INTERACTIONS BETWEEN MALARIA WORKERS AND CLINICAL MALARIA PATIENTS IN JEPARA DISTRICT, INDONESIA

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Abstract. In a one-year longitudinal study of all clinical malaria cases treated by the Village Malaria Workers (VMWs) during 1999-2000, data on health-seeking behavior during a seven-day illness period were collected using a diary; 24 interactions were audiotaped. The results showed that 87% of cases had been treated by the VMWs on day four of the illness period. On day two, the percentage not treated was significantly higher in male as compared with female cases (p = 0.01) and in those below 15 years of age as compared with those 15 years and older (p < 0.001). "Not doing anything" and "using VMWs only" were the two most common actions. Interactions between the VMWs and the patients focused on medical tasks, and low compliance with treatment was a common concern of the VMWs. The concept of preventive measures and the role of mosquitoes were lacking in the interactions.

INTRODUCTION

Entering the 21st century, malaria remains the most important infectious disease at the global level. The disease is endemic in about 100 countries and territories in the world, and it threatens 2,400 million (> 40%) of the world's population (WHO, 1999a,b). In Southeast Asia, malaria transmission occurs in eight out of ten countries, and it is estimated that 85% of the population lives in areas at risk for malaria transmission (WHO, 1997). In low endemic countries, early diagnosis and prompt treatment are the primary strategies for fighting malaria (Kidson, 1992; WHO, 1993, 1999a). For this population, the use of currently avail-

able tools, such as reliable microscopic examination and timely delivery of chloroquine, will remain the major hope (WHO, 1999c). The success of these strategies depends on the availability of services to the community, as well as an understanding of community awareness of malaria signs and symptoms and their care-seeking behavior (Tanner and Vlassoff, 1998).

Unfortunately, malaria has persisted in Indonesia, especially in Java-Bali islands. The annual parasite incidence (API) in Java and Bali islands in 1986, 1996, and 1998 was 0.21, 0.09, and 0.02 per 1,000 population, respectively (Ministry of Health, 2001). In Central Java, however, the incidence in 1998 was five times higher than expected. Community participation has a long history in the malaria control program (MCP) in Java-Bali through the role of village malaria workers (VMWs) in the surveillance system (Mantra, 1992). These

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workers are usually men, have some primary school education, and reside in the local community. After receiving one week of training concerning malaria symptoms, presumptive treatment, and taking blood slides, the VMWs perform active case detection (ACD): conducting home visits in their designated areas, taking blood slides from those who have recently had malaria symptoms, giving chloroquine-based presumptive treatment, and delivering the slides to the health center for microscopic examination. Once the slide has been confirmed as malaria, radical treatment using a combination of chloroquine and primaquine is delivered by the VMWs. A follow-up slide should also be taken. The VMWs are paid on a part-time basis and are supervised by the health center; they receive a small remuneration. In Jepara District, Central Java Province, one of the foci endemic areas, 58% of confirmed malaria cases during the years 1994 to 1998 were identified by ACD. The VMWs performance, as measured by the proportion of 0-14-year-olds detected, geographical coverage, and the prevalence of *P. falciparum* gametocytes, was better than that of passive case detection (PCD) (Utarini, 2002). Despite a policy of active case detection for Java-Bali islands, the number of VMWs decreased over time due to budget restrictions at the district level, in which health care was decentralized (Hunt, 1991; Ministry of Health, 1999).This study was undertaken as part of a larger study that evaluated the performance of VMWs. Previously, different measures have been used to evaluate this performance, such as the number of patients treated and the proportion of visits of those with clinical malaria symptoms (Ruebush *et al*, 1992; Ghebreyesus *et al*, 1996; Hii *et al*, 1996), the slide positivity rate (Hii *et al*, 1996; Ruebush *et al*, 1992); the number of confirmed malaria cases and the time lapse from diagnosis to treatment (Ruebush *et al*, 1992; Utarini, 2002), the cost of treatment, prophylaxis, vector control, and report-ing activities (Ruebush *et al*, 1990), and perceived qualities (Ruebush *et al*, 1994). However, our understanding of the effect of VMWs on community care-seeking behavior for malaria in low endemic areas is limited. This paper addresses the following issues. First, when malaria is suspected, what are the initial actions taken by individuals or their caretakers; what are the most common actions? Second, when are the VMWs sought for diagnosis and treatment, and third, how do the VMWs interact with those having clinical symptoms of malaria?

