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Policy Model of Community Adaptation using AHP in the Malaria Endemic Region of Lahat Regency - Indonesia

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Abstract*: Lahat Regency is a malaria-endemic region, so the research aims to develop a model of policy adaptation of society in the malaria-endemic region to Lahat Regency. This research is a qualitative study by collecting data through interviews and Focus Group Discussion (FGD), which is then processed using Expert Choice that is analyzed by the Analytical Hierarchy Process (AHP) technique. The results showed that there were 3 criteria in determining the priorities of the adaptation policy, i.e the hosts/society, agent/cause of the disease, and vector/environment. The policy Model was compiled using 3 criteria that resulted in successive policy priorities as follows: strengthening of preventive and curative malaria program of local-based (39.8%), strengthening malaria information system through community empowerment (17.4%), strengthening the commitment of central and local governments in sustainability fulfilment of program needs and coordination among related agencies (14.7%), projection of malaria transmission in space and time scale periodically and sustainably based on environmental factors (9%), malaria centre or malaria control centre (6.2%), the program of Chemoppropilaxis as an action against Plasmodium (5.8%), strengthening the capacity of health workers and laboratory personnel (4.2%), and development of the cross-sectoral intervention model (3%). 3 priorities became the main program conducted through a wide range of strategies.

***Keywords*: adaptation, endemic, policy, malaria, lahat**

I. INTRODUCTION

Malaria is a disease that is transmitted by mosquito bite *Anopheles* females due to *Plasmodium* parasites [1]. The disease develops due to a supportive environment and is triggered by climate change [2] [3]. Many studies have shown a link to a rise in temperature or climate change against the increasing cases of malaria [4]. The increased weather temperature can lead to faster growth of the larvae and mosquito repellent, and the shorter *gonotrophic* and *sporogonic* cycles [4]. In addition to climate change, population mobility factors, community socio-economic and mosquito resistance also affect its improvement [5].

Responding to the high number of malaria disease, the Government has carried out various countermeasures, through the Malaria Gebrak Program and the Malaria Elimination Movement [6]. However, the efforts have not been optimal, so until now malaria is still a problem in Indonesia. It is supported by the topographical conditions of Indonesia such as beaches, Outback, mountain feet and mountains is a place of mosquito repellent *Anopheles* [7].

South Sumatera Province has become one of the provinces in Sumatera Island which has Annual Parasite Incidence (API) number amounting to 0.31 per 1000 inhabitants in 2015, where Lahat Regency became one of the malaria-endemic regions, with the prevalence in 2010 is around 16.4%. Based on the quarter data of 2011, 4 of the 30 public health centres in Lahat Regency, have the highest number of clinical malaria sufferers [8]. The results [8] showed that the main determinant of malaria in Lahat Regency was a puddle of water or breeding place, to prevent it effectively can be done by interning or eradicating the puddle of water or breeding place [9]. Eradication of breeding will be more effective considering that *Anopheles* mosquitoes have a very adaptable nature in various environmental conditions, so in the effort to control the malaria vector, besides, to eradicate a breeding *Placenta*, also needed information about the biologic and Bionomic properties of *Anopheles SP* in the region [10]. Later in its transmission, the malaria disease caused by this *Anopheles* mosquito is multifactorial, which is influenced by ecological, socio-economic, and demographic factors, so that the control should consider the factor [11]. The enormous potential of Lahat Regency as a malaria-endemic region makes this disease must be addressed. Otherwise, this disease could potentially cause death, while pregnant women if left untreated can cause miscarriage or children born prematurely, have low birth weight babies (BBLR), and be born dead [12]. The high transmission of malaria disease and the magnitude of the impact requires immediate attention from the government, especially those in endemic regions. Therefore, it is necessary to compile an adaptation policy for people in the endemic region.

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The purpose of this research is to develop a Model of public adaptation policy of endemic Malaria district of Lahat Regency, South Sumatera Province.

