ISPHE 2018

INTERNATIONAL SEMINAR ON PUBLIC HEALTH AND EDUCATION

PROCEEDINGS

Wellbeing Promotion and Technologies:
Health, Physical Activity and Medicine

Semarang, May 8-9, 2018

The Wujil Resort and Conventions

Semarang Central Java, Indonesia

ENVIRONMENTAL FACTORS ON SPREADING FILARIASIS DISEASE ON DEMAK COAST

1st Rudatin Windraswara
Dept. of Public Health
Universitas Negeri Semarang
Semarang, Indonesia
rudatin@mail.unnes.ac.id

2nd Dyah Mahendrasari Sukendra
Dept. of Public Health
Universitas Negeri Semarang
Semarang, Indonesia
dyahmahendra@yahoo.com

3rd Ririn Wardhani
Dept. of Public Health Universitas Negeri Semarang Semarang, Indonesia
ririnwardanizuhruf@gmail.com

Filariasis is an endemic infectious disease in Indonesia. Endemicity of filariasis was shown by Demak district with mf rate was >1% in 2016. Purpose of this research is to describe of environmental (physics, biology, and social) in endemic filariasis area. The result showed that average distance of the biological environment (garden plant, puddle rob, mangrove plants, open sewerage, garbage inundated, and cattle pen) from the house was <10 m.
Keywords: Filariasis, Environmental.

1. INTRODUCTION

Lymphatic filariasis is an infectious disease that attacks lymph nodes with symptoms of lymphangitis and lymphadenitis caused by filarial worms (Brugia malayi, Brugia timori, and Wuchereria Bancrofti) and is transmitted by mosquitoes (WHO, 2013).

Bedono village is a coastal area bordering the Java Sea and has an area of 551,673 Ha. Administratively, Bedono Village is divided into 5 hamlets, 5 RW and 23 RT and its territory is included in the lowland because it is located at an altitude of 0-3 mdpl. Most of Bedono Village area consists of wetland (pond) of 490,673 Ha, protected forest with area 166,876 Ha, and settlement area is only 61 Ha (Government of Bedono Village, 2017). In the preliminary study results during March 2017, it was found that Bedono village has environmental characteristics that are mostly overgrown with mangrove and bush vegetation (75%), puddles of rob in surrounding houses (70%), chicken cages around mangrove plants (10%), and ditch / open ditch (100%).

In addition, in Bedono Village area there has been an extreme environmental change due to conversion of mangrove forests for land clearing and environmental pollution. Reduced mangrove forests (since 2006) are known to have resulted in extreme environmental changes such as abrasion that drowned two hamlets (in 2009) and the emergence of vector-borne disease (2016). Environmental changes such as loss of mangrove vegetation are known to cause the migration of mosquito habitat from mangrove forests to settlements so that the behavior of mosquitoes looking for blood also changes (Kemenkes 2011). Mangrove forests are known to be vector-borne diseases such as mangroves have a canopy that protects mosquito larvae from breeding into mosquito habitats (Putra et al., 2015). Because of the environmental changes, the distribution of mosquitoes is suspected to be uncontrollable. In addition, mosquitoes could potentially be vector filariasis since mosquitoes have invasive properties (capable of widespread in new environments) (Manguin, 2011).

2 METHOD

The research was conducted in Bedono Village, Sayung District, Demak District with 1,081 families, divided into 5 villages, Bedono, Morosari, Mondoliko, Pandansari, Tonosari, and Tambaksari Hamlet. This research was conducted for one month since May II (11-20) to June II (11-20).

This study used descriptive study with observational type and cross sectional design. Sources of data in this study are secondary data and primary data. Secondary data in the form of filariasis case report (obtained from infectious disease report of Demak District Health Office 2016 and Sayung I Health Center) and data on rainfall (obtained from BMKG 2017). Primary data comes from observations about the physical and biological environment as well as interviews related to the social environment during the study.

The research instruments used in this research are measurement sheet, observation, and questionnaire sheet. The measurement sheets are used to record the measurements of the physical environment (temperature, humidity, and rainfall) and the biological environment (garden plants, puddles, mangroves, open SPALs, waste in puddles, and cattle stables).

