 0 | 0 | 0 | 9207 | 9207 | 557 |
| 3 | Lengkiti | 10 | 1480 | 7835 | 64678 | 74003 | 26 |
| 4 | Lubuk Batang | 0 | 0 | 0 | 53645 | 53645 | 1297 |
| 5 | Lubuk Raja | 0 | 0 | 0 | 22034 | 22033 | 243 |
| 6 | Muara Jaya | 15 | 1537 | 14615 | 21217 | 37384 | 28 |
| 7 | Pengandonan | 0 | 0 | 0 | 4596 | 4596 | 102 |
| 8 | Peninjauan | 0 | 0 | 0 | 50033 | 50033 | 33 |
| 9 | Semidang Aji | 0 | 0 | 0 | 44016 | 44016 | 65 |
| 10 | Sinar Peninjauan | 0 | 0 | 0 | 11394 | 11394 | 348 |
| 11 | Sosoh Buay Rayap | 0 | 0 | 0 | 22518 | 22518 | 80 |
| 12 | Ulu Ogan | 2371 | 4655 | 12111 | 4322 | 23460 | 40 |
| 13 | Kabupaten | 2396 | 7672 | 34561 | 317620 | 362249 | 2925 |

Source: Department of Public Works, Department of Health, Planning Board, Central of Statistics Board Ogan Kmoering Ulu

Broad classification elevation of the sea level based on research Idung, 2006 in Sukabumi, West Java, which divides the four (4) levels of malaria risk zone to facilitate in analyzing spatial zones that are considered at risk of malaria.¹⁵ Table 3. elevation of the sea surface range 0-500 m exist throughout the District in Ogan Komerung Ulu with a total area covering 317.620 hectares while the area to the range of 1500 to 2000 m above sea level is only in 3 (three) sub district of the sub district Lengkiti, Muara Jaya and Ulu Ogan with total area of approximately 34.561 hectares, the highest distribution of malaria cases occur in sub district Lubuk Batang with the number of cases of malaria in 1297 while the lowest cases occur in Sub district Lengkiti with the number of cases was 26 cases of malaria.

Distribution of malaria-endemic areas based on the classification of malaria risk zone. District of Ogan Komerung Ulu is endemic malaria, this was due to elevation of the sea surface conditions suitable for breeding and mosquito breeding, there are eight (8) types of Anopheles living forms of *An. Aconitus*, *An. Annularis*, *An. Barbirostris*, *An. Kotchi*, *An. Nigerimus*, *An. Schuepnerii*, *An. Umbrosus*, *An. Vagus*. The pattern of uneven distribution of most of the spread of mosquitoes are concentrated in the sub

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district of Lubuk Batang and in the area surrounding an elevation of the sea surface of 0-500 meters sea level and is the vector *Anopheles* breeding sites.

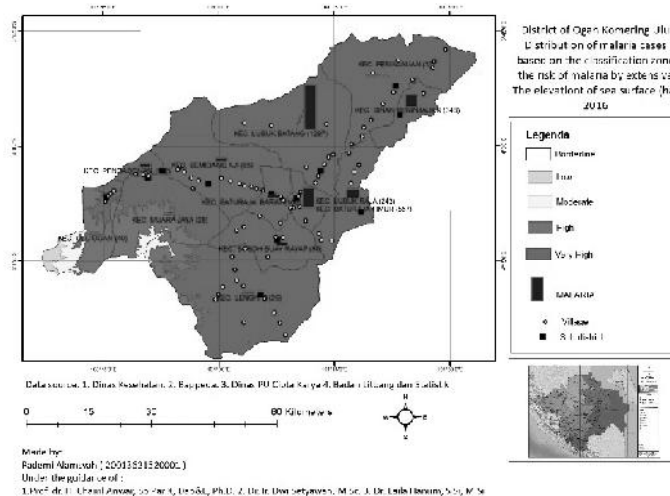


Figure 2. Distribution of malaria cases based on classification zone by extensive the elevation of sea surface (ha) in Ogan Komering Ulu 2016

Determination of the need for a malaria endemic region to help facilitate determining the risk of malaria hotspot zones in Ogan Komering Ulu District. Because without the risk of malaria is the determination of the zone will complicate the variables that determine the basic cause of malaria, caused by a common environment variables as input in determining the area where malaria is endemic and malaria-risk zone.

The test result data distribution with the Kolmogorov sminov test showed the value Asymp.Sig of 0.66 is greater than 0.05 it indicates that the normally distributed data and the data with regression testing can be done.