II. METHODOLOGY

This research is qualitative research by collecting data through interviews and FGD. Interviews and FGD were conducted with the community and various stakeholders, including the city government officials of Lahat, the Regional Development Planning Agency (BPBD), the Municipal Health Office of Lahat, the Public Health centre, and the village government. Besides, researchers review the data and the results of pre-existing studies as well as documents relating to the policies, programs, and activities related to the malaria disease problem.

Results obtained, processed using Expert Choice analyzed by AHP using the working principle of AHP consist of a hierarchy (decomposition), assessment of criteria and alternatives (comparative judgment), synthesis of priority, and logical consistency (local consistency). In the assessment of criteria and alternative, the comparison of pairs using a scale of 1 to 9 as found in Table-1 below.

Table-I: Banding Scale in Pairs

Value	Description
1	Equally important
3	Somewhat more important one over other
5	Quite important
7	Very important
9	Extreme smoothness
2,4,6, 8	The Middle value between two adjacent decisions

Source [13-14]

III. RESULT

The malaria disease transmitted by the malaria mosquito (*Anopheles sp*) females [15, 16] can attack all people without exception and the selectivity of the host [17]. Besides, the mosquito is very adaptive and fast in finding surrogate prey, if the desired option Host not found in his life environment [18] The once infected *Anopheles sp* Mosquito will still be infected for life and can transmit parasites every time bite [18]. These mosquitoes can multiply in any open and stagnant water, including water that is very polluted even [19]. Therefore, in the prevention of malaria mosquitoes, it is necessary to identify the habitat of the larvae of vector mosquitoes [20, 21].

Lahat Regency is largely a plantation region and there are many rice fields [9] that are ecologically suitable for the development of the *Anopheles* mosquito. In the rice fields near the beach, has been found 33 species consisting of 10 types of *Anopheles* 5 of which are a role transmitted malaria, 13 types of Culex, 4 types of *Aedes* the remaining types of *Mansonia* and *Ficalbia* [22]. Rice paddy fields are ensured that the presence of *Anopheles Aconitus*, *Culex tritaeniorhyncus*, *Anopheles indefinitus* and *Anopheles Anullaris.* Next in the plantation area, mosquitoes like to put eggs on the holes of trees, shelter, places to eat and shelter [23]. Thus, the land of Lahat Regency is a place that has been liked by mosquitoes.

Malaria data search results in Lahat Regency showed that the API number in Lahat Regency was in the Medium Case Incidence (MCI) range. This Status is owned by Lahat Regency since 2014, according to the Ministry of Health, the territory that belongs to the MCI category is the region that has the API Number of 1-4.9 per mile [8]. This was supported by the results of Margarethy's research that conducted interviews in 31 Public Health Center areas in Lahat Regency. The results of the interview illustrate that the participation of public health centres in activities based and Puskesmas cooperation with related cross-sectors (government, private, NGOs) in the prevention of malaria is still not optimal. The potential spread of malaria disease, making malaria control activities must be integrated with various sectors and programs. This is due to the various risk factors affecting the incidence of malaria cases such as geographic conditions that allow the development of vectors, *Anopheles* in the rice paddy breeding, environmental hygiene, the presence of abandoned mining lands and others [24]. The policy Model of public adaptation in the malaria-endemic area in Lahat Regency, compiled using 3 criteria, i.e the hosts/society, agent/cause of disease, and vector/environment. Of these 3 criteria, the following 8 alternative policies are generated:

1. Projection of malaria transmission in space and time scale periodically and continuously based on environmental factors [25]
2. The Program of Chemopropilaxis as an action against *Plasmodium*
3. Strengthening the malaria information system through community empowerment [26]
4. Strengthening the preventive and curative malaria eradication program locally based
5. Development of cross-sectoral intervention model [27]
6. Strengthening the commitment of the central and local governments in sustainability fulfilment of program needs and coordination among related agencies [20]
7. Making Malaria Center or Malaria control centre
8. Strengthening the capacity of health workers and laboratory personnel

