

# MALARIA SELF-CARE IN NIMBORAN SUBDISTRICT, JAYAPURA DISTRICT, PAPUA PROVINCE, INDONESIA

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**Abstract.** Papua is one of five provinces with high malaria incidence in Indonesia. In 2009, the Indonesian Ministry of Health issued decree No 293 on malaria elimination. Socioeconomic, culture and psychological conditions, and perception of malaria are determining factors in seeking treatment. Health seeking behavior also are influenced by enabling factors, such as income and health insurance; and by health providers, such as availability of health care facilities, tariffs and living locations. Self-care is one form of community participation in knowledge, prevention and early detection of malaria, and in seeking treatment and compliance to malaria treatment, especially among inhabitants in malaria endemic areas. This study was an observation in Nimboran Subdistrict, Jayapura District, Papua Province, Indonesia during 2013. Thirty individuals from 'Pengurus Rukun Tetangga' group were chosen randomly for the survey. Facts evaluated were knowledge of cause of malaria, disease transmission, symptoms and complication, diagnosis, treatment and side effects, medical seeking behavior and treatment, vector breeding sites, and attitude towards compliance of malaria treatment and use of mosquito nets. Self-care against malaria was considered important by 65% of the respondents. All participants had visited health centers and complied with prescribed drug regimen. All respondents with malaria-infected neighbors visited health centers. Regarding antimalarial malaria drugs, the majority of respondents knew of Darplex<sup>®</sup> and were aware that a common side effect of antimalarials was tinnitus. The majority of respondents identified ponds as malaria vector breeding places and recognized the importance of managing vectors in malaria prevention. The study concludes that malaria self-care was needed for awareness, prevention and treatment of this debilitating disease.

**Keywords:** malaria awareness, malaria prevention, self-care, Indonesia

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## INTRODUCTION

Indonesia still faces problems of malaria. It is one of three Asean Economic Community (AEC) countries, among Myanmar and Thailand, with high confirmed malaria cases (Bhatia *et al*, 2013). Indonesia had 396 (80%) of 495 districts

and cities with malaria outbreaks in 2007 (Department of Health Indonesia, 2009). However, the incidence of malaria in Indonesia has decreased from 2.9% in 2007 to 1.9% in 2013 (National Institute of Health Research and Development, 2008, 2013). Case fatality rate (CFR) of malaria was 0.26% in 2000 and increased to 0.49% in 2003, but decreased to 0.056% in 2007, still above the national target of 0.04% (Department of Health Indonesia, 2008). Five provinces with high malaria incidence are Papua, East Nusa Tenggara, West Papua, Central Sulawesi and Maluku (National Institute of Health Research and Development, 2010). The annual malaria incidence (AMI) and annual parasite incidence (API) in Papua Province is above the national API of 45.87 per 1,000 population at risk (Papua Province Health Office, 2011). The Millennium Development Goals target 6 is to reduce malaria morbidity, an important cause of disease burden and reduction in human productivity.

Malaria eradication efforts in Indonesia has been conducted for decades (Dale *et al*, 2005). In 2009 the Ministry of Health stated in Decree No 293 that malaria elimination be composed of four phases: eradication, pre-elimination, elimination and maintenance of elimination status. Whereas the malaria elimination was planned according to islands/provinces and targetted in 2010, 2015, 2020, and 2030, respectively. Papua Province and other eastern provinces in Indonesia were targetted for malaria elimination by year 2030.

It is known that characteristics as socioeconomic conditions, culture (Kloos, 1990) and psychological conditions of the people, perception of illness or possibility of coming down with malaria are determining factors for decision to seek treatment (Heggenhougen *et al*, 2003). Health

seeking behavior is influenced by enabling factors, such as income and having health insurance, in addition to health providers, such as availability of health care facilities, tariffs and residing in rural or urban areas (Greenwood, 2008).

A recent study showed that health technology alone can not decrease disease morbidity and various aspects of community empowerment are required (Kumar and Preetha, 2012). The malaria control program conducted by Health Offices should be supported by community activities as the community is a resource for ensuring success of the program (Directorate of Community and Village Empowerment, 2009). Self care is one form of community participation in malaria control program by providing correct knowledge regarding malaria, its prevention and early detection, seeking proper medical treatment and compliance to malaria treatment regimen, especially among inhabitants in malaria endemic areas (Innovations for Maternal, Newborn and Child Health, 2010).

