



Analysis of Malaria Control Situation in Magelang Regency and Obstacles to Maintain Malaria Elimination Status

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Abstract

Magelang Regency received malaria elimination certificate in April 2014, however, the epidemic signal was received back in April 2015. Malaria epidemic had occurred for two months and until the end of December, indigenous cases could still be found. The purpose of this study was to find out description of situation regarding malaria, malaria control, and obstacles to malaria control in Magelang Regency. Rapid assessment method was conducted by adopting the methodology in the protocol and methods for malaria situation analysis from WHO (2003) and by using desk review as the reference for the research process in malaria control method in a region with similar condition to Magelang regency. Data collection was performed through interview and observation. This study found that in April 2015, the number of indigenous cases was 2 which was increased to 37 cases in May and the peak prevalence was 56 cases in June. Previously, import cases were found in March. Up until December, malaria cases were dominated by indigenous cases (97%). Village regulation regarding malaria migration surveillance was still not available in most receptive villages. In area which had eliminate malaria, there should be regulation that govern malaria migration surveillance. Therefore, the Regent should advise the village chief through a circulatory letter to form a new regulation regarding malaria migration surveillance in order to reduce outbreak potential.

Introduction

In 2012, there were 97 countries and regions with malaria transmission risk. Those regions were visited by 125 million international tourists annually. Every year, numerous international tourists acquired malaria infection during their visit to malaria endemic countries/regions, and more than 10.000 were reported to get malaria after their return to their country of origin (World Health Organization, 2012). Malaria still become health problem in Indonesia because the disease could be found

in every provinces in Indonesia. According to annual paracyte incidence (API), a region stratification was performed which found that Eastern Indonesia was included in high malaria stratification, moderate stratification were found in several region of Kalimantan, Sulawesi, and Sumatera, while Java and Bali were included in low stratification, although there were still high malaria focus/villages (Center for Data and Information & Directorate of P2B2, 2011).

In Central Java Province, the malaria

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morbidity numer (annual paracyte incidence/API) tend to decrease from year 2011 (0.11/1000 people), 2012 (0.08/1000 people), 2013 (0.07/1000 people), and 2014 (0.05/1000). However, there were still indigenous cases in 5 regencies, namely Purworejo, Banjarnegara, Purbalingga, Banyumas, and Kebumen. There were 2 death cases because of malara (CFR 0.1%) di Purbalingga and Kebumen (Dinkes Prov Jateng, 2014).

Magelang Regency is a regency in Central Java with malaria endemic cases and has direct border with Purworejo Regency which is also a malaria endemic region. On April 16th 2014, the regency acquired malaria elimination certificate because the number of cases was decreasing from 15 cases in 2011, to become 31 cases in 2012, 32 cases in 2013, and only 6 cases in 2014. However, increase of malaria cases was happened in 2015 with 161 indigenous cases and 5 import cases and peak incidence was happened in June with 56 cases and was declared as outbreak (DKK Magelang, 2015). This finding showed that malaria still became a health problem in Magelang Regency, therefore analysis of malaria situation is important to be conducted in order to acquire description of malaria situation, its control, and obstacles in its control in Magelang Regency, and as basis for formulation of plan and strategy to maintain malaria elimination status.

Methods

This situation analysis used rapid assesment method which adopted methodology from Protocols and Methos for Malaria Situation Analysis (World Health Organization, 2003) and also used desk review of several malaria control method in region with similar situation as Magelang. Primary data collection was performed through direct interview with key informants which consisted of malaria control officer in Dinas Kesehatan and selected community health centers, village chief, hamlet chief, neighborhood chief, and ordinary people, while secondary data was collected from documents or archives from Dinas Kesehatan dan Badan Pusat Statistik. The collected secondary data consisted of data regarding geography, demography, socio-economic condition, health care personnel and facility, and malaria morbidity.