3 RESULT AND DISCUSSION

1.1 Biological Environment

The biological environment described in this research is in the form of condition of yard plant, mangrove plant, puddle rob, open SPAL, chicken livestock pen, and garbage with water. It is known that the average distance between the biological environment (garden plants, mangroves, puddle rob, open spal, chicken litter, and garbage) with a population of <10 m. The distance of the yard plant is in accordance with the research by Sipayung (2014) that the yard plant found in the majority filariasis endemic area is 0-500 m from the house. While the distance of mangrove plants is in accordance with research by Kurniawan (2008) that the average distance of mangrove plants in the coastal area is 0-200 m from the settlement. The puddle distance is similar to that of Wulandhari (2015) that the average pipe in Pekalongan City as endemic area is 0-10 m from the house. The gap opening distance is similar to that of Ginandjar (2008) that in Muaro Jambi district as filariasis endemic areas have an average gap of 0-100 m. While chicken and litter cages are the same as Ardias's research, et. al (2013) that the majority of the population in filariasis endemic areas have cattle and trash cages 0-10 m from home.

The biological environment spacing of <10 m is a vulnerability to filariasis transmission due to the average mosquito flight distance of 0-3 km from the blood-searching site (MOH RI, 2007; Tsuda, et al., 2008; Okorie, 2014). However, the flying distance of the mosquito can be as far as> 30 m from where the blood is sought by the wind speed factor (Kusnanto, 2013). In addition to wind speed, the type of biological environment in the form of yard plants can affect the presence of filariasis vector, considering the type of garden plants (trees and shrubs) is the preferred place for mosquitoes to rest (Manimegalai, 2014).

While close proximity of mangroves (<100 m) to households causes the risk of filariasis vector bites to increase as mangroves can be a breeding ground for mosquitoes. On the contrary, if the distance of mangrove plant is far from settlement (> 100 m) then mangrove plants can change function as protection of vector borne disease. This is because the mangrove plant provides a habitat for mosquitoes so that mosquitoes can be localized to residential areas. The statement is supported by Putra et. al (2015) which mentions that mangrove plants can become immunity vector borne disease diseases such as malaria because mangroves have a canopy that is able to protect the breeding of mosquito larvae to become a habitat when adult mosquitoes. Loss of mangrove function as protection of vector borne disease (filariasis, malaria, dengue) can be caused by land clearing so mosquitoes move habitat to settlement (Kemenkes, 2011).

In the biological environment, a puddle of rob which is <10 m from the house is known to be at risk of mosquito bites as it is closer to the mosquito breeding area. Inundation with 0.2-18% salt is known to be a breeding ground for mosquitoes such as Anopheles sp (Jude, et al., 2012; Pratama, 2015), Aedes sp (Jude, et al., 2012; Arduino, et al., 2015), and Culex sp (Jude, et al., 2012; Saputri, 2015).

In addition to the salinity conditions, the characteristics of the inundation pools found in the village Bedono is overgrown with water plants and clumps of fish. The existence of a water plant in the form of catfish (Lemna sp) makes the puddle of rob can not be used as a place for mosquito breeding due to water plants type catfish eye (Lemna sp) makes the mosquito larvae can not live because Lemna sp releases substances capable of causing perforation in larvae so that larvae can not survival (Tariq, M, et al., 2009). In addition, the existence of the clump fish makes the mosquito larvae can not survive because the clump fish are known to eat mosquito larvae (Manguin, et al., 2011). The existence of these conditions causes a rob pool with water-planting characteristics and the predators have no potential as potential vector filariasis habitat. However, in the rob pools that are not overgrown with catfish and predatory fish can be used to breed mosquitoes.

While the presence of open drains within <100 m can be at risk of mosquito bites since open ditches are potential habitat of filariasis vector (Culex sp) (Misrha, 2014). In addition to Culex sp. Mosquitoes, Anopheles sp and Aedes sp mosquitoes are also known to be able to breed in gullies (Arana-Guardia, et al., 2014; Naeem, et al., 2015). Sewers may be used by mosquitoes to breed because the gut provides provides a place for female mosquitoes to ovoposit (Arana-Guardia, et al., 2014). Therefore, it is necessary to eradicate mosquito breeding such as

maintaining the smooth flow of sewer water from blockage (eg garbage) so as not to stagnate.

