Original Article

Evaluation of Epidemiological Investigation 1-2-5 Implementation Program in Sukabumi

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ABSTRACT

Epidemiological investigations as part of the malaria surveillance system in Indonesia are carried out through the 1-2-5 method. Assessing the 1-2-5 strategy compliance level at the district level is the first step towards determining whether the surveillance and response strategy is working as planned or not. This study was conducted in order to determine whether PE 1-2-5 had been implemented in health centers (puskesmas) in malaria receptive areas according to the technical guidelines issued by the Indonesian Ministry of Health. Health centers were determined through purposive sampling technique. The sampling is determined by selecting health centers that have been doing malaria vector control service in 2018 and 2019. Ten Puskesmas in malaria receptive areas in Sukabumi District were selected. The informants in this study were the key players in the malaria program at the health centers: the head of the health centers, the manager of the malaria program, and the village malaria o cer (JMD) who were involved in the vector control process in 2018 and 2019 at the selected health centers. Data collection was conducted through in-depth interviews done by researcher with informants. The interview showed that the malaria program personnel in Sukabumi are doing the strategy as best as possible in order to achieve malaria elimination. 1-2-5 surveillance program in Sukabumi district has been implemented even though the implementation is not as ideal as the technical guidelines suggested by the Indonesian Ministry of Health, Sukabumi district still applied the strategy based on it by adjusting various aspects (resource situation and the availability of facilities) to the suitable condition in Sukabumi.

Keywords: malaria, surveillance, epidemiological investigation, receptive, qualitative study.

ABSTRAK:

Penyelidikan epidemiologi sebagai bagian dari sistem surveilans malaria di Indonesia dilakukan dengan metode 1-2-5. Menilai tingkat kepatuhan strategi 1-2-5 di tingkat kabupaten adalah langkah pertama untuk menentukan apakah strategi surveilans dan respon berjalan sesuai rencana atau tidak. Penelitian ini dilakukan untuk mengetahui apakah PE 1-2-5 telah dilaksanakan di Puskesmas di daerah rawan malaria sesuai dengan petunjuk teknis yang dikeluarkan oleh Kementerian Kesehatan RI. Penentuan Puskesmas dilakukan dengan teknik purposive sampling. Pengambilan sampel ditentukan dengan memilih Puskesmas yang telah melakukan pelayanan pengendalian vektor malaria pada tahun 2018 dan 2019. Terpilih sepuluh Puskesmas di daerah rawan malaria di Kabupaten Sukabumi. Informan dalam penelitian ini adalah pelaku utama program malaria di puskesmas: kepala puskesmas, pengelola program malaria, dan petugas desa malaria (JMD) yang terlibat dalam proses pengendalian vektor tahun 2018 dan 2019 di Puskesmas terpilih. Pengumpulan data dilakukan melalui wawancara mendalam yang dilakukan peneliti dengan informan. Wawancara menunjukkan bahwa petugas program malaria di Sukabumi melakukan strategi yang terbaik untuk mencapai eliminasi malaria. Program surveilans 1-2-5 di Kabupaten Sukabumi telah dilaksanakan meskipun pelaksanaannya tidak seideal juknis yang disarankan oleh Kementerian

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Kesehatan RI, Kabupaten Sukabumi tetap menerapkan strategi berdasarkan hal tersebut dengan menyesuaikan berbagai aspek (sumber daya). situasi dan ketersediaan fasilitas) dengan kondisi yang sesuai di Sukabumi.

Kata kunci: *malaria, surveilans, penyelidikan epidemiologi, reseptif, studi kualitatif.*

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INTRODUCTION

Malaria is a communicable disease that becoming a problem in many countries. In 2019, malaria has caused 409,000 deaths globally.[1] World health organization has reported that among all regions in the world, Southeast Asia is an area with a significant cost of malaria control. This significant impact has made malaria control becoming one of the government's main agenda in several countries, with malaria elimination as the final goal.[2]

The malaria Annual Parasite Incidence (API) in Indonesia is increased from 0.84 in 2018 to 0.93 per 1,000 population in 2019. At the provincial level, the provinces of Papua, West Papua and East Nusa Tenggara have very high malaria APIs compared to other provinces in Indonesia, 64.03, 7.38, and 2.37 per 1,000 population respectively. Most of the provinces (31 provinces) (91.2%) had malaria API < 1 per 1,000 population.[3] There are two ways of malaria infections, natural infection and unnatural transmission.[4] This makes the spread of malaria more rapidly, so it needs to be controlled.