Results and Discussions

Malaria control program in DKK Magelang was managed by staff of Disease Control and Eradication Section. Magelang Regency has 29 community health centers in every subdistricts. The total number of healthcare personnel to control malaria in all community health centers combined were 64 general practitioners, 176 nurses, 28 health analysts, and 29 surveillants. Health system was already reached village level with the presence of mobile four-wheeled community health centers, 65 auxilliary community health centers, and 261 village health posts, and 15 village malaria officer in 5 working area of malaria receptive community health centers. The supporting facility for malaria case finding consisted of adequate rapid diagnostic test (RDT), 1-2 microscope in each community health center, adequate reagent, adequate slide glass, and adequate artemisinin-based combination therapy (ACT). The funding for malaria control was received from Health Operational Assitance of Regional Government Budget.

Case finding program consisted of active and passive case finding. Active program was conducted by village malaria officer through actively find malaria cases in the community or through report of the presence of fever cases. The village malaria officer would acquire blood speciment from the suspect which then be checked by microscope or RDT. Meanwhile, passive case finding was conducted when the suspect patient came to the healthcare facility. Report of active and passive surveillance data which had been collected by the community health centers would be reported monthly to the Dinas Kesehatan before 10th day of each month. However, malaria positive case would directly be reported to the Dinas Kesehatan.

Tabulation and analysis of malaria data was performed descriptively in the Dinas Kesehatan which would then be presented as text, table, or graphical data. Dissemination of information was conducted through regular meeting with malaria officer of community health centers twice in a year, monthly meeting with village malaria officer, and cross border meeting with another malaria endemic regencies and report to Central Java Province

Dinas Kesehatan.

Based on data, between 2011 and 2015, in Magelang Regency, there were malaria cases every year. However, there was a significant increase from 6 cases in in 2014 to become 166 cases in 2015. This finding showed that there was still problems in control and eradication of malaria in Magelang Regency.

Figure 1 gave more detailed data of malaria cases in Magelang Regency in 2015. Import cases were found in February and March, while indigenous cases started to be found in April and continued to be found until December. The number of cases was increased from 2 cases in April to become 37 cases in

May, and the peak number of cases was reached in June with 56 cases. This event happened because of delayed in finding and control of malaria cases. The distribution of malaria cases between men and women was equal (50% each).

Figure 2 showed that age group with the most cases (89 cases) was 15-54 years old age group, while age group with the smallest number of cases (0 cases) was 0-11 months old age group. Malaria cases were dominated by indigenous malaria cases (97%). The most common type of malaria parasite in Magelang Regency was *Plasmodium falciparum* (99%).

Based from Figure 3, it can be known

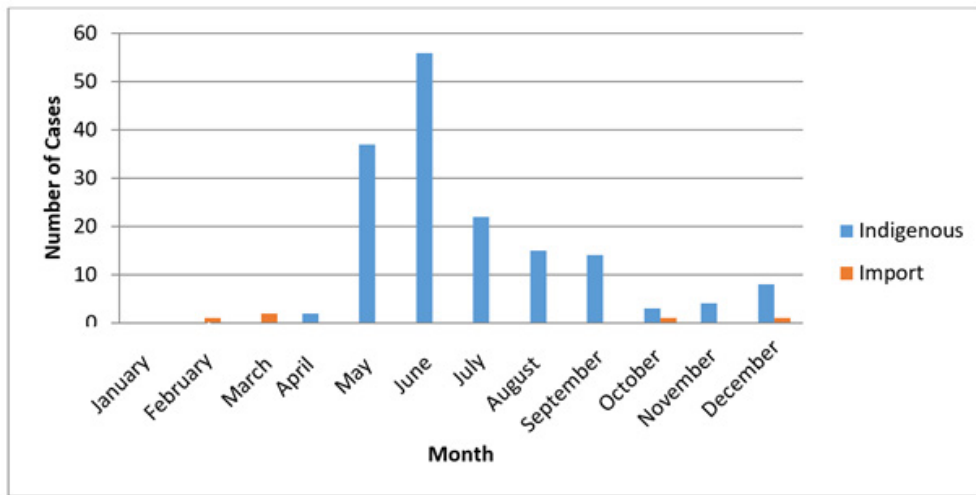


Figure 1. Malaria Cases in Each Months Based from Patient’s Origin in Magelang Regency, 2015
Source: Health Agency of Magelang Regency, 2015