Fig 1. Model Hierarchy Adaptation Policy in Endemic Malaria Region

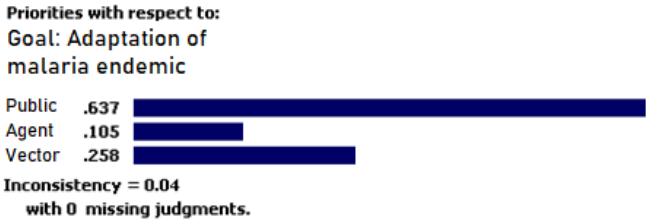

Fig 2. Value of Inconsistency Ratio

The processing result using AHP indicates that the value of the third Inconsistensi criteria is 0.04 or small from 0.1. This means that the policies being organized are consistent and can continue to define policy priorities. The results of this assessment are derived from the weighted ones given on each criterion and the alternative policy [29-32]. The pictures below are the policy priorities in a row, i.e the strengthening of preventive and local-based malaria eradication program (39.8%), strengthening the malaria information system through Community empowerment (17.4%), strengthening the commitment of central and regional governments in the continuity of the fulfilment of program needs and coordination among related agencies (14.7%), projection of malaria transmission in space and time scale periodically and continuously based, Making Malaria Center or Malaria Control Center (6.2%), the Program of *Chemoppropilaxis* as an action against *Plasmodium* (5.8%), strengthening the capacity of health workers and laboratory personnel (4.2%), and the development of a cross-sectoral intervention model (3%).

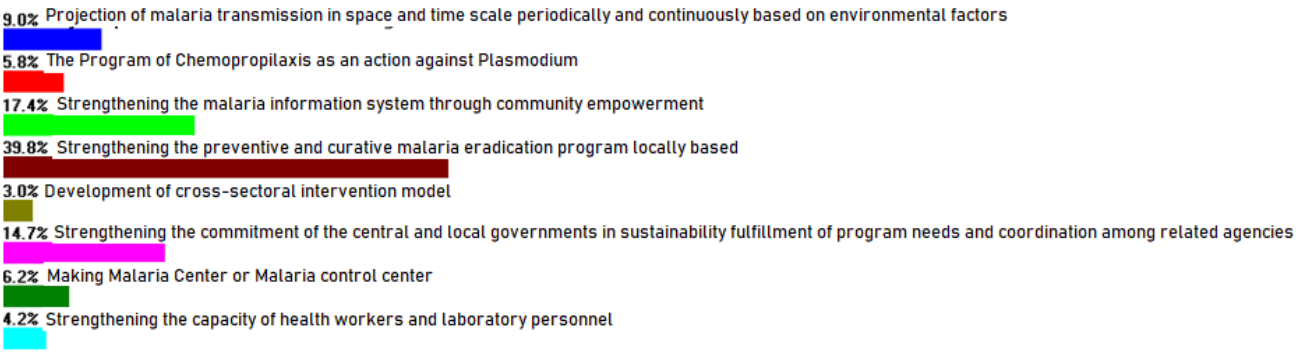

Fig. 3. Policy Priorities

Of the 8 alternative policies, the following 3 policy priorities are given:

1. Strengthening the malaria eradication program and local-based curative

Preventive

a. Vector control of disease or by spraying Indoor Residual Spraying (IRS), division mosquito nets insecticide, larviciding
b. Environmental control with the spread of the Fish eater and close all that could potentially be breeding place
c. Personal protection to avoid mosquito bites using complete clothes, sleep using mosquito nets, mosquito repellent, avoid visits in areas prone to malaria transmission
d. Modification of behaviour by reducing activity outdoors from dusk to dawn
e. Malaria prevention Program in women mainly pregnant mothers with *Plasmodium* screening