Malaria control in Indonesia as stipulated in the Decree of the Health ministry of Indonesia aims to make Indonesia free from malaria transmission gradually until 2030.[5] The decline in malaria cases is an indicator of the government's success story in controlling malaria. This decline is expected to continue until the elimination of malaria is achieved. The indicator of malaria elimination in Indonesian district is shown by the absence of indigenous cases for three years consecutively in that district.[6]

Even though West Java Province is included into one of low transmission area when compared to the eastern Indonesia. This province still has not achieved its elimination state. In 2018, the West Java Provincial Health Office reported a malaria morbidity rate which were 181 positive cases of non-indigenous malaria. Most of the cases came from Sukabumi, Garut, Tasikmalaya, and Pangandaran districts. In 2016-2019 the number of imported malaria cases reported in Sukabumi District were 111, 75, 76, 60, and 43 cases respectively. West Java Province is targeted to have eliminated malaria by 2024. In the year of 2020, West Java province is expected to be at the maintenance strategy stage. This makes every public health centre in a malaria receptive area demanded to be able to carry out surveillance and control of malaria vectors.[7]

Malaria elimination depends on a surveillance system that can detect, treat, and respond quickly and eciently to individual cases in the population.[8] Epidemiological investigations (PE) as part of the malaria surveillance system in Indonesia are carried out through the 1-2-5 method depicted in table 1. The 1-2-5 method is one of the malaria control methods that contains things that need to be done after a positive case is found based on the processing time.[6]

One in the 1-2-5 method is defined as the first day a positive malaria case was reported based on microscopic examination, so after microscopic examination confirmed the case, the case must be reported to the district/city health oce in 24 hours. Two is defined as the second day, it is the beginning of epidemiological investigation day which can be held from the second day to the fourth day. In this period, contact survey and risk factor observation such as case interview, vector survey, and the observation of people's behaviour should be conducted.[6]

Five is defined as the fifth day, the fifth day is the latest limit for the prevention to be carried out. Started with focus investigation. In this activity, risked population and vector presence are identified to clarify the source of infection. This activity followed by the making of case location map and the risk factor map present at that time. After that, focus countermeasures will be held. These countermeasures consisted of medication monitoring, searching for suspects who stays around the patient from one month before the confi rmed point, vector control (bed net distribution, IRS, larvicidation), health promotion, and the analysis of people's activity around breeding places (see in Table 1).[6]

Table 1. A series of epidemiological investigations and malaria's focus [6]

Day				
1	2	3	4	5
Alert Report (Notification)	Epidemiological investigation			Countermeasures
confirmed suspect	Case investigation			Focus investigation
Positive	Contact survey and risk factor observation			Focus mapping
Case report (1x24 hours)	Focus classification			Focus countermeasures

Similar control measures are also carried out in China by applying a 1-3-7 approach to monitoring malaria elimination strategies with activities such as case reporting, investigation and case management.[9,10] The "1-3-7" strategy in China has played an important role since the inception of the National Malaria Elimination Action Plan. This plan in detecting, treating, and responding to malaria cases has been running e ciently. This method is also proven to be able to eliminate the source of malaria infection faster.[11, 12]

Assessing the 1-2-5 strategy compliance level at the district level is the first step towards determining whether the surveillance and response strategy is working as planned or not. The absence of studies related to the implementation of PE 1-2-5 in malaria receptive areas in West Java Province is the basis for us to conduct research in one of the malaria receptive areas in West Java Province, Sukabumi district.