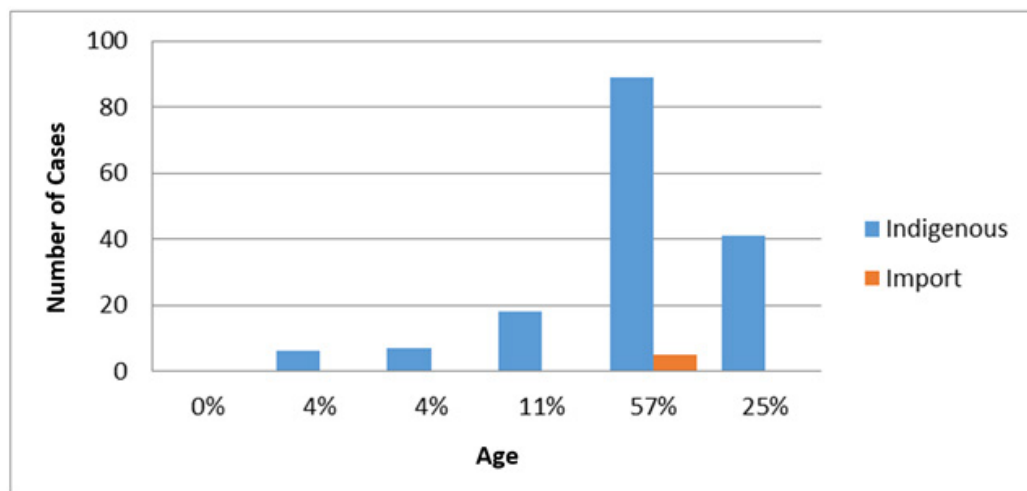


Figure 2. Distribution of Malaria Cases Based on Age in Magelang Regency, 2015
Source: Health Agency of Magelang Regency, 2015

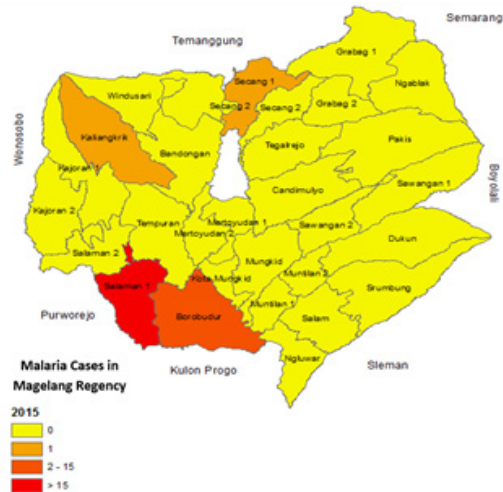


Figure 3. Map of Number of Malaria Cases Based on Working Area of Community Health Centers in Magelang Regency, 2015

Source: Health Agency of Magelang Regency, 2015



Figure 4. Map of Malaria Receptive Area Based on Working Area of Community Health Centers in Magelang Regency, 2015

Source: Health Agency of Magelang Regency, 2015

that malaria cases occurred in working area of Kaliangkrik, Secang 1, Salaman 1, and Borobudur Community Health Centers, however, the highest number of cases occurred in Salaman 1 Community Health Center with more than 15 cases.

Figure 4 showed that in Magelang Regency, there were several working area of community health centers which determined to be malaria receptive area, namely Kajoran 1, Kajoran 2, Salaman 1, Salaman 2, and Borobudur Community Health Centers. Those area had direct borders with Wonosobo Regency, Purworejo Regency, and Kulon Progo

Regency, which were also malaria endemic areas.