In order to increase malaria prevention activities, health center functions should be accompanied with the participation of community leaders of "self care" to provide promotional, preventive, curative and rehabilitative activities to enhance health conditions among inhabitants in malaria endemic areas. Hence this study was to develop self care of malaria in endemic areas by enhancing knowledge in the prevention, early detection and treatment of malaria.

## MATERIALS AND METHODS

This was an operational research for the development of a Modul Self Care of Malaria with a cross-sectional design. The study was conducted in Nimboran Sub-district, Jayapura District, Papua Province,

Indonesia in 2013. Thirty participants were randomly selected from ‘Pengurus Rukun Tetangga’ group with a proportion of 0.3,  $\alpha = 0.1$  and  $\beta = 0.2$ . Inclusion criterion was relatively newly selected Pengurus Rukun Tetangga, and exclusion criterion was Pengurus Rukun Tetangga not participating in health activities.

Variables were knowledge of malaria regarding causation, transmission, symptoms and complications, diagnosis, treatment and its side effects, health seeking behavior and treatment, vector breeding places; attitude towards malaria treatment compliance and practice of mosquito net use (Bruce-Chwatt, 1990; Directorate General of Communicable Diseases and Environment Health, 2011a, b).

RESULTS

**Characteristics of respondents**

Sixty-seven percent of respondents lived in rural areas (Table 1). The average age was 39 years old and mainly of Papua ethnicity. Fifty-seven percent are males with a high school education. Forty-three percent were farmers or self-employed, and 43% were civil servants. The average monthly family income was Rp 1,356,667 (USD 111.5).

**Knowledge on malaria**

Sixty-three percent of respondents knew that mosquito is a cause of malaria but 20% could correctly answer all the questions on the cause of malaria (Table 2). Ninety-four percents of respondents were aware that infected mosquito is the vector of malaria, but only 4 respondents correctly identified *Anopheles* as a vector.

Ninety-seven percent of respondents recognized a general symptom of malaria was fever and 63% as chill (Table 3). However, 10% replied that malaria symptoms

Table 1  
 Characteristics of ‘Pengurus Rukun Tetangga’ respondents (n=30) at Genyem Health Center, Jayapura District, Papua Province, Indonesia in 2013.

Characteristic	Number (%)
Residence	
Rural	20 (67)
Urban	10 (33)
Age (years)	
Minimum	20
Maximum	57
Average	39
Gender	
Male	17 (57)
Female	13 (43)
Ethnicity	
Papua	24 (80)
Others	6 (20)
Education	
Elementary School	1 (3)
Junior School	1 (3)
High School	16 (54)
Diploma/University	12 (40)
Occupation	
Farmer	6 (20)
Self-employer	7 (23)
Housewife	2 (7)
Kampong staff	2 (7)
Civil servant	13 (43)
Family income (Rp)	
Minimum	200,000
Maximum	4,000,000
Average	1,356,667

were reddish eyes, pale pallor, icterus on eyes/face, dizziness or pain if stepping on stones, and shouting. Regarding symptoms of severe malaria, 27% indicated high fever and seizure. The most frequent answer to malaria complication was cerebral malaria.

Ninety percent of respondents answered that malaria detection was by blood examination and rapid diagnostic

Table 2

Knowledge on cause and transmission of malaria among 'Pengurus Rukun Tetangga' respondents at Genyem Health Center, Jayapura District, Papua Province, Indonesia in 2013.

Cause	Number (%)	Transmission	Number (%)
Malaria parasite	6 (20)	Mosquito	28 (94)
Mosquito	19 (63)	Blood	1 (3)
Environment	3 (10)	Low immunity	1 (3)
Others	2 (7)		

Table 3

Knowledge on malaria symptoms among 'Pengurus Rukun Tetangga' respondents at Genyem Health Center, Jayapura District, Papua Province, Indonesia in 2013.