Curative

a. Treatment with Artemisinin Combination Therapy (ACT)

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b. Microscope examination/Rapid Diagnostic Test (RDT)
c. Administration of drug Artemisinin Combination Therapy (ACT) for positive malaria
d. Compliance monitoring of drug-taking

2. Strengthening the malaria information system through community empowerment
   a. Socialization and counselling to the public regarding malaria
   b. Actively involvement of the community as information media
3. Strengthening the commitment of the central and local governments in sustainability fulfilment of program needs and coordination among related agencies
   a. Good and clear coordination between the District government and the health service
   b. Modify the environment and build partnerships with the community to clean the place of mosquito-breeding.

There are 20 of the 80 species of *Anopheles* mosquitoes that have been shown to transmit the parasite of *Plasmodium* types scattered in various islands in Indonesia [34]. The transmission of the mosquito occurs through an active bite at night starting from 18.00 to the morning at 6.00, with the peak bite for each different species [33]. The high bite of the *Anopheles* type of *aconites* occurs at 22-23 then decreases and rises back at 01-02 at midnight [34]. In India, *Anopheles Aconitus* started to bite at 18.00 with a biting peak at 02.00 at midnight [35]. While the most *barbirostris* type *Anopheles* at 23.00-05.00, *Anopheles sundaicus* at 22.00-23.00, the most *Anopheles maculatus* at 21.00-03.00 and all kinds of mosquitoes will be more encountered if outside the house. Therefore, with the 3 policy priorities that are generated above as an adaptation policy model, it can be considered for the health office so that people are accustomed to living or adapt in areas that are potential for the breeding of mosquito repellent *Anopheles*. Although in the study of Atkinson et al mentioned that the knowledge of malaria and its means of prevention does not guarantee the public to do so or to use mosquito nets, but more influenced by climate factors, work and night activities, especially men [36].

IV. CONCLUSION

Lahat Regency is one of the regencies endemic to malaria, so it is required that the model of adaptation policy that the community can do with the government to suppress the pain rate of malaria disease. The policy Model is compiled using 3 criteria by generating successive policy priorities as follows: strengthening the preventive and local-based malaria eradication program (39.8%), strengthening the malaria information system through Community empowerment (17.4%), strengthening the commitment of central and regional governments in the continuity of fulfilling program needs and coordination among related institutions (14.7%), projection of malaria transmission in space and time scale periodically and sustainably based on environmental factors (9%), Making Malaria Center or Malaria Control Center (6.2%), the Program of *Chemoppropilaxis* as an action against *Plasmodium* (5.8%), strengthening the capacity of health workers and laboratory personnel (4.2%), and the development of a cross-sectoral intervention model (3%). 3 priorities became the main program conducted through a wide range of strategies.