MATERIALS AND METHODS

Study site

This study was conducted in Jepara District, one of the highest malaria endemic districts in Central Java. Malaria has been unstable in this area. The highest incidence during the 1990s was 3.5/1,000 population, with predominantly *P. falciparum* infections. A detailed description of the epidemiology of malaria in Jepara is presented elsewhere (Utarini, 2002). In the mid-1990s, ACD was carried out by approximately 30 VMWs. However, this number declined to 20 VMWs in 1999. Utarini *et al* (2003) found that the understanding of malaria in this community was limited and confused by traditional beliefs. The concept of transmission and the role of mosquitoes were not well understood, and preventive measures were at best confused with prevention of dengue fever. Self-treatment with modern medicine was also common.

Study design

A one-year longitudinal study, from September 1999 to August 2000, using diaries was initiated in all six villages in the Mlonggo II health center area (Lebak, Tanjung, Plajan, Kawak, Suwawal Timur, and Bulungan). This health center was selected purposively out of the three endemic health centers in Jepara. It covered a total population of 36,698 in 1997.

The remaining two health centers were not included because of an ongoing research project on malaria in pregnancy, which might have interfered with our research on community perceptions and care-seeking behavior. All five male VMWs were invited to participate in this study. Age, sex, daily actions (none, non-medication, self-medication using herbs and drugs, and consultations with different providers), and dates of consultation were recorded by the VMWs in the diary that covered prior contacts between the villagers and the VMWs. When the VMWs visited a household, they asked the patients or their caretaker to recall daily actions for the seven previous days. This information was entered into the diary by the VMWs, and completeness was checked by the field coordinators. Blood slides were then taken for microscopic examination at the health center. We included all clinical malaria cases that had been treated by the VMWs during the illness period.

To capture the content of the interaction between the VMWs and the patients/caretakers, a convenience sample of 24 interactions, selected over a one-year period and representing different VMWs, clinical/confirmed malaria cases, and men/women, were audiotaped. The validity of the information recorded in the diary was enhanced by attaching one research assistant to each VMW for a one-year period, with a three-month rotation of the research assistants. The study design and methods used in relation to the natural history of illness as well as the number of subjects/observations are summarized in Table 1.

Data entry and analysis

The information in the diary covered the period from the start of symptoms up to the date of consultations with the VMWs. Therefore, the duration of the illness period varied from one to seven days. To describe the actions taken daily, the following questions were asked in sequence: (a) How many cases met with the VMWs on a particular day in the illness period, and (b) What other actions were carried out among those who did or did not meet with the VMWs? For example, out of 3,746 cases, 3,360 had seen a VMW before the fourth day; and out of the 486 cases recorded on their fourth day of symptoms, 222 cases were treated by the VMWs only or in combination with other actions (Fig 1). Of the 264 remaining cases recorded on the fifth day, 60 cases performed multiple actions, and 204 did not do anything. Daily combinations of actions per case and the length of actions were then computed. Data were entered and analyzed using EpiInfo.

The qualitative analysis followed the procedures for qualitative thematic content analysis (Burnard, 1991), which focuses on describing pre-determined themes of interaction (exchange of information and the interaction itself) as the framework of analysis. "Exchange of information" explained the content of information shared by the provider and the patient, while "interaction" illustrated the interpersonal skills involved. In addition, gender differences were also scrutinized. Transcripts were

Table 1
Data collection points and methods.