The existence of livestock enclosures with a mean distance of <10 m is known to increase the potential for transmission of filariasis disease since cattle pens can be used for mosquitoes to rest (Mishra, et al., 2014). In addition, temperatures and humidity in livestock enclosures that are compatible with mosquito breeding, cattle pens may potentially be potential habitat of filariasis vectors (Dhimal, et al., 2014). While the presence of waste contained in puddles may increase the risk of mosquito bites due to waterlogged waste is one potential habitat of aquatic mosquitoes phase with a minimum volume of 5 cc (Higa, et al, 2010).

1.2 Distribution of Filariasis Vector by Temperature, Humidity, and Rainfall

Based on the results of the study, it is known that the mosquitoes are caught in Bedono village at 25-30^{0}C with peak temperature caught at 29,5^{0}C. These results are similar to Sukendra's (2016) study which states that Culex sp mosquitoes caught in Pekalongan City as filariasis endemic areas are present at 27-300C. The temperature is known to be the optimal temperature for the development of several species of mosquitoes such as Culex sp (in the range 26-300C) (Okorie, et al., 2014), Aedes aegypti (temperature range 24-270C) (Puspawati, 2012), and Anopheles sp (temperature range 25-300C) (Beck-Johnson, L., et.al, 2013). Due to the condition of air temperature in Bedono village as filariasis endemic area support activity of mosquito bites, hence needed strategy to avoid mosquito bites like repelent use mosquito repellent.

Changes in environmental conditions found in filariasis endemic area of Bedono Village is indicated by the decreasing of mangrove forest and abrasion phenomenon that drowns the land and sweeps the ponds. The existence of environmental changes is known to affect the temperature and humidity environment. In the Donatoa study, et. al. (2012) mentions that the reduction of mangrove vegetation by 0.7% causes an increase in carbon emissions by 10% which will affect the temperature rise of 0.0190C. Increased temperatures and decreased moisture can cause some types of mosquitoes to adapt and have an increased durability (Manguin, et al., 2011). Therefore, at the location of the research (Bedono Village) has a moisture that supports the activity of mosquitoes, the mosquitoes can move to bite optimally. For that, the strategy needed to avoid mosquito bites like the use of anti-mosquito drugs.

4 CONCLUSIONS

The conclusions of this research are physical condition such as temperature, humidity and rainfall in filariasis endemic area of Bedono Village during May-June 2017, ie temperature, humidity and rainfall in medium / tropical category. The existing social environment in filariasis endemic area of Bedono Village in 2017 is known that most respondents have average night-out habits at 23.00-24.00 with kind of activities chatting on home terrace, fishing, keep post pilgrimage ticket, and eat.

Suggestions from this research are for Bedono Village community should clean up the potential environment of mosquito breeding (open SPAL and waste water puddle), protect mosquito bites (wear mosquito repellent lotion, wear shirt and trousers) when out at night -20.00 and 23.0-03.00), and reduced nighttime activities outside the home with mangrove vegetation.

REFERENCES

Ambarita, L. P., Taviv, Y., Sitorus, H., Pahlepi, R. I., Kasnodihardjo.2014. Perilaku Masyarakat terkait Penyakit Kaki Gajah dan Program Pengobatan Massal di Kecamatan Pemayung Kabupaten Batanghari, Jambi. Media Litbangkes.24(4):191 – 198

Arana-Guardia, R., Baak-Baak, C. M., Loroño-Pino, M. A., Machain-Williams, C., Beaty, B. J., Eisen, L., & García-Rejón, J. E. 2014. Stormwater Drains and Catch Basins as Sources for Production of Aedes aegypti and Culex quinquefasciatus. Acta Tropica. 134. 33–42. http://doi.org/10.1016/j.actatropica.2014.01.011

Ardias, Setiani, O. Hanani, Y. D.2012. Faktor Lingkungan dan Perilaku Masyarakat yang Berhubungan dengan Kejadian Filariasis di Kabupaten Sambas. *Jurnal Kesehatan Lingkungan Indonesia*.11(2):199-207

Arduino, M. d. B., Mucci, L. F., Serpa, L. L. N., Rodrigues, M. d. M.2015. Effect of salinity on the behavior of Aedes aegypti populations from the coast and plateau of southeastern Brazil. *J Vector Borne Dis.*(52):79–87

Chandra, Goutam.2008. Review: Nature limits filarial transmission.*Parasites and Vectors*.1(13):1-6.