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REFERENCES

1. Departemen Kesehatan RI, Profil Kesehatan Indonesia 2015, Jakarta: Departemen Kesehatan RI, 2016
2. D. Hermon, Impact of Land Cover Change on Climate Change Trend in Padang, Indonesia. Indonesia, *Journal of Geography*, Vol. 46, Issue. 2, pp.138-142, 2014
3. D. Hermon, Estimate of Changes in Carbon Stocks on Land Cover Change in the Leuser Ecosystem Area. Forum Geografi. Indonesia", *Journal of Spatial and Regional Analysis*, Vol. 29, Issue. 2, 2015, pp.187-196
4. Indonesia Climate Change Sectoral Roadmap (ICCSR), Indonesia Climate Change Sectoral Roadmap (ICCSR) Sektor Kesehatan, Jakarta: ICCST Sektor Kesehatan, 2010
5. Intergovernmental Panel on Climate Change (IPCC), A Report of the Working Group of the Intergovernmental Panel on Climate Change: Summary for Policymakers. Geneva: IPCC, 2007
6. I.R.F. Elyazar, S.I Hay, J.K. Baird JK, "Malaria Distribution, Prevalence, Drug Resistance and Control in Indonesia", *Advances in Parasitology*, Vol. 74, pp. 41-175, 2011
7. D. Hermawan, "Hubungan Keberadaan Tempat Perindukan Nyamuk dan Tingkat Pengetahuan asyarakat Terhadap Kejadian Malaria di Desa Sukajaya Lempasing Kabupaten Pesawaran Provinsi Lampung Tahun 2015", *Jurnal Medika Malahayati*, Vol. 3, Issue. 4, pp.190-6, 2016
8. Dinas Kesehatan Kabupaten Lahat. Laporan pengelola program malaria Kabupaten Lahat tahun 2015. Lahat: Dinkes Kab Lahat; 2015
9. H. Hasyim, A. Camelia, N.A. Fajar, Determinant of Malaria in the Endemic Areas of South Sumatera Province, *Jurnal Kesehatan Masyarakat Nasional*, Vol. 8, Issue. 7, pp. 291-294, 2014
10. N.W.D. Adnyana, Beberapa aspek bionomik Anopheles sp di Kabupaten Sumba Tengah Propinsi Nusa Tenggara Timur, *Media Litbang Kesehatan*, Vol. 21, Issue. 2, pp. 62–70, 2011
11. P. Sriwichai, Y. Samung, S. Sumruayphol, K. Kiattibutr, C. Kumpitak, and A. Payakkapol, Natural human Plasmodium infections in major Anopheles mosquitoes in western Thailand, Parasit Vectors, Vol. 9, Issue. 1, pp. 17, 2016,
12. Ditjen PP dan PL Kemenkes, *Pedoman Manajemen Malaria*, Jakarta, 2014
13. Soedarto, *Buku Ajar Parasitologi Kedokteran*. Jakarta: CV.Sagung Seto, 2011
14. M. Yeryan, H.R. Basseri, A.A. Hanafi-Bojd, A. Raeisi, H. Edalat , R. Safari, Bio-ecology of malaria vectors in an endemic area, Southeast of Iran, *Asian Pac J Trop Med*, Vol. 9, Issue. 1, pp. 32–38, 2016,
15. D.T. Boewono dan S. Nalim, Pencirian, Pelepasan Dan Penangkapan Ulang Sebagai Upaya Mengetahui Perilaku Menggigit Vector Malaria An. Aconitus. Seminar Parasitologi Nasional ke V, Ciawi, Bogor: 1998.
16. Malaria Research Centre in India. Bionomics of Malaria Vectors in India. Vector Biology, pp.19-31, 2002
17. . Wijayanti, Malaria sebagai penyakit zoonosis, *Balaba*, Vol. 8, Issue. 02, pp. 46–50, 2012
18. A.H. Kelly and J. Lezaun, Walking or Waiting? Topologies of the Breeding Ground in Malaria Control, *Sci Cult* (Lond), Vol. 22, Issue. 1, 2013, pp. 86–107.
19. AA. Hanafi-Bojd, H. Vatandoost, M.A. Oshaghi, Z. Charrahy, A.A. Haghdoost and M.M. Sedaghat, Larval habitats and biodiversity of anopheline mosquitoes (Diptera: Culicidae) in a malarious area of southern Iran". *J Vector Borne Dis*, Vol. 49, Issue. 2, pp. 91– 100, 2012
20. A. Tabbabi, A. Rhim, C. Brengues, J. Daaboub and N. Ben-Alaya-Bouafif, Larval habitats characterization and species composition of anopheles mosquitoes in Tunisia, with particular attention to anopheles maculipennis complex, *J Trop Med Hyg*, vol. 92, no.3, pp. 653–659, 2015

