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Malaria Content in Elementary School Curriculum in Supporting Integrated Vector Management for the Elimination of Malaria in Purworejo District

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***Abstract*—** *Malaria remains a health problem in Indonesia. In 2017, 4.9 million people lived in malaria endemic areas, with 261,617 cases reported and 100 fatalities. In the Purworejo district, there were 276 cases in 2017. The lack of knowledge about malaria in early childhood is strongly suspected as one of the factors affecting prevention. This research aimed to measure the level of knowledge of elementary school students about malaria and determine how far the school curriculum should have malaria content.*

Random sampling was performed on 121 elementary school studentsfrom 24 schools,to measure knowledge of malaria and determine its inclusion in curriculum. Data was analyzed to determine the level of knowledge of malaria and the extent to which it appears in curriculum. The results of a survey of 121 (6th grade students) show that the majority (95%) had heard about malaria in general. They understand malaria as a "heat and cold" disease (87%), and transmitted by mosquitoes (98%). Nearly half of respondents (47%) had a family member who had suffered from malaria. Only 41% realized bedrest is importantto recover if infected. When verbally questioned about aspects of the Anopheles mosquito species, only 12% answered correctly. Respondents were less well informed that Anopheles is a transmitter of malaria (25%), and did not understand that the river/pond is a breeding ground for the Anopheles mosquito (5%). In all schools surveyed (100%), we found no local content related to malaria in the elementary school curriculum.

Lack of knowledge about malaria is still a factor in the persistence of malaria cases. Curriculum becomes a source of knowledge forelementary school students in endemic areas. The inclusion of local content about malaria is one of the community's behavioral factors to prevent malaria.

The basic knowledgeabout Anopheles species and its ecology in early childhood is below exectations. There is no health lesson about malaria in the elementary school curriculum. Education on malaria is needed to help eliminate malaria in the long term and to ensure the sustainability of malaria control.

***Keyword*— *malaria, elementary school curriculum, Purworejo*.**

I. BACKGROUND

Malaria remains a health problem in Indonesia. The elimination of malaria by 2030 is a national target, howeverthere is still huge cases of it[1]. The biggest obstacle in handling the malaria diseases, according to the 2017 World Malaria Report, is the emergence of parasite (plasmodium) resistance to malaria drugs, vector resistance (Anopheles) against insecticides, and inadequate health system performance [2]. Treatment is currently being applied with the provision of artemisinin-based combination therapies (ACT) in the first 24 hours of patients with fever. Treatment with ACT has not been effective, and people still use drug stores and stalls to obtain malaria control drugs [3].

Until 2017, an elimination ofmalaria certificate was obtained by 247 districts/cities from 514 districts/cities in Indonesia [1]. Maluku Province, North Maluku, Papua, West Papua, East Nusa Tenggara, are areas with high endemicity.Purworejo is one of the malaria endemic areas in Central Java Province that has not yet received yet the certificate of elimination of malaria[4, 5]. The malaria cases in Purworjodistrict fluctuate with the spread across areas. In the Kemiri subdistrict, malaria cases have not occurred in the past 5 years, but malaria has occurred on 2017. The Kaligesingsub district is an endemic area, with malaria cases reported annually. Overall, malaria cases in Purworejo district still show high statistics; in 2015 (1,022 cases of malaria), increased to malaria cases in 2014 as many as 658 cases. In 2016, there was an increase in the incidence of malaria, with 1,342 cases. In 2017, there were 276 cases, with a MoPI of 0.39% o. [4,5].

Integrated malaria eradication requires integration of various aspects including: and integrated approach,

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human resource capability, event decision making (related evidence making), related sector collaboration, community assistance, and local government policies. Purworejo district has a malaria elimination target of 2023 through this integrated activity. Increasing knowledge in the community about malaria is one model for taking strategic steps toward malaria elimination. Early childhood is a period in dire need of knowledge about malaria, so that children can take an active role in adopting malaria risk prevention in adulthood. Content on malaria in localcurriculumis strongly suspected to be a much needed thing [4,5,6].