Dhimal, M., Ahrens, B., Kuch, U.2014. Species composition, seasonal occurrence, habitat preference and altitudinal distribution of malaria and other disease vectors in eastern Nepal. *Parasites & Vectors*.7(1):1-11.

Dinas Kesehatan Kabupaten Demak.2016. Rekapitulasi Kasus Filariasis Kabupaten Demak tahun 1995-2016. Dinas Kesehatan Kabupaten Demak.

Dinas Kesehatan Provinsi Jawa Tenagh.2015. Profil Kesehatan Provinsi Jawa Tengah tahun 2015. Dinas kesehatan provinsi.

Donatoa, D. C., Kauffmanb, J. B., Murdiyarsoc, D., Kurniantoc, S., Stidhamd, M., dan Kanninene, M. 2012. Mangrove adalah salah satu hutan terkaya karbon di kawasan tropis.Brief CIFOR. (3):1-12.

Erickson, S. M., Xi, S., Mayhew, J. F., Ramirez, J. L., Aliota, M. T., Crishtensen, B. M., Dimopuolos, G. 2009. Mosquito Infection Responses to Developing Filarial Worms. PLoS Negl Trop Dis. 3(10): e529.

Ginandjar, Praba dan Esther Sri Majawati.2014. Faktor Risiko Kejadian Filariasis Limfatik di Kecamatan Moro Sebo Kabupaten Muaro Jambi. Artikel Penelitian Fakultas Kedokteran UKRIDA. (1):1-5

Gleave, K. Cook, D., Taylor, M. J., Reimer, L. J. 2016. Filarial Infection Influences Mosquito Behaviour and Fecundity.Sci. Rep. 6(36319): 1-4

Hardinisah, S., Marsaulina, I., Santi, D. N.2016. Pemilihan Anti Nyamuk Ditinjau dari Tingkat Pendidikan, Pendapatan dan Perilaku Serta Keluhan Kesehatan pada Keluarga di Kelurahan Asam Kumbang Kecamatan Medan Selayang Tahun 2015. Jurnal Kesehatan. 7(1):1-7

Hermawan, E.2017. Fenomena *Urban Heat Island* (UHI) pada Beberapa Kota Besar di Indonesia sebagai Salah Satu Dampak Perubahan Lingkungan Global. *Jurnal Lingkungan*. 5(1): 33-45

Higa Y., Yen, N. T., Kawada, H., Son, T. H., Hoa, N. T., Takagi, M.2010. Geographic Distribution of *Aedes aegypti* and *Aedes albopictus* Collected from Used Tires in Vietnam. *Journal of the American Mosquito Control Association*. 26(1):1-9.

Jude, P. J., Tharmasegaram, T., Sivasubramaniyam, G., Senthilnanthanan, M., Kannathasan, S., Raveendran, S., Ramasamy, R., Surendran, S. N.2012. Salinity-tolerant larvae of mosquito vectors in the tropical coast of Jaffna, Sri Lanka and the effect of salinity on the toxicity of Bacillus thuringiensis to Aedes aegypti larvae.*Parasite & Vectors*.5(1):1-8

Kemenkes RI.2011.Atlas Vektor Penyakit di Indonesia: Seri 1.Jakarta:Kkementerian Kesehatan RI.

Kemenkes RI.2015.Infodatin:Filariasis Menuju Elimininasi Filariasis 2020.Jakarta:Kementerian Kesehatan RI

Khan, A. M., Dutta, P., Das, S., Pathak, A. K., Sarmah, P., Hussain, M. E., & Mahanta, J. (2015). Microfilarial periodicity of Wuchereria bancrofti in Assam, Northeast India. *Journal of Vector Borne Diseases.* 52(3): 208–212

Kirti, J. S., Shipali, Kaur, J. 2014. Comparision of Male and Female Genitalia of Culex species with Scanning Electron Microscopy (SEM). Int J Curr Res Aca Rev. 2(1): 17-24