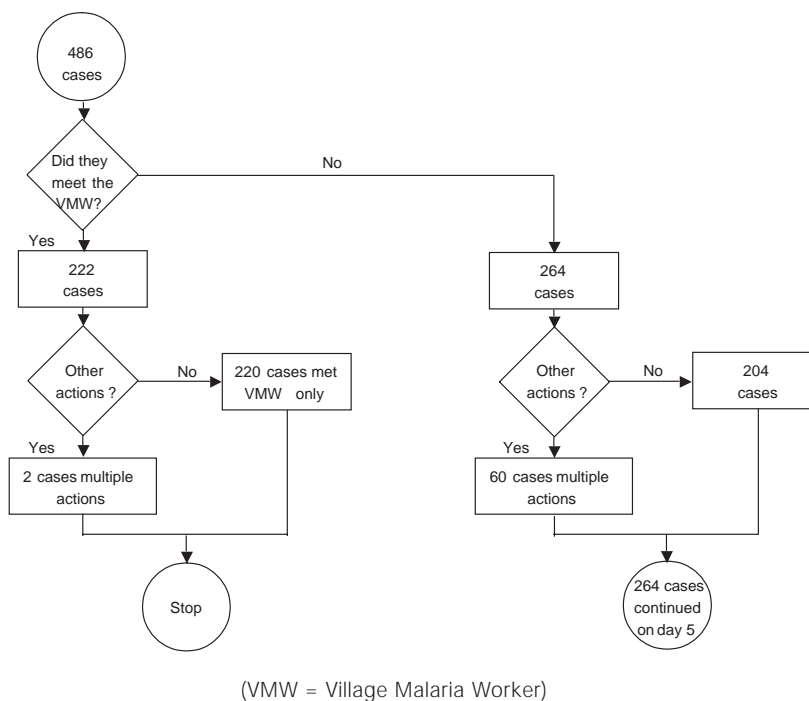| Study design	Points in the natural history of malaria		
	Symptom recognition	Early diagnosis (clinical cases)	Case management (confirmed cases)
Longitudinal	3,746 diaries		18 diaries
Observational	6 taped interactions		18 taped interactions

(VMW = Village Malaria Worker)

Fig 1–Flowchart illustrating actions taken on the fourth day by 486 cases.

produced from the audiotaped interactions and field notes. Notes and open codes were generated and organized manually, and similar codes were grouped into categories by the first author. Finally, sections with similar coding were grouped according to the pre-determined themes and pasted onto sheets.

Ethics

Verbal informed consent was obtained from the VMWs and the clinical malaria cases. The study was approved by the ethics committees of the Faculty of Medicine, Gadjah Mada University, Indonesia; the Faculty of Medicine, Umeå University, Sweden; and the World Health Organization, Tropical Disease Research, Switzerland.

RESULTS

Characteristics of the interactions

During the one-year study period, 3,746 clinical malaria cases aged between 6 months and 92 years were recorded. There was a male predominance among the cases (64.9% *vs* 35.1%, p < 0.001), and they were on average five years older (median: 45 *vs* 40 years, p < 0.001). Infants aged less than one year with clinical malaria symptoms comprised 0.5% (n=19) of the cases.