Table 4. The Results of the Regression Equation Model Analysis with Multiple Linear Regression Spatial Patterns of Malaria Incidence with Elevation of the Sea Surface Area

| | Coefficients | Standard Error | tStat | P-value | Lower 95% | Upper 95% | Lower 95.0% | Upper 95.0% |
|--------------|--------------|----------------|----------|----------|-----------|-----------|-------------|-------------|
| Intercept | 8.842524 | 128.7376 | 0.068686 | 0.946925 | -288.027 | 305.7121 | -288.027 | 305.7121 |
| X Variable 1 | 1.377545 | 1.038763 | 1.326139 | 0.221404 | -1.01785 | 3.772937 | -1.01785 | 3.772937 |
| X Variable 2 | -0.90833 | 0.748235 | -1.21396 | 0.259381 | -2.63376 | 0.817105 | -2.63376 | 0.817105 |
| X Variable 3 | 0.081832 | 0.089604 | 0.913262 | 0.387799 | -0.12479 | 0.288458 | -0.12479 | 0.288458 |
| X Variable 4 | 0.011672 | 0.002772 | 4.211041 | 0.002952 | 0.00528 | 0.018063 | 0.00528 | 0.018063 |

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Regression model used can be seen in Table 4. that intercept figures are denoted by the letter Y or the dependent variable at 8.84 and independent variable are denoted by the letter X, can be seen from the coefisien are denoted by the letter B.

For the regression model can be made as follows:

$$Y = a + B_1X_1 - B_2X_2 + B_3X_3 + B_4X_4$$
$$Y = 8.84 + 1.37X_1 - 0.908X_2 + 0.08X_3 + 0.01X_4$$

Where :

X_1 = low risk zone (elevation of sea surface from 1500 to 2000 m)

X_2 = moderate risk zone (elevation of sea surface from 1000 to 1500 m)

X_3 = high risk zone (elevation of sea surface from 500-1000 m)

X_4 = very high risk zone (elevation sea surface from 0-500 m)

Interaction of malaria cases against the broadly elevation of sea surface.

Transmission of malaria is affected by the elevation of the sea surface, it can affect the metabolism, growth and development of mosquitoes. The lower the elevation of the sea surface of a point indicates the higher the temperature of the place and vice versa. The higher somewhere indicate the lower the air temperature. The deployment of more extensive pattern occurred in the region at an elevation of the sea surface below 1000 m above sea level and less or not found at elevation of the sea surfaces above 1000 meters above sea level. This is caused by the behavior of Anopheles sp. who are happy to live in the lowlands.¹⁶

Height range of the Anopheles mosquito breeding places are also relatively unchanged. It is caused by changes in air temperature at each elevation.¹⁷ Interval air temperature in the lowland in the District OKU an optimum temperature for metabolism, growth and development Anhopeles mosquitoes, while the range of temperatures in the highlands is the lower limit for the metabolism and the proliferation of mosquitoes.

Statistical analysis Linear Regression Multiple with spatial pattern of malaria incidence with an area of elevation shows that the coefficient of determination (R Square) on the model regression statistics of 0.84, which implies that 84% of malaria cases is influenced by the extent of the height of the sea surface in hectares, In value Significance F of 0.00 or below 0.05, then the regression can be used to predict the incidence of malaria. The result of statistical analyze showed $p=0.00$; F table=3.4 showed the elevation factor influence to the incidence of malaria significantly.

Effect of elevation of the sea surface area with malaria incidence. The results of this study confirm that, although malaria is a disease that can be spread or potentially and easy to spread, in some cases have specific characteristics resulting from the combination of many variables. Factors elevation of sea surface to have an enormous influence on the spread of malaria, all of the risk factors elevation of sea surface has a

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consistent relationship associated with the transmission of malaria. Variable elevation of sea surface is consistently highly significantly associated with transmission of malaria in all Subdistrict in district of Ogan Komering Ulu.

The research result is consistent with research conducted by Cohen et al in 2008 the research results concluded that the spread of malaria generally decreases with increasing altitude.⁷ Research in Sukabumi and Kebumen concluded that the high incidence of malaria occurs in the highlands of Sukabumi and Kebumen this may be related to the fact that Indonesia is also experiencing the impact of global climate change because the temperature in Indonesia increased at a rate of 0,2°C - 0.3°C per decade.¹⁸

CONCLUSION

Malaria is a disease that requires ArcGIS approach to map risk zones based on factors elevation of sea surface in District of Ogan Komering Ulu, South Sumatra province. The spatial pattern of malaria incidence was highest in the subdistrict of Lubuk Batang with elevation, including very high risk zone (0-500) in District of Ogan Komering Ulu, South Sumatra province. This study confirms that, elevation factor influence spread of malaria in District of Ogan Komering Ulu, South Sumatra province.