Parameter	Number (%)
<b>General symptom<sup>a</sup></b>	
Fever	29 (97)
Chill	19 (63)
Dizziness	9 (30)
Nausea	13 (43)
Vomiting	12 (40)
Diarrhea	0 (0)
<b>Severe symptom<sup>a</sup></b>	
High fever	8 (27)
Seizure	8 (27)
Unconsciousness	7 (23)
Delirium	2 (7)
Wrong uttering	1 (3)
Tea-like urine	2 (7)
Dyspnea	1 (3)
Syncope	1 (3)
<b>Complication<sup>a</sup></b>	
Cerebral malaria	2 (7)
Convulsion	0 (0)
Renal dysfunction	1 (3)
Lung edema	1 (3)

<sup>a</sup>Could give more than one choice.

test (RDT) (Table 4). For malaria treatment, 43% and 40% replied quinine and Darplex<sup>®</sup>, respectively. No respondent mentioned artemisinin combination

therapy (ACT). Forty-three percent of respondents recognized tinnitus as an antimalarial drug side effect.

All participants mentioned malaria management was through visiting health centers or hospitals (data not shown). Additional descriptions were by being active and healthy, consuming papaya leaves and flowers and "sambiloto" (*Andrographis paniculata*), draining swamps and maintaining a clean environment, using mosquito nets, and taking paracetamol/antipyretic. Many said that if visiting the nearest health center was too far use traditional treatment followed by trip to hospital, or firstly undertake a blood examination and take antimalarial drug.

Regarding awareness of breeding places of malaria vectors, 53% of the respondents mentioned ponds and 10% mossy swamps (Table 5). Some said dirty environment, hanging clothes, bad smelling and moist places, dirty ponds, open and closed water containers, dry leaves, used cans, ditches, and clean and waste streams.

Sixty-seven percent were aware that using mosquito nets prevented malaria (Table 5). A number of respondents included such measures as using mosquito coils, spraying insecticides and burning wood, and few mentioned eating regular/healthy meals, although some said tak-

**Table 4**  
 Knowledge on malaria detection and treatment among 'Pengurus Rukun Tetangga' respondents at Genyem Health Center, Jayapura District, Papua Province, Indonesia in 2013.

Parameter	Number (%)
<b>Detection</b>	
Symptoms	3 (10)
Blood examination	27 (90)
<b>Drugs</b>	
Quinine	13 (43)
Chloroquine	4 (13)
Primaquine	2 (7)
ACT	0 (0)
Darplex®	12 (40)
Paracetamol	1 (3)
<b>Side effect<sup>a</sup></b>	
Nausea	9 (30)
Dizziness	9 (30)
Tinnitus	13 (43)

ACT, artemisinin combination therapy. <sup>a</sup>Could give more than one choice.

**Table 5**  
 Knowledge on malaria vector breeding places and prevention among 'Pengurus Rukun Tetangga' respondents at Genyem Health Center, Jayapura District, Papua Province, Indonesia in 2013.

Parameter	Number (%)
<b>Breeding place<sup>a</sup></b>	
Swamp	3 (10)
Forest	0 (0)
Beach	0 (0)
Pond	16 (53)
Rice field	1 (3)
<b>Prevention<sup>a</sup></b>	
Mosquito net	20 (67)
Mosquito repellent	2 (7)
Prophylaxis	2 (7)

<sup>a</sup>Could give more than one choice.

**Table 6**  
 Mosquito net use among 'Pengurus Rukun Tetangga' respondents at Genyem Health Center, Jayapura District, Papua Province, Indonesia in 2013.

Parameter	Number (%)
Never	6 (20)
Seldom	5 (17)
Frequently	1 (3)
Always	16 (53)
Total	28 (93) <sup>a</sup>

<sup>a</sup>Two did not respond.

ing spicy food and hot drink, and having a healthy life or keeping active. Others described keeping clean the environment, houses/garden/cans, garbage sites, and ditches.

**Attitude and behavior**

All had taken different antimalarial drugs for various reasons to cure malaria completely so that there would not a recurrent illness. Few said the drugs could be used for prevention and that there were ways to prevent drug resistance. Fifty-three percent of respondents always used mosquito nets (Table 6).