Species of mosquito which ever founded in working area of Salaman 1 Community Health Center were *An. aconitus*, *An. barbir*, *An. maculatus*, *An. balabacensis* which could be captured inside and outside the house, *An. Balabacensis* captured on the wall; *An. barbirostris*, *An. vogus*, *An. moculatus*, *An. kochi*, *An. annularis*, *An. balabacensis*, *An. acunitus* were captured in the nest.

Environmental data consisted of physical environment, biology, and social culture. Physical environment data in

Magelang Regency were as follows: average temperature was 25.62°C, humidity was 82%, average rainfall was 2.589 mm/year, average rain days was 12.1, wind speed was 1.8 knot, and average altitude was 360 meters above sea level. Biologival environment consisted of agricultural field in the form of rice field, the majority was irrigation rice field with area of 28,028ha or around 32.44%. Meanwhile, dry field was dominated with vegetables field/garden with area percentage of 37.54% from dry field area of 32,437ha. According to Ristiyanto (2007), socio-cultural environment in Magelang Regency were knowledge and attitude of respondents in supporting measures to prevent malaria transmission (80% from 31 respondent), however, this was not followed by acts to prevent malaria such as usage of mosquito net and mosquito essence (39.76% from 31 respondents). The habit of watching TV together in the night with open door and windows (5 malaria cases) had the potential to transmit malaria (Ristiyanto, 2007). Beside that, male villagers often conduct religious gathering every Thursday night while female villagers conduct it every Tuesday night. These habit might also support malaria transmission.

The malaria control measures which had been taken were: early malaria diagnosis using microscopic confirmation and rapid diagnostic test (RDT); treatment using Artemisinin-based combination therapy (ACT) in positive case of malaria; prevention of malaria transmission using long lasting insecticidal net (LLINs) was not completely used in receptive area; campaigning for cooperation and partnership between government sector and people thorough national forum on hitting malaria; establishment of malaria control policy in every village, namely the publication of village regulation regarding malaria migration surveillance; routine meeting between malaria officer of Dinas Kesehatan and malaria officer of community health centers.

Based on SWOT analysis towards malaria control measures, the following results were obtained: (1) Aspect of local policy and malaria control strategy regarding development of existing programs and policies continuity in order to obtain optimum results such as formulation of village regulation regarding

malaria migration surveillance; (2) Aspect of institution and its structure in supporting malaria control program regarding resources to empower accurate and rapid diagnosis and effective malaria treatment; (3) Aspect of health sector and other sectors, so they could execute more effective control measures regarding cross program and cross sector cooperation; (4) Aspect of partners and opportunities for more effective intervention, particularly in community level regarding people participation in improving environmental condition and human resources capacity.

Based from above SWOT analysis, a focus group discussion (FGD) was conducted in order to determine the main priority of malaria control program and maintenance of malaria elimination status in Magelang Regency, particularly by developing existing programs and policies such as the presence of village regulation regarding malaria migration surveillance.

Village regulation regarding malaria migration were not entirely present in every malaria receptive villages. This policy regulated new comer and person from outside of the region who went back to their village to report to the local hamlet chief/neighbourhood chief/cadres. This was important to screen for malaria import case as early as possible. The recurrence of malaria case in a place where transmission could occur was a potential cause of epidemic or parasite reintroduction in a place which previously has eliminated malaria cases. In the United States of America, indigenous malaria outbreaks were reported to be started from import cases which were related to migrant worker from endemic areas in Mexico. Import cases were reported sporadically and in 2015, an outbreak occurred in Chiapas coast with 10 indigenous cases. This outbreak was highly probable to be caused by parasite reintroduction (Betanzos, 2012).