Even though West Java province were included into a low transmission for malaria when compared to the eastern Indonesia region. To conduct the

1-2-5 in low transmission also have its own merit as the low transmission is the first target of elimination. However, in community health centers, malaria might not be priority and complete for resources and manpower with other diseases. With existing health system and manpower, to properly adopt the epidemiological investigation 1-2-5 program based on technical guidelines issued by the Ministry of health might be questionable, it is important to conduct the study to evaluate the operation strength and weakness of the 1-2-5 method implemented in health centres in malaria receptive areas.

MATERIALS AND METHODS

Materials

This research is part of a descriptive study with a case study design titled "Determination of Vector Control Resources Indicators at the Community Health Centre (Puskesmas) Level in Malaria Receptive Areas in West Java Province".[7]

Research location is in Sukabumi district. Which in the southern region of West Java Province, is located at the coordinates of 6 ° 59'19 ″ South Latitude and 106 ° 33'03 ″ East Longitude. The administrative area of Sukabumi district is ± 419,970 ha or 4,145.7 km². Health centres were determined through purposive sampling technique. The sampling is determined by selecting health centres that have been doing malaria vector control service in 2018 and 2019.

The trend of malaria cases in Sukabumi in the last five years has relatively decreased from 111 cases in 2015 to 43 cases in 2019. In 2015, all puskesmas had a history of malaria cases both indigenous and imported. Puskesmas with more than 6 cases are Cisolok Puskesmas, Simpenan Puskesmas, Lengkong Puskesmas, Cimanggu Puskesmas, Tamanjaya Puskesmas, and Tegal Buled Puskesmas. In 2019, there were two health centers with more than three imported malaria cases, Puskesmas Cimanggu and Puskesmas Surade.

Based on the criteria, ten Puskesmas in malaria receptive areas in Sukabumi District were selected (Puskesmas Palabuhan Ratu, Puskesmas

Cisolok, Puskesmas Cikakak, Puskesmas Lengkong, Puskesmas Simpenan, Puskesmas Jampangkulon, Puskesmas Cibitung, Puskesmas Tamanjaya, Puskesmas Surade, and Puskesmas Tegal Buleud) (Figure 1).
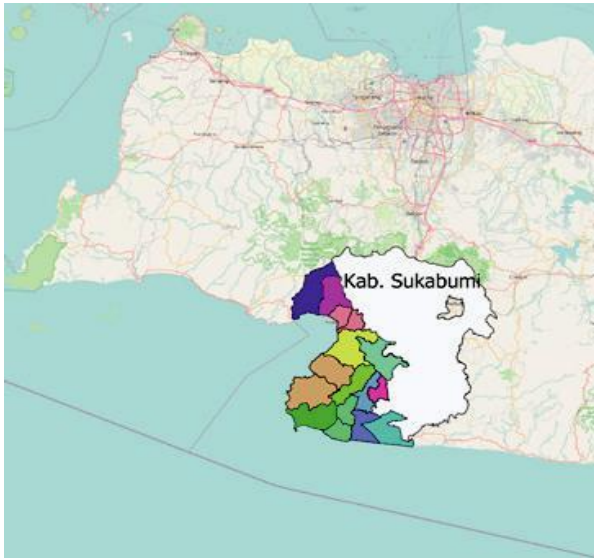

Figure 1. Research Locations in Sukabumi, West Java Province (The color di erence in Sukabumi districts shows the location of the Puskesmas (community health center) as the research location.

Informants

The informants in this study were the key players in the malaria program at the health centres, these key players have important roles in this research. The process of selecting informants was discussed in advance with the head of the health centres. After the informants were identified and willing to participate in this study, an agreement was made for data collection time. These key informants are the head of the health centres, the manager of the malaria program, and the village malaria o cer (JMD) who were involved in the vector control process in 2018 and 2019 at the selected health centres. The determination of the total informants' number is carried out by following the principles of adequacy and suitability that previously predicted by the researcher.[13] The number of informants from the health centres in Sukabumi was 28 informants.