The role of VMWs was important in the care-seeking behavior for malaria (Fig 2). On the fourth day of the illness period, 87% of all cases identified by ACD were treated by the VMWs. On all days, the percentages of male cases not treated by the VMWs were higher than the female cases (Fig 2a). Similarly, the percentage of children aged less than 15 years not treated by the VMWs was also higher than those aged 15 years and older (Fig 2b). However, the differences of the percentage not treated in male and female cases, and in those below 15 and ≥15 years of age were only significant on the second day (60.7% and 54.6%, p = 0.01; 71.3% and 56.9%, p < 0.001,
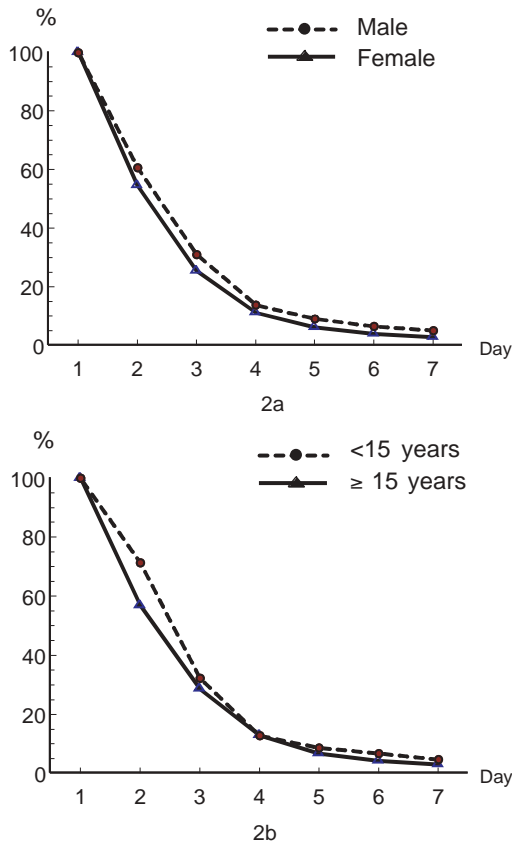
Fig 2–Percent of active case detection (ACD) cases not yet treated by the village malaria workers on a certain day of the illness period by sex (2a) and by age (2b).
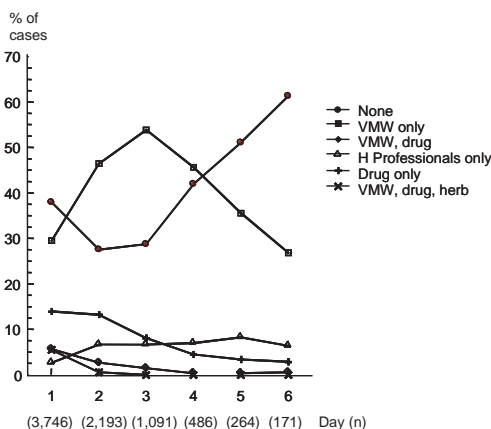

Fig 3–Actions taken by clinical malaria cases that had been treated by the village malaria workers (VMWs) on a certain day during the illness period.

respectively). Overall, the interaction between VMWs and the patients occurred on average (median) on the second day for both sexes, with a range between 1-14 days in males and 1-15 days in females.

The two most common treatment positions at any day were "not doing anything" (none) and "use of the VMWs only" (Fig 3). On the first day of symptoms, "no action was taken" by 38.0% of the patients, followed by "VMWs only" (29.6%), "drug only" (14.0%), "VMW-drug" (5.7%), "VMW-drug-herb" (5.5%), "health professionals" (2.7%), and "other actions" (4.5%). This pattern changed on the second to fourth days, when the VMW was chosen as the most frequent treatment source. On the fourth day, the proportion of those who went to health professionals (7.0%) exceeded the "use of self-medication with drugs" (4.5%), as well as "combinations of VMW-drug" (0.4%), and "VMW-drug-herb" (0.0%). After the fourth day, "no action" was the first treatment option again. Excluding "no action" did not change the pattern of seeking-behavior.

Content of interactions

All 24 taped consultations involved interactions between 23 malaria patients (14 males and 9 females) and 5 malaria workers. These included 6 interactions during presumptive treatment, and 18 interactions subsequent to confirming malaria (during radical treatment). The duration of consultations for the presumptive treatment visits was generally shorter than for radical treatment visits, despite additional time spent for completing the diary during the former visits. During the 18 radical treatment visits, 6 patients still had symptoms, 2 patients used multiple providers, 1 patient had multiple diagnoses, and an epidemiological investigation was carried out for 7 patients.

Encounters during presumptive treatment visits took place according to expectations and contained three categories of information: symptoms (occurrence and types), past

actions, and instructions about taking the drugs. Information on preventive measures and the role of mosquitoes in malaria was not included during the conversation. Typical information on drug dosage, frequency, and timing was provided in a simple manner. In describing their symptoms, patients occasionally mentioned the symptoms they considered severe ("When I have headache, I don't go to work"). All patients reported the use of self-medication with over-the-counter drugs, while a few mentioned herbs and massage. Concerns about low compliance with the treatment were expressed by the VMWs at this stage, and some VMWs asked the patients to take the drugs while they were still present. Reluctance on the part of the patients was noticeable during this interaction, and was affected, for example, by the number of pills to be taken at once, as illustrated below (Table 2).