Further research is needed on the interaction case model predictions based on other natural conditions, the addition of socio-economic factors, population growth, health facilities and influence the transmission of Plasmodium sp from mosquitoes to humans and from humans to mosquitoes will increase the accuracy of the prediction model of malaria cases to explain the distribution of cases in fact.

REFERENCES

1. World Health Organization. *World Malaria Report*. Geneve Switzerland World Health Organization (WHO). 2013.
2. Kementerian Kesehatan Republik Indonesia. Badan Penelitian dan Pengembangan. Riset Kesehatan Dasar. 2013
3. Dinas Kesehatan Propinsi Sumatera Selatan. *profile Dinas Kesehatan Propinsi Sumatera Selatan*. 2014.
4. Dinas Kesehatan Kabupaten Ogan Komering Ulu. *Profile Dinas Kesehatan Kabupaten Ogan Komering Ulu*. 2014.
5. Kementerian Kesehatan Republik Indonesia. *Pedoman Penatalaksanaan Kasus Malaria di Indonesia*. Direktorat Jenderal Pengendalian Penyakit dan Penyehatan Lingkungan. 2009.
6. Coulibaly, D., Rebaudet, S., Travassos. Spatio-Temporal Analysis of Malaria within a Transmission Season in Bandiagara, Mali. *Malaria Journal*, 2013; 12: 82.

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7. Cohen, J. M., Ernst, K. C., Lindblade, K. A., Vulule, J. M., John, C. C., & Wilson, M.L. Topography-Derived Wetness Indices are Associated with Household-Level Malaria Risk in Two Communities in the Western Kenyan highlands. *Malar J*, 2008; 7: 40.
8. Prahasta, E. *Konsep-konsep Dasar Perspektif Geodesi dan Geomatika Sistem Informasi Geografis*. Edisi revisi. Bandung: CV.Informatika. 2014.
9. World Health Organization. *Malaria Rapid Diagnostic Test Performance Results of WHO Product Testing Of Malaria RDT: Round 1*. Geneve: WHO. 2008
10. Clarke, K., Mclafferty, S. & Tempalski, B. On Epidemiology and Geographic Information Systems: A review and Discussion of Future Directions. *Emerging Infectious Diseases*, 1996; 2 (2): 85-92.
11. Januri MH. *Perbandingan Hasil Pemeriksaan Malaria Menggunakan Metode Mikroskopis dengan Metode Immunochromatography Test/ICT 2 Produk*. [Karya tulis ilmiah]. Samarinda: Stikes Wiyata Husada. 2013.
12. Sutanto I. *Diagnosis mikroskopik dan serologik malaria*. Dalam: Harijanto PN, Nugroho A, Gunawan CA, editor. *Malaria dari molekuler ke klinis*. Edisi ke-2. Jakarta: EGC. 2009. Hal: 103-12.
13. Utami BS, Estiana L, Tuti S. Penggunaan Rapid Diagnostic Test (RDT) oleh Kader Sebagai Alat Bantu dalam Penemuan Kasus Malaria di Desa Guntur, Kecamatan Bener, Kabupaten Purworejo. *Jurnal Ekologi Kesehatan*, 2008; 7 (2): 740
14. Widijanti A, Sihite BA. Nilai Diagnostik Rdt Malaria Menggunakan Enzim Hrp-2, Pldh Pan, Dan Pldh Vivax. *Medika Tahun Ke-XXXVI*, 2010; 10: 676–680. Available at: <http://Www.Jurnalmedika.Com/Edisi-Tahun-/Edisi-No-10-Vol- xxxvi-010/240-Artikel-Penelitian/419- Nilai-Diagnostik-Rdt-Malaria- Menggunakan-Enzim-Hrp-2- Pldh-Pan- Dan-Pldh-Vivax>.
15. Yan bi. *Impact of Socio-Ecological Variability on the Transmission of Malaria in Yunnan Province, China* A thesis submitted for the Degree of Doctor of Philosophy at School of Public Health and Social Work Queensland University of Technology, Australia. 2013.
16. Arsin AA. *Malaria di Indonesia Tinjauan Aspek Epidemiologi*. Penerbit: masagena press anggota ikapi. 2002.
17. Srivastava. *Diversity and seasonal densities of ector anophelines inrelation to forest fringe malaria in district Sonitpur, Assam (India)*. 2003.
18. Sari, PA., Maulidya, M., Butarbutar, RN., Sari, RE., & Rusmantor, W. Working Paper: *Indonesia and Climate Change*. Current Status and Policies. Jakarta: Department for International Development (DFID) and The World Bank. 2007.