**History of malaria among respondents**

Thirty-seven percent had a neighbor with malaria during the previous 4 months. All infected neighbors visited health centers. Four of the 11 respondents (36%) indicated that their neighbors has vivax malaria and 3 (28.0%) having neighbors with falciparum malaria. Four respondents informed that infection was diagnosed by blood examination and that 4 and 5 (45.0%) learnt that their neighbors were treated with Darplex® and primaquine, respectively (data not shown).

All respondents had visit health centers for malaria treatment, 5 also went to



hospitals and 3 used traditional treatment or took papaya leaves/flowers or “sambiloto”. Three persons (10%) visited other malaria endemic village for 1, 2 or 7 days.

## DISCUSSION

Almost all respondents were aware that mosquitoes are responsible for malaria transmission and 63% that malaria is caused by mosquitoes. The knowledge of malaria transmission is important to prevent host (human) and vector (mosquito) contact. However, just 53% of the respondents who used mosquito nets likely was influenced by the knowledge of the cause of malaria.

The majority of respondents knew that fever and chills are general symptoms of malaria but fewer had knowledge of symptoms of severe malaria, and fewer still of those of cerebral malaria. In high endemic areas, malaria is very common but have mild symptoms because inhabitants acquire natural immunity following becoming infected. This possibly causes resident population not being aware of symptoms of severe malaria form of infection, complicated malaria or even mortality from malaria. Although 90% of the participants knew of confirmation of malaria by blood examination, the low knowledge of severe malaria symptoms could cause delay in seeking treatment. This is in concordance with the use of malaria medication showing about 40% of the respondent indicated quinine and Darplex® (artemisinin and piperaquine combination). It is likely that quinine is the first choice as antimalarial drug although ACT is the present standard therapy. Regarding antimalarial drugs side effects, tinnitus was frequently mentioned because of its unusual symptom so that people remember. For attitude,

all respondents acknowledged to have fully complied with the drug regimen prescribed. This is important to prevent development of antimalarial drug resistance.

The common answers regarding malaria vector breeding places were ponds because Nimboran Subdistrict has forest areas suitable for malaria vector breeding. Knowledge of vector breeding places is important for managing sources of infection agents to stop malaria transmission. But the natural ecology of Papua Province with wide forest areas poses a challenge for controlling malaria vector breeding. Thus regular use of mosquito nets should be promoted because of its effectiveness in preventing malaria particularly as long lasting insecticide-treated nets can be used for 3-5 years. As mosquito repellants are relatively expensive, wearing long sleeve shirts at night can also be useful. Antimalarial prophylaxis should be recommended for travelers, not for residents in malaria endemic areas.

The 37% of respondents had neighbors with malaria during the previous 4 months indicated malaria transmission in Nimboran Subdistrict was high. Among these respondents, one-third knew the type of malaria and also confirmed the presumptive diagnosis and advised drug treatment.

Correct knowledge of malaria should be enhanced in the effort to promote malaria prevention, especially in high endemic areas (Denver, 1984). It needs education on malaria causation, transmission, symptoms, early diagnosis and prompt treatment, and compliance to treatment regimen if there is to be any decrease in malaria that is responsible for economic loss. The role of self-care is to empower community leaders to improve health

education among inhabitants to achieve malaria elimination (WHO SEARO, 2008, 2009; Directorate General of Communicable Diseases and Environment Health, 2011c).

In summary, results from this questionnaire study conducted among 30 'Pengurus Rukun Tetangga' members of Jayapura District, Papua Province in 2013 on malaria self-care revealed that (i) mosquito net use was about 65%, (ii) knowledge of severe malaria symptoms and complications were lacking but such awareness is because in high endemic malaria areas the disease was assumed to be a common mild illness, (iii) less than a half of the respondents knew of Darplex<sup>®</sup>, an ACT, although all visited health centers for malaria treatment, (iv) respondents with neighbors sick with malaria said they all visited health centers, (v) the majority of respondents knew tinnitus was a side effect of antimalarial drugs, (vi) all respondents complied with prescribed drug regimen, and (vii) the majority of respondents recognized ponds as malaria vector breeding places. The study concludes that malaria self-care was needed for promotion of malaria prevention and treatment efforts in the region.

#### CONFLICT OF INTERESTS

The authors declare no conflict of interests.

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