Kurniawan, Jeppry.2008. Analisis Faktor Risiko Lingkungan dan Perilaku Penduduk Terhadap Kejadian Malaria Di Kabupaten Asmat Tahun 2008. Tesis. Semarang: Universitas Diponegoro

Kusnanto, H. M., & Lazuardi, L. 2013. The Relations of Climate and Land Use with the Incident of Filariasis in Pasaman Barat 2007-2013, 4531, 241–256

Komaria, R. H., Faisya, H. A. F., Sunarsih, E.2016. Analisis Determinan Lingkungan Fisik Dan Perilaku Preventif Terhadap Kasus Filariasis

di Kecamatan Talang Kelapa dan Kecamatan Sembawa Kabupaten Banyuasin. Jurnal Ilmu Kesehatan Masyarakat. 7(2):1-10

Lestari, M. I. 2016.DEET: Bahan Aktif Repellent yang Efektif dan Aman bagi Traveller. Jurnal Kedokteran Udayana.5(1):1-11.

M. M., Manyi, Vajime, C.G and Imandeh, G. N. 2014. Seasonal changes of microfilarial infection and infectivity rates in mosquito populations within Makurdi, Benue State, Nigeria. *International Journal of Mosquito Research*.1 (4): 01-09

Manguin S, Bangs MJ, Pothikasikorn J, Chareonviriyaphap T. 2010.Review on Global Co-transmission of Human Plasmodium species and Wuchereria bancrofti by Anopheles Mosquitoes. *Infect, Gen. and Evol*. 10:159-177

Manguin, S., & Boëte, C. 2011. Global impact of mosquito biodiversity, human vector-borne diseases and environmental change. *The Importance of Biological Interactions in the Study of Biodiversity*.27–50. http://doi.org/10.5772/22970

Manimegalai K, Sukanya S.2014.Biology of the filarial vector, Culex quinquefasciatus (Diptera:Culicidae). *Int J Curr Microbiol App Sci*.3 (4): 718–24

Misrha, Chirasmita.2014.Culex Mosquito:Vektor Filariasis.Journal of Entomology.(1):95-98

Naeem, S., Ahmad, S., Sohail, K., Shah, S. F., Naeem, K. 2015. Study of Relative Abundance of Different Mosquito Genera in Different Habitats at Peshawar. Journal of Entomology and Zoology Studies. 3(4): 391-394

Nasirin.2008. Faktor-Faktor Lingkungan dan Perilaku yang Berhubungan dengan Kejadian Filariasis di Kabupaten Bangka Barat.Tesis. Semarang: Universitas Diponegoro.

Okorie,P. N., Popoola, K.O.K., Awobifa, O. M., Ibrahim, K. T., Ademowo, G. O.2014.Species Compositon and Temporal Distribution of Mosquito Populations in Ibadan, Southwest Nigeria.*Journal of Entomology and Zoology*.2(4):164-169

Paiting, S., & Setiani, O.2012. Faktor Risiko Lingkungan dan Kebiasaan Penduduk Berhubungan Dengan Kejadian Filariasis di Distrik Windesi Kabupaten Kepulauan Yapen Provinsi Papua. *Jurnal Kesehatan Lingkungan Indonesia*.11(1): 76–81

Pemerintah Desa Bedono.2016. Profil Desa Bedono tahun 2016. Pemerintah Desa Bedono Sayung Demak

Pratama, G. Y. 2015. Nyamuk Anopheles sp dan Faktor yang Mempengaruhi di Kecamatan Rajabasa, Lampung Selatan. *J Majority*, 4(1), 20–27

Putra, A. K., Bakri, S., Kurniawan, B. 2015. Peranan Ekosistem Hutan Mangrove pada Imunitas terhadap Malaria: Studi di Kecamatan Labuhan Maringgai Kabupaten Lampung Timur. Jurnal Silvia Lestari. 3(2): 67-78

Raini, Mariana.2009. Toksikologiinsektisida Rumah Tangga dan Pencegahan Keracunan. *Media Penelit. dan Pengembang. Kesehat*. 19(2):27-33