In encounters at radical treatment visits, subsequent to confirming the presence of malaria ("You have a malaria blood"), further emphasis was placed on assuring compliance in taking the prescribed drugs (Table 3). For example, assurance concerning drug potency, normal side effects, advice, and consequences of low compliance were frequently used by the VMWs to discourage poor compliance. Less common themes included checking compliance with presumptive treatment. The VMWs competed with the paramedics and private practitioners for patients,

even during the presumptive treatment. The fact that the VMWs had frequent contacts with the community was utilized by them to promote themselves indirectly during the interactions: "We come here by ourselves, we take blood slides and give drugs, even to other members who may have malaria, and still it doesn't cost anything." and "If we're not around, who will give the drugs to the people in the community?"

Out of all radical treatment interactions, the role of the mosquito in malaria transmission was mentioned once. In several interactions, the term "malaria virus" was used instead. The importance of prevention was only acknowledged once: "Clean the animal stall, clean the gutter; these are places for mosquitoes."

The exchange of information both at presumptive and radical treatment visits mainly comprised communication focusing on the medical tasks, as illustrated above. From the perspective of the VMWs, a certain degree of interpersonal skill is involved, especially when trying to attain good compliance in taking the drugs. Showing empathy and concern, giving reassurance about the drug dosage, and encouraging compliance were often expressed, regardless of their effectiveness. The patients were also involved to some extent in the interaction, as illustrated by their asking confirmation of the illness, asking questions related to the drugs, asking for re-assurance about how

Table 2
Example of an interaction between a VMW and a patient.

VMW	Take these drugs now.
Patient	All of them?
VMW	Yes, so that they will cure you. These are for today, and these for tomorrow.
Patient	Should I take all these pills? (asking for confirmation)
VMW	Come on! If you can swallow a banana, then you should be able to swallow the pills.
Patient	Yeah...! (showing reluctance)
VMW	The pills are small enough to fit down your throat.
Patient	Can I just grind up all the pills and make a powder?
VMW	What do you mean by "grind up the pills?" No! No! You should swallow them.

Table 3
Categories of information exchange at the radical treatment visits and quotations to illustrate these categories

Categories	Statements
	Provider side
Assurance of drug potency	"Even if they (paramedics/midwives) give you injections, you'll still get the disease without that (malaria) drug"
Experience of "normal" side effects	"The drug causes fatigue, sleepiness..." "You may experience sudden darkness, but things will be OK again soon."
Common information given	"One small package per day, and you have to finish it, don't save it for the next day. Six pills every day. There are three/five packages; you have to finish them in three/five days."
Advice while taking drugs	"Eat more, and drink more" You can grind it up (for children). I gave you spare drugs in case, she vomits" You can add sugar (for children)"
Hidden competition	"When you feel ill again, don't go to that person (paramedic), look for me or other malaria workers, you don't have to pay" Don't go to her (midwife), your disease may not be identified and you will be ill again. She also doesn't have this kind of drug for malaria"
Drugs given to other family members	"Tell him to take the pills in one day. I will come back again to take blood slides"
Consequences of low compliance	
Illness complication-cost	"If you don't take all the drugs, you'll turn yellow, beri-beri, and finally typhoid. Typhoid is expensive to cure..."
Transmission	"Take the drugs at once, so it (malaria) won't spread to the family. If you don't take them (drugs) all, the mosquito that bites you can bite your children, grandchildren, and they will all suffer from malaria. Everyone in the family will be ill"
Treatment course	"If you don't take the drugs routinely, then should be repeated again like with TB"
	Shared provider; Patient concern
Drug appearance and taste	"It tastes bitter... really bitter...very very bitter" "It's small in size, but it's powerful. It's like chilli, the smaller the hotter!"
	Patient side
Rapid relief of symptoms	"I don't have any more symptoms...do I need to take them (the drug) all?
Identified constraint	"She (a child) vomits up the drugs, she refuses to take the drugs..."

to take the drugs, and even suggesting the number of pills they should take, as well as showing reluctance and a lack of interest in the prescriptions.