Data collection and analysis

Data collection was conducted through in-depth interviews done by researcher with informants. Indepth interviews were conducted by a team of interviewers consisting of researchers from the Indonesian Ministry of Health, with educational background in public health and anthropology who have been trained and experienced in conducting in-depth interviews in qualitative research. Interviews were conducted one on one with each informant. The interview was conducted in a room determined by the informant, where the room used was a separate room from the workspace of other employees. This is intended so that topics that are confidential can be discussed by informants more freely. Interviews were conducted for approximately 1-2 hours. The completion of the interview was determined from the saturation of the answers from the informants after being asked the same rearranged questions.

The interview is limited to the topic of the implementation of PE 1-2-5 in each health center's work area. During the interview process, researchers were equipped with research instruments in the form of interview guides to guide in-depth interviews which developed from the elimination guide issued by the Ministry of Health [6]. The questions in the interview guide consisted of how the process of reporting malaria cases was carried out on 24 hours, how the process for case investigation was carried out on day 2, and how the case control process went and how long it took from reporting. Our in-depth interview also includes document observation in it.

The qualitative data analysis in this study is a thematic analysis. This analysis was carried out in three stages: the making of interview's transcript, data grouping and then the preparation of a matrix to see the relationship between each data group. Themes are produced based on case reporting, case investigation and case management. The transcripts of each response were examined and subjected to appropriate themes, then compared with other sources to identify repetition of words, relevant text, and phrases. Collective variation of

sources' opinions and views with related verbatim quotations is used to produce a narrative and outline of the findings.

Before the interviews were conducted, informants were provided with the consent form. All informants who agreed to sign the consent form were interviewed. Each informant was informed about the research based on the research explanation text. Informants were also informed about their option to stop the interview at any time without coercion. Informants who refused, gave up, decided to stop being interviewed and were not willing to be re-interviewed were excluded from the sample of this study. Each informant who was interviewed gave the researcher written consent to participate in this research. Data related to individual identities were removed from the data subset for ethical purpose. Ethical clearance for this research is obtained under the number LB.02.01/2/KE.475/2020 and issued by the Health Research Ethics Commission of the Indonesian Health Research and Development Agency.

RESULTS AND DISCUSSION

Result
Characteristics of informants

There were slightly more informants aged 40-60 years old than informants aged 20-40 years old, with most of them are men. Most of the informants' last education was university level. The number of informants by position in the health centres, as shown in Table 1, shows that not all selected health centres have JMD personnel (Table 2).

The Strength of 1-2-5 Implementation in Sukabumi

Based on the results of in-depth interviews with informants, malaria cases in ten puskesmas were reported to the Sukabumi District Health O ce on the day the cases were found or at least the following day. The report delivered by informal media, either by telephone or short message. If there is a case report, the program manager or JMD will confirm the patient and collect finger

Table 2. Characteristics of informants

Characteristics of informants	Total	Percent
Age group		
20-40 years old	13	46.43
40-60 years old	15	53.57
Gender		
Man	24	85,71
Woman	4	14,29
Last education level		
University	22	78,57
High School	6	21,43
Positions in Health centres		
Head of the health centres	10	35,71
Malaria programme manager	10	35,71
Village malaria o cer (JMD)	8	28,58

blood samples and coordinate with surveillance to report the case.

Although for the case of recording, the recording is applied informally by each informant individually (formal recording usually have a certain uniform format), each informant has their own way of recording the details of the case, but based on what this research observation, the case and case suspect finding are carried out within 24 hours based on key player's notes.

"yes, it is one day... once in 24 hours... if there is an information about a positive case, we are fast response, directly came to the places informed...we took their sample, we did the rapid test as well... JMD came with us... til to the puskesmas... if the result from the lab is there, then we confirmed it to the district health o ce... (informant 1)

"yes, we made the report in that day directly... well... actually it's depended... sometimes we did it the day after" (Informant 2)

"(in Sundanese) well... if there's a positive case... I think the report will be made the day after... through contact... by phone... the fi rst report made is... informal, I have to coordinate with surveillance o cer before anything else... (informant 3)

The informant stated that the investigation of the case (PE malaria) started on the second day. This case investigation is carried out by the program manager if microscopic examination results are out. Epidemiological investigations are carried out to probe information on whether the cases found are indigenous or imported cases, as well as to investigate the history of illness and to conduct a larva survey.