Dinas Kesehatan and its structure had cover until village level in malaria control system. High commitmen was possessed by program executioner. In every community health center in receptive areas, there were a health analyst, 2 microscope, adequate reagent and ACT drugs, and also 3 village malaria officers. The diagnosis of malaria which used

Table 1. Strength Weaknes Opportunity Threat (SWOT) Analysis of Malaria Situation in Magelang Regency, 2015

	Positive	Negative
Internal	<p>Strength</p> <p>The government was committed to eliminate malaria.</p> <p>Implementation of malaria eradication programs were supported by adequate fund.</p> <p>Appropriate early detection and treatment.</p> <p>The presence of mosquito net with insecticide, although the coverage was still not even.</p> <p>The presence of active and passive detection supervision.</p> <p>Campaign to carry out routine cross border cooperation and coordination and simultaneous mass blood survey (MBS).</p> <p>The presence of village malaria officer.</p>	<p>Weakness</p> <p>Cross program cooperation had not have active role yet.</p> <p>High work burden of malaria village officer because each officer supervised 3-4 villages in each working area of community health centers.</p> <p>Inadequate courageness in submitting budget.</p> <p>Lack of malaria case management ability, particularly in malaria receptive area, case management was impeded by poor logistical planning in healthcare facility.</p>
External	<p>Opportunity</p> <p>The presence of human resources who would help in malaria eradication, namely healthcare personnel, public figure, village malaria officer, cadres, and others.</p> <p>The presence of policy in malaria receptive village regarding malaria migration surveillance.</p>	<p>Threat</p> <p>Implementation of policy regarding malaria migration surveillance in all receptive village.</p> <p>Resistance towards available antimalarial drugs or insecticide and lack of mosquito net.</p> <p>Instability in people migration.</p> <p>Tradition of night religious gathering in the community.</p> <p>Numerous mosquito breeding area such as, rice field, vegetable field/garden, river, and puddle.</p> <p>Hilly geographical characteristic and the presence of house on the hill which caused difficulty for malaria village officer to actively find malaria cases.</p>

(Source: Primary Data)

microscopic examination of blood specimen and rapid diagnostic test had the highest impact in malaria control. Both examination provided high expectation for accurate diagnosis as key components of successful malaria control although each of them had their own special strengths and weaknesses (Kusuma, 2014; Wongsrichanalai, 2007). Therefore, in order to definitely establish a malaria cases, multiple examination should be conducted towards new comer who was suspected as import cases. Early treatment was already appropriate to use ACT.

Cross program coordination in Dinas Kesehatan and community health centers had not have active role yet in malaria control. Coordination with health promotion program

at Dinas Kesehatan or community health center levels was still lacking. This was based from interviews with malaria executioner program in community health center who stated that malaria education were more often to be given by village malaria officer or cadre, while brochure and environmental survey were performed by the executioners themselves. Therefore, intensive and continuous coordination were needed particularly between health promotion program and environmental health program. In Bali, cross program coordination had been conducted between health promotion program and environmental health program by conducting health promotion and observation surveys to areas which were suspected as

malaria focus areas (Roosihermatie, 2012).

Cross sectoral cooperation in malaria control program was still become a weakness because there was no effort from other sector to actively participate in malaria control program. However, the commitment from Regional Government was quite high which could be seen by the presence of budget for malaria control. Partnership building between related stakeholdres (government agencies, non governmental organizations, personal figure or other institution) was important in order to achieve malaria control objectives. Partnership building was important because there would be no decrease in malaria cases when there was no change in people attitude. People attitude was not an easy task because it need sincerity strategy, and cooperation with related parties (Lestari, 2012). According to Laihad (2011), factors which affected the success of people participation in malaria control program were people habit and behaviour. Coordination with other sectors need to be conducted as did in Bali, where Dinas Perikanan dan Kelautan scattered fish seed as predator of mosquito larvae, Dinas Pertanian regulated farming pattern in farming area by rotating rice and secondary crop farming alternately in order to inhibit mosquito development, and Dinas Pekerjaan Umum regulated the permission and supervision of physical process of construction and constructing drainage system (Roosihermatie, 2012).