DISCUSSION

Early diagnosis and prompt treatment have been identified as the basic elements of

any MCP, and these should be seen as the fundamental rights of all populations affected by malaria (WHO, 1993; WHO and UNICEF, 2005; WHO SEARO, 2006). In this context, the role of VMWs is important in bringing the required services closer to those in the community who need them most, by taking blood slides from those who have recently had fever and by giving presumptive treatment. Unfortunately, budget constraints could lead to a shift from ACD to PCD in Indonesia (Hunt, 1991) or may impede the sustainability of the ACD policy. The relative performance of ACD and PCD has been compared; ACD carried out by the VMWs was found to be more beneficial than PCD (Utarini, 2002). Therefore, it is important to evaluate the performance of the VMWs. This research focused on the outcome measures, that is, the effectiveness of VMWs in early detection and case management. Both dimensions of process quality (technical and interpersonal skills) have been described (Donabedian, 1997).

Positioning village malaria workers in care-seeking behavior for malaria

This study found that 87% of the clinical malaria patients seen by the VMWs in the ACD were treated within four days of symptom recognition. Considering that most of these patients were properly treated and that the time lapse until radical treatment was only two days (Utarini, 2002), this meant that the majority of clinical cases had good access to appropriate treatment within six days of symptom recognition. This is still within the ideal timeframe from the MCP perspective, because the duration of the pre-erythrocytic stage of *P. falciparum* is 5.5-7 days after infective bites. Our results concurred with a review of community health workers, "Community health workers in general demonstrate their effectiveness best in the area of increasing access of care...." (Swider, 2002).

Treatment action patterns have been classified according to different characteris-

tics: service utilization (formal *vs* informal health services) (Konradsen *et al*, 2000), sources of treatment (home management *vs* outside) (Foster, 1995; McCombie, 2002; Nyamongo, 2002), types of providers (traditional *vs* modern), types of action (none *vs* action), types of treatment (traditional *vs* modern medicine) (Hunte and Sultana, 1992; Thera *et al*, 2000), exclusivity of treatment (single or in combinations), and combinations of the above (Tipping and Segall, 1995; McCombie, 1996; Donnelly *et al*, 1997; Ryan, 1998; Baume *et al*, 2000; Espino and Manderson, 2000).

Regardless of whether treatment given by the VMWs belongs to the category of home management or not, this study demonstrated the importance of self-initiated treatment. "No actions" and "seeking care from the VMWs" were the two most important treatment positions during the seven-day illness period. The high proportions of "no action" confirm the community understanding of malaria as a common but minor illness in this area (Utarini *et al*, 2003). However, once the patients suspect *katisen/panas tis/*malaria, the role of the VMWs is acknowledged, and the community has good access to different sources of treatment and providers (both traditional and modern).

"Self-medication" (use of self-initiated modern medicine) was in third position for the first three days, and as the illness progressed, this was then replaced by "seeking care from health professionals" (mostly paramedics). These findings confirm results from other studies conducted both in high and low endemic areas for malaria (Ryan, 1998; Espino and Manderson, 2000; Giao *et al*, 2005). Studies in the Philippines and Thailand have also shown that self-treatment was practiced more often in high incidence areas compared to low incidence communities (McCombie, 1996). In a literature review, Tipping and Segall (1995) stated that home-based care and over-the-

counter drugs were often the first resort, especially for illnesses considered as mild and non-serious. This pattern is associated with both direct and indirect costs involved in care-seeking behavior, and in this regard, home-based care is considered a cost saving strategy. Indeed, the VMWs also emphasized this aspect to convince the community, as was evident from the taped interactions.

Perceived treatment effectiveness also affects treatment-seeking behavior. Among those who took action, malaria tended to be associated with modern rather than traditional medicine. Traditional healers and herbal medicines were rarely used, while self-medication ("drug only") was the third most common action taken until three days post-symptom recognition. Different types of drugs were used, from simple analgesics and antipyretics to the use of antimalarial drugs (Miguel *et al*, 1998; Espino and Manderson, 2000; Utarini *et al*, 2003). In a country with a weak regulatory system for drug distribution, such as Indonesia, a trade-off between access to over-the-counter drugs and proper drug consumption is possible, and this may lead to low treatment compliance.