Ridha, M. R.2016. Vektor Potensial Filariasis Dan Habitatnya Di Desa Mandomai Kabupaten Kapuas Provinsi Kalimantan Tengah. Tesis. Bogor: Intitut Pertanian Bogor

Rohani, A., Zamree, I., Ali, W. M. W. N., Hadi, A. A., Asmad, M., Lubim, D., Nor, Z. M., Lim, L. H. 2013. Nocturnal man biting habits of mosquito species in Serian, Sarawak, Malaysia. Advances in Entomology 1(2): 42-49

Salim, M. F., Satoto, T. B. T., Kusnanto, H. 2016. Zona Kerentanan Filariasis Berdasarkan Faktor Risiko dengan Pendekatan Sistem Informasi Geografis. Journal of Information Systems for Public Health. 1(1): 16-24.

Saputri, R. P. I.2015. Perbandingan Kemampuan Penetasan Telur Nyamuk Culex sp Berdasarkan Jenis Air Perindukan (Air Limbah Batik, Air Limbah Rumah Tangga,

Air Rob). Skripsi. Semarang: Universitas Diponegoro

Sipayung, M., Chatarina, U. Wahjuni, Devy, S. R.2014. Pengaruh Lingkungan Biologi dan Upaya Pelayanan Kesehatan terhadap Kejadian Filariasis Limfatik di Kabupaten SarmI. *Jurnal Berkala Epidemiologi*.2(2): 263–273

Sukendra, D.M., Shidqon, M.A.,2016. Gambaran Perilaku Menggigit Nyamuk Culex Sp. sebagai Vektor Penyakit Filariasis Wuchereria bancrofti.Jurnal Pena Medika.6(1):19-33

Tariq, R. M., Naqvi, M. H., Zavar, S. M. N., 2009. Two Indigenous Aquatic Weeds Lemna Minor and Spirodella Spp., Gave Promising Biological Control Of Mosquito Larvae With Rainbow Fish On Field Level In Karachi, Sindh, Pakistan. Pakistan Journal of Botany. 41(1): 269-276

Tawas, R. C., Pijoh, V. D., Tuda, J.2015. Tindakan Masyarakat tehadap Penyakit Malaria di Kecamatan Silian Raya Kabupaten Minahasa Tenggara. *Jurnal e-Biomedik (eBm)*.3(1):261-268

Tsuda Y., Komagata, O., Kasai, S., Hayashi, T., Nihei, N., Saito, K., Mizutani, M., Kunida, M., Yoshida, M., Kobayashi, M.2008.A Mark-release-recapture Study on Dispersal and Flight Distances of Culex pipiens pallens in a Urban Area o Japan. *Journal of The American Mosquioto Control Association*.24(3):33-343

Tuten , H.C., Bridges Jr, W.C., Adler, P.H.2012. Comparative morphology of the pyloric armature of adult mosquitoes (Diptera: Culicidae). *Arthropod Structure & Development*.41:475-481.

WHO.2013.*Lymphatic Filariasis:Managing Morbidity and Preventy Disability an aide-memoire for National Programme Magers*.Geneva:WHO Press

Widiastuti, P. dan WInarsih.2016. Karakteristik Host dan Lingkungan Penderita Filariasis di Kabupaten Tangerang Tahun 2015.Skripsi:Program Studi Kesehatan Masyarakat Universitas Islam Negeri jakarta

Wijayanti, Tri.2009. Analisis Situasi Filariasis Limfatik di Kelurahan Simbang Kulon Kecamatan Buaran Kabupaten Pekalongan. *BALABA*.5(1):11-16

Windiastuti, Ike Ani, et.al.2013.Hubungan Kondisi Lingkungan Rumah, Sosial Ekonomi, dan Perilaku Masyarakat denganKejadian Filariasis di Kecamatan Pekalongan Selatan Kota Pekalongan.*Jurnal Kesehatan Lingkungan Indonesia*.(12):51-57

Wulandhari, S. A.2015. Analisis Spasial Aspek Kesehatan Lingkungan dengan Kejadian Filariasis di Kota Pekalongan.Skripsi.Semarang: Universitas Negeri Semarang.

ISPHE

INTERNATIONAL SEMINAR
PUBLIC HEALTH EDUCATION

ISBN 978-602-61215-6-1