"Well... in the second day, we did PE to decide whether the case is indigenous or import..." (Informant 4)

"... The first thing we ask is the chronology... where did he/she came from, his/her origin transmit place, and then how long he/she has been stayed here... how long did he/she feel sick... previous sickness history... and then we will do the larvae survey in that location, mostly mr. H did it, I got the interview part... the result: if we

found someone who's close to the patient and got a fever, usually the day after we will do MFS (Malaria Fever Survey) (Informant 2)

Apart from conducting PE, program managers and JMD also conduct contact surveys and risk factor investigations. A contact survey is carried out together with PE of malaria cases, mostly among family members. However, it does not rule out the surrounding community in a radius of 100 m from the case house. The contact survey is carried out by taking finger blood from family members or examining it using a rapid test.

"... and then we examined member of the household (who stay at the same house) who got closed contact with the patient. Even though If the house got two family in it, yes most of the house here is like that mam, one house usually have two to three family in it,,, eeehh, and we check all of them. If one of the members is positive, then we will do the widespread checking... for example, we check in 1 meter radius, ehhh I mean 100 meter wide upfront, 100 meters to the back" (informant 1)

Risk factors investigation is performed by observing the environment around the case whether there is a potential puddle of water as a breeding ground for Anopheles. If there is, then observation and Anopheles larvae collection are performed.

"Look at the local environment in behind and the front of patient house whether mosquito breeding places were present or not, if there isn't, maybe a rice field or a lagoon present in some distance"(informant 5)

"Then we also do the larvae collection... for JMD to determine whether the larvae were present or not..." (informant 4)

The fifth day activity in PE 1-2-5 is control cases formatted as treatment for patients. This activity is performed immediately after the case is confirmed (in the second or third day) and followed by monitoring starting from the fourth day. Monitoring of treatment is also performed by the Program Manager or JMD. In addition, counseling was also performed to the surrounding community.

"Yes, it was resolved immediately .. Followed up the case .. Treatment, the day after he was confi rmed positive. Yes, for example, we bring the medicine directly to his house if the test is positive, then we consult the doctor and just gave the medicine" (informant 6)

"(in Sundanese) well ... at least they were monitored we, we can follow up ... later ... after the treatment we do the blood test again..." (Informant 3)

"Positive ... the first thing we do is gave the medicine ... then they can go home ... and we told them that later in the 4th day we will come to their house ... in the 4th day, the 7th, and so on. (Informant 7)

"... later, if the result, for example, if there is someone who has closed contact with the patient has a fever, usually the next day we performed Mass Fever Survey" (informant 2)

"Eee In here, we gave the treatment directly. For example, if there are many suspects who are positive, maybe at least we gave them mosquito net. Promotion to promote the effort to the community, like counselling" (Informant 1)

The drawback of PE 1-2-5 implementation

The manager of malaria program in health centres encountered several drawbacks in implementing PE 1-2-5. One of those drawbacks is the absence of a standard reporting system for reporting suspect or case findings. This makes program manager report cases through informal channels such as short messages via messaging applications (WhatsApp) or by telephone.

" (in Sundanese) Well, at least if we found positive case, then the day after that... by that contact... we call them by phone before anything else... when about the report... we did it informally... before that I have to coordinated with surveillance programmer..." (informant 7)

"report by telephone or whatsapp right away that very day when we found the positive case..." (Informant 8)

Geographical drawbacks were also encountered in conducting PE 1-2-5 activities, especially when performing contact surveys.

"......generally, since this is a rural area, so the distance between houses were far. For example, when the procedure said in 200 meters perimeter, we only got few houses in that perimeter. Hehehe... So, in the end, we usually just came to the houses with mindset of getting at least twenty individuals or more". (Informant 2)

Other drawbacks include the availability of facilities and budget. Often the health centres did not perform a spot survey to identify risk factors due to the unavailability of the tools and costs needed to carry out a spot survey.