The natural habitat of *An. aconitus* mosquito was in rice field, particularly in terraced field (the water flow slowly). Larvae of *An. aconitus* were present in the field portion and at the edge of water canal, particularly ones with grassy water poskets (Hakim, 2011). Agricultural fields in Magelang Regency was dominated by irrigated field. This finding showed that the potential of mosquito development was quite high, therefore measures to improve environmental condition were needed such as maintenance of agriculture field so the water canal condition remained clean at the edge and the water flow smoothly, regular drying of irrigated field every 10 days, scattering of fish which ate larvae, and maintaining the environment so there would not be puddle.

Physical environment parameters which

were predicted to affect malaria prevalence were temperature, humidity, and people house construction (presence of ceiling, type of wall) (Hasyim, 2014; Noviarti, 2016). A study by Friaraiyatini (2006) showed that temperature, humidity, and house construction had significant influence on malaria prevalence. Optimal temperature for parasite development inside mosquito body was between 20°C-30°C. Sixty percent humidity was the lowest threshold for malaria reproduction. In Magelang Regency, the average temperature was 25.62°C and the humidity was 82%. This findings showed that in term of physical environment, there was a high potential of mosquito development (Friaraiyatini, 2006). Increase in malaria prevalence was caused by environmental changes beside climate changes, for example the presence of puddle was a risk factor of malaria disease (Fibrianto, 2009).

In socio-cultural aspect, several health promotion program need to be conducted, particularly education regarding malaria prevention and control measures in the community such as the importance of mosquito net utilization, closing the door and windows during the nigh, application of repellent and usage of long closed sleeve when go out door, et cetera. A study by Mangguang (2015) found that usage of mosquito net was a dominant factor which affect the prevalence of malaria. People's knowledge regarding malaria was quite good, however, the preventive measures were still inadequate. Continuous education could be conducted in hamlet level through demonstration media/film or other health promotion media such as poster, banner, billboard, brochure, and radio program. Usage of health communication media with appropriate and clear message delivery technique and attractive visual communication design media would be a more effective way to give information for people regarding efforts to control malaria in community which had high mobility. Those media could be posted at certain busy places such as market or at the entrance of malaria endemic areas (Wulandari, 2013; Waris, 2014).

Other partner and all community institution had the potential to participate in order to produce more effective intervention,

for example: non governmental organizations (NGOs) could provide health message regarding malaria, farmer could have role in maintaining agricultural/rice field environment, public figures, hamlet chief and neighbourhood chief could mobilize their people to maintain their house environments.

Conclusions

Programs and policies such as village regulation regarding malaria migratio surveillance could become strength, however, that policy was not optimal because the villages were not entirely had village regulation regarding malaria migration surveillance. Institution and its structure in support of malaria control program was a strength, particularly regarding resources in empowering accurate and rapid diagnosis and effective malaria treatment because available resurces supported the achievement of the objectives. Cooperation between health sector and other sectors was still become weakness because cooperation between program and sectors had not have active and continuous role yet in malaria control program. The oresence of partners and opportunities to conduct more effective malaria control intervention, particularly in community level such as NGOs, farmer, public figure, hamlet and neighbourhood chiefs, and cadres.

Recommendation

Formulation of policy brief which is directed to Magelang Regent regarding current malaria situation and the importance of a policy regarding malaria and community roles, particularly in malaria receptive village level. The regent which had the highest power in the area need to advise the governmental agencies until village level through circulatory letter in order to asked them to make village regulation regarding malaria migration surveillance in order to reduce the outbreak potential and to mobilize the people to have active roles in malaria control efforts.

The village rule regulates people who arrive and depart from the village to report to their local hamlet/neighbourhood chiefs. When they does not report, there will be penalty given. After receiving the report, the hamlet/neighbourhood chiefs will contact village malaria officer or staff from community health center. Those officer or staff would

acquire blood sample which will be examined using rapid diagnostic test and microscopic examination. When diagnosis of malaria is established, the patient will be given malaria treatment according to the type of parasite and mass blood survey would be conducted in the surrounding area in order to screen and to detect malaria cases early.

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