Quality of service

The actual exchange of information, the content of communication, and the atmosphere during the interaction between the VMWs and the patients were scrutinized in order to evaluate the technical and interpersonal skills that were used. Technical performance depends on the knowledge and judgment used to determine appropriate strategies, while interpersonal process is the vehicle by which technical care is implemented and on which its success depends (Donabedian, 1997). Here, the longitudinal study reflects the technical performance of the VMWs, while the qualitative part of the study explores both technical and interpersonal skills.

Patient compliance with treatment is a central issue in the interaction between VMWs and patients at both the presumptive and radical treatment visits. This indicates high awareness of the problem, particularly among the VMWs, and possibly also due to frequent use of self-medication. Once the patients had been treated by the VMWs, information on how to take the drugs was not always given to the patients in a clear way. From the patient's perspective, reluctance about asking questions was demonstrated by a non-response reaction. Interactions during the radical treatment visits conveyed unclear information about drugs and the lacked health education. The complexity of low compliance increases with easy access to antimalarials (even Fansidar) in Jepara and the absence of simple interventions, such as availability of chloroquine syrup for children (Ansah *et al*, 2001), improved drug packaging (Gomes *et al*, 1998; Ansah *et al*, 2001; Yeboah-Antwi *et al*, 2001), and written instructions (Homedes and Ugalde, 2001). Although chloroquine-resistant *P. falciparum* has not been reported recently in Jepara, this problem should obviously be anticipated, as it has already occurred in Indonesia since 1973 and spread to all provinces (Tjitra *et al*, 1997).

Strengths and limitations of the present study

This longitudinal study offered several advantages compared to cross-sectional surveys in evaluating care-seeking behavior. The pattern of treatment seeking was based on the actual clinical malaria cases rather than on hypothetical answers based on past exposure to an illness. A review of treatment-seeking behavior for malaria by McCombie (1996) further illustrates inconsistencies in responses because of the discrepancies between the actual and hypothetical reports of behavior. However, observation in one illness episode such as in this study may not have revealed the overall pattern for malaria. The outcome observed at the end of one illness episode is likely to affect the choice of treatment in subsequent episodes of illness (Kaewsonthi and Harding, 1986; McCombie,

1996). In this case, a smaller sample of households observed over a longer period would likely allow for studies of >1 episodes, thus yielding additional information.

Out of all clinical malaria patients identified in the malaria surveillance system, only those who were treated by the VMWs at some stage during the same illness episode were analyzed. The aim of our study was to describe the work of VMWs. Nevertheless, clinical malaria cases missed by the VMWs and asymptomatic malaria cases may have been undetected.

Finally, a combined quantitative and qualitative data collection method was applied and a rapid assessment procedure (RAP) on community understanding about malaria was conducted prior to this study. These strategies enabled us to improve the credibility of the qualitative study through triangulation of methods and to acquire a comprehensive representation of the work of VMWs. The applicability of these findings to other settings, however, could have been enhanced by using a stratified sampling technique for selecting the health centers and a maximum variation sampling for capturing the interactions.

In conclusion, this study concluded that interactions with the VMWs and not taking any action were the most common treatment-seeking behavior. The timing of the VMWs' visits within four days of symptom recognition appeared to be the ideal timing, both from the perspective of MCP (ie, malaria transmission) and the households (ie, a shift to health professionals). The findings emphasized the importance of home management in the treatment for malaria. Individuals involved in decision-making regarding treatment, such as mothers or shop owners, should be given sufficient knowledge about the importance of correct dosage and treatment compliance. Likewise, patient compliance with treatment should be further studied, and simple interventions should be carried out by VMWs in order to improve treatment should be explored. Further comprehensive evaluation of the role and performance of VMWs is recommended at a district level, both in order to strengthen active case detection and to improve service quality.

ACKNOWLEDGEMENTS

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