"... actually, we do want to do it, but we were limited by the unavailability of the tools... the tools to capture mosquitoes..." (Informant 4)

"... in order to do the spot survey, we were limited by its costs... there were no budget for that in BOK (Health Operational Assistance Budget) ... sometimes we did it by came along with o cer from district health o ce when they do those survey, sometimes we did it when the budget is in place... for spot survey..." (Informant 9)

In addition to contact surveys and risk factor investigations, usually population behavior surveys were conducted as well. However, most Health centres have never conducted a population behavior survey related to the risk of malaria transmission in their area.

DISCUSSION

Despite of its several constraints that need to be improved, the 1-2-5 surveillance programme in Sukabumi district has been implemented. Case and suspect case finding has been reported once within 24 hours even though it is done informally. This case reporting rate can minimize the increase in case transmission. Delays in malaria reporting in endemic areas can lead to

increased local transmission, as a result of delayed interventions in vector control and contact transmission surveys.[14] Therefore, through the 1-2-5 surveillance system, health centres are encouraged to report confirmed and suspected malaria cases within 24 hours to the district health o ce. Similar conclusion is reported from China, where confirmed and suspected malaria cases are reported within 24 hours using the web-based China Information System for Disease Control and Prevention (CISDCP).[15]

In contrast to malaria surveillance in China which has used a web-based information system, malaria cases reporting from the health center to the district health o ce is still performed informally, by telephone or messaging applications. However, quick reporting using telephone or short messages is considered more e ective than paper-based reporting. Reporting using a short message application such as WhatsApp allows the delivery of reports in real time, makes communication easier and allows the delivery of the same message (report) at the same time to several related parties (for example through the group feature). These advantages will allowed faster action/intervention process.[16, 17]

Meanwhile, the paper-based reporting system is considered formal but less than optimal because it requires limited media for distribution, communication, and human capacities. This paper-based reporting system is also not well integrated into every health service unit, such as in health centres and district health o ces.[18]

Although it is considered faster than paper-based reporting, reporting by telephone or short message still requires improvement, especially related to its reports form and information storage in the form of text and media (audio, visual, audiovisual). It is highly recommended to develop a web-based reporting system that comes with clear standard operating procedures. It might optimize the distribution of each report and it's archiving. Strengthening information systems and health monitoring is needed to avoid loss of information.[19]

It would be better if the malaria key player also consisted of individuals who specifically handled the prevention of malaria transmission.

Unfortunately, this research still shows that this individual does not exist yet. All things related to malaria are still borne by the holders of the malaria program.

The case investigation is performed on the second day, consisting of two components, case confirmation and case classification. Based on the results of this study, it appears that all people with fever who come to health facilities or report to JMD, will be followed up by taking finger blood samples for microscopic examination or examination using a rapid test. In confirming this case, the ability of a laboratory officer to read blood slides had a significant effect. Trained laboratory personnel or personnel who work in high malaria endemic areas will have high probability to easily distinguish between positive and negative slides. However, in low endemic areas, this ability tends to be less used and forgotten. Therefore, the need for laboratory personnel certification in the confirmation of malaria cases is a necessity. Elimination of malaria will be impossible without access to adequate and well-trained human resources.[19]

Village malaria cadre plays an important role in malaria control, and this is the one of the strengths of malaria program in Sukabumi. Since malaria cadre is the representatives of the health center that are the closest to the community. Some of the JMD task include active and passive patient detection, epidemiological surveys, and vector control.[20] A study states that health cadres drawn from the community have an important role in the prevention, education and control of malaria cases in the community.[21] the first step to make JMD as one of the key players in the malaria program is increase JMDs knowledge regarding the tasks that they will carried out. Heads of Puskesmas and program managers play an important role in this.[22]

Case classification concluded from the results of interviews with the patient's disease history and mobility. Unfortunately, there is no confirmation from the medical records department and the puskesmas regarding unreported cases. A case is classified as imported only if the individual has traveled to a malaria endemic area in the previous month, else is classified as indigenous.