21. A. Craig, Stoops, R. Yoyo, Gionar, R. Saptoro, S. Dwiko, K A.Barbara, H. Andris, I. F.Elyzar and A. Munif, Laboratory and field testing of bednet traps for mosquito (Diptera:Culicidae) Collection in West Java Indonesia. Prepear Journnal of Medical, Entomology : 2008
22. A. Munif, sangat berpengaruh bagi kehidupan nyamuk antara lain sebagai tempat. *Aspirator*, Vol. 1, Issue. 2, pp. 94-102, 2009
23. I. Margarethy, A. Yenni, T. Wurisastuti, M. Salim and Santoso, Associated of Malaria Prevention Program with Malaria Case in Lahat Regency 2016, *BALABA*, Vol.14, Issue.1, pp. 71-84, 2018
24. E.F.H. Murhandarwati, A. Fuad, Sulistyawati and M.A. Wijayanti, Change of strategy is required for malaria elimination: a case study in Purworejo District Central Java Province Indonesia, *Malar J*, 2015
25. I.O. Ajayi, C.O. Falade, E.A. Bamgboye, A.M. Oduola and O.O Kale, Assessment of a Treatment Guideline to Improve Home Management of Malaria in Children in Rural South-West Nigeria. Malaria Journal. 7: 24, 2008.
26. Mardihusodo, Malaria: Status Kini dan Pengendalian Nyamuk Vektornya untuk Abad XXI, Yogyakarta, 1999
27. H.S.P. Manalu, S. Sukowati, Peran tenaga kesehatan dan kerjasama lintas sektor dalam pengendalian malaria, *J Ekol Kesehat*, Vol. 13, Issue. 1, pp. 50–58, 2014
28. D. Hermon, Evaluation of physical development of the coastal tourism regions on tsunami potentially zones in Pariaman City-Indonesia. *International Journal of GEOMATE*, Vol. 17, Issue. 59, pp.189-196, 2019
29. D. Hermon, The Strategic Model of Tsunami Based in Coastal Ecotourism Development at Mandeh Regions, West Sumatera, Indonesia, *Journal of Environment and Earth Science*, Vol. 6, Issue. 4, pp. 40-45, 2016
30. I. Umar, I. Dewata, Mitigation Policy Directions In Flood Hazard Zone At Limapuluh Kota District, West Sumatra Province", *Jurnal Pengelolaan Sumberdaya Alam dan Lingkungan*, Vol. 8, Issue. 2, pp.251-257, 2018
31. Dit.Jen P2M dan PLP. Program dan Kebijakan Pengendalian Vektor/ Reservoir Penyakit di Indonesia. Simposium Nasional Pengendalian vektor dan Reservoar, 17 Desember 2006
32. Boewono, D.T. dan Nalim, S. Pencirian, Pelepasan Dan Penangkapan Ulang Sebagai Upaya Mengetahui Perilaku Menggigit Vector Malaria An. Aconitus. Seminar Parasitologi Nasional ke V, Ciawi, Bogor : 1998
33. Munif, A. Kepadatan Predator Pada Perairan Sawah Serta Pengaruhnya Terhadap Populasi Larva Anopheles aconitus di Sukanagalih. Parst. Ind., 3 (Ed Khus), pp. 69-78, 1994
34. R.M. Bhatt and V.K Kohli, Biting Rhythms of some Anophelines in Central tral Gujarat. Indian J. Mal: Vol. 33, pp.180-190, 1996
35. A. Munif dan Yusniar. Tabel Kehidupan An.Aconitus Sebagai Pendukung Analisis Epidemiologi Penyakit Tular Vector. *Media Penelitian dan Pengembangan Kesehatan*. Vol XV No. 4/2005
36. J.A. Atkinson, A. Bobogare, L. Fitzgeralds, L. Boaz, B. Appleyard, H. Toaliu, A. Valley. 2009. A Qualitative Study on the Acceptability and Preference of Three Types of Long-Lasting Insecticide-Treated Bed Nets in Solomon Islands: Implications for Malaria Elimination. *Malaria Journal*. Vol. 8, pp. 119, 2009

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