Classification of cases must be conducted carefully because it will affect the malaria elimination status in an area. Misclassification of cases can occur especially if interviews with suspected cases/ confirmed cases were not performed properly and in situations where population mobility between regions is high.[19] Regardless of whether cases are classified as indigenous or imported, case management must be performed in order to avoid the risk of local transmission, especially in receptive areas such as Sukabumi District.

Case control is performed within five days since the confirmed case or suspect is reported. The implementation of case management at the receptive community health center in Sukabumi district was in accordance with the technical guidelines, even before the fifth day, treatment had been given if the case had been microscopically confirmed. Management is not only limited to administering drugs in confirmed cases but also to follow-up treatment in the form of re-examination, and to perform counseling in the area where confirmed cases live. In fact, one health centre stated that if based on contact survey they found a person with symptoms of fever, it would be followed up by holding a mass fever survey (MFS). The implementation of this MFS is in accordance with malaria management guidelines. Additionally, then there are some health centres that distributes insecticide-treated bed nets.[23]

The drawbacks in implementing PE 1-2-5 raised by informants were mainly related to the facilities. Many informants mentioned the need to improve appropriate and adequate surveillance facilities. Unfortunately, the suitability and adequacy of the facilities are still not supported by qualified data. Despite of its importance in determining the condition of epidemiological readiness in an area, data collection regarding the capabilities and needs of health facilities in terms of malaria case management is still limited and minimal. A study in Uganda reported that knowledge and experience regarding the capabilities and needs for malaria case management were needed to increase the e ciency of the program.[24]

Other countries also experience drawbacks in implementing epidemiological investigation. Resources for investigating and responding to many cases especially in higher transmission and multiple pre-elimination arrangements are often too limited. Several countries in Asia Pacific region, members of the Asia Pacific Malaria Elimination Network, are considering adopting algorithms 1-3-7 for their own malaria elimination programs. In most cases implementing 1-3-7 approach will require an adjustment to the time frame. For example, in the Solomon Islands, reporting a case within 24 hours is often impossible due to lack of cell phone or internet coverage. Reporting of cases via VHF radio stationed at health posts can only take place within 48 hours, which means a "2-4-7" system may be more appropriate. In addition, 1-3-7 approach provide a simple set of targets for the applied program when assessing new elimination strategies, such as mass drug administration in response to outbreaks. A key component of the algorithm is the comprehensive and appositely recorded activities.[25]

The malaria control strategy in Indonesia still can not described as the successful strategy yet. A study conducted in Purworejo, Indonesia, reported the need for a change in strategy to achieve malaria elimination in the area. Indonesia has many challenges in implementing a malaria elimination program. Unrecapitulated data based on month, village, number of people with clinical malaria, age, sex, pregnancy status, plasmodium species, type of treatment and types of malaria transmission (indigenous or imported) make the control strategy less optimal.[26]

This study is inseparable from several limitations. This research is a cross-sectional study conducted in one period so that the concluded results cannot be generalized at all times. Moreover, this study also uses qualitative data that focuses on describing opinions and experiences in the last two years. Another limitation of this study is the small number of samples because this study is part of a qualitative study that uses the principle of adequacy as the basis for sampling.[13] The researcher determines whether the information extracted is su cient

enough to describe the malaria program in the study area or not. Therefore, the researchers determined informants who could explain correct and accountable information related to the malaria program in Sukabumi districts and some bias caused by opinion might be presented.

Despite of the existing limitations, to the best of authors' knowledge, this article is the first report that assessing the epidemiological investigation strategy implemented at the district level in Indonesia. This article can be used as a foundation for deciding whether the 1-2-5 strategy has been implemented according to the technical guidelines issued by the ministry of health.

CONCLUSIONS

The 1-2-5 surveillance programme in Sukabumi district has been implemented. Although the implementation is not as ideal as the technical guidelines suggested by the Indonesian Ministry of Health, Sukabumi district still applied the strategy based on it by adjusting various aspects (resource situation and the availability of facilities) to the suitable condition in Sukabumi. With this adjustment, hopefully policy maker could use this publication as a basis for the improvement of programme in order to prevent future malaria transmission.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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