II. METHODS

This was an analytical observation study, with a cross-sectional approach. The population was children in elementary school, grades5 and 6, in the Kaligesingsubdistrict. Elementary schools are spread across 12 villages in the Kaligesing district. Sampling was carried out by purposive proportional sampling [7]. The number of samples was calculated by the approach:

$$n = \frac{Nz^2\sigma^2}{d^2(N-1) + z^2\sigma^2}$$

Using a sample calculation approach, a total sample of 121 elementary school students in grades5 and 6 were included. Questionnaires were prepared to measure knowledge about malaria amongelementary school students. The questionnaire was adjusted to the standards for elementary school students, equipped with visualization of images for verbal knowledge. Data processing was achieved by compiling descriptions of attitudinal knowledge and practices in preventing malaria. Analysis was carried out to measure the level of knowledge and practice in controlling malaria. Analysis of the elementary school curriculum was used to determine the presence or absence of local content on malaria.

III. RESULT

The results of a survey conducted on the 121 elementary school students from 24 different schools in Purworejo district. The majority (95%) of children had heard the term malaria. They understood malaria as a "hot-cold"disease (87%). They also understood that mosquitoes are malaria transmitters (98%). They had sufficient knowledge that Anopheles were the cause of infectious malaria (25%). When pictures were verbally presented of the Anopheles mosquito species only a small portion (12%) answered correctly, identifying the genus.They also had family members who had suffered from malaria (47%). When asked about the conditions in the house that attract mosquitoes, only 41% understood that hanging clothes are a resting place for mosquitoes. They also did not understand that rivers/ponds are a breeding ground for Anopheles mosquitoes (5%).

The majority of elementary school students (70%) had their families used mosquito nets as a means of protecting against mosquitoes. They did not understand (only 25%) that the Anopheles mosquitoes are malaria transmitters. They understood that mosquitoes transmit infection at night (81%).

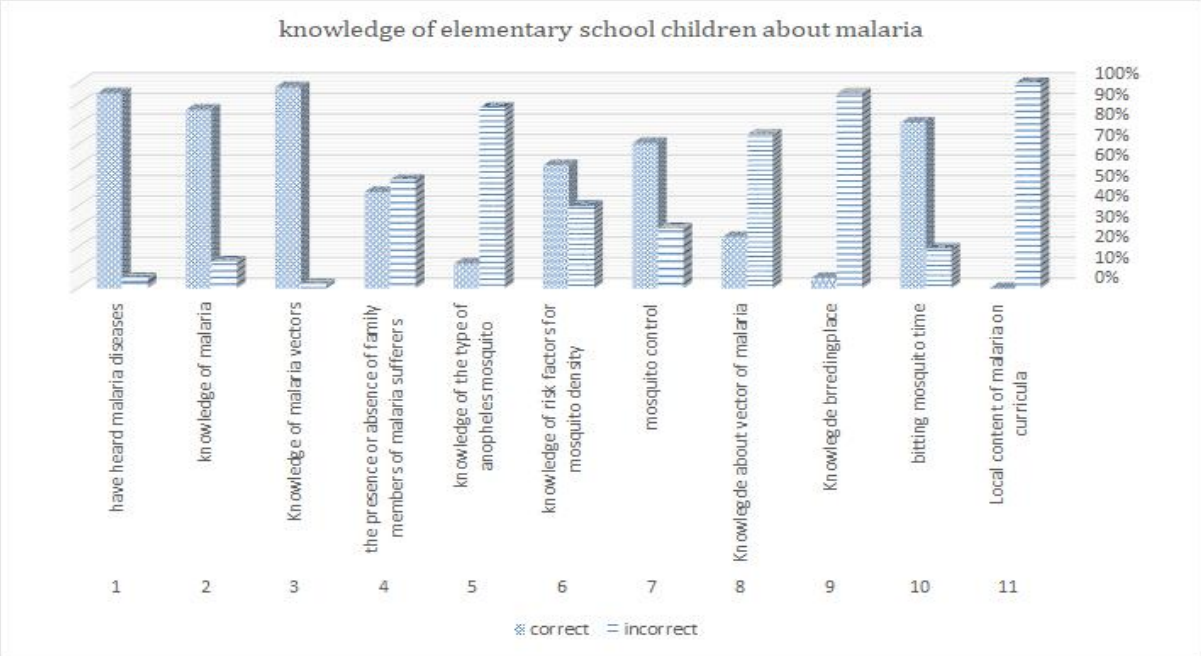

Fig.1: Results of survey of elementary school students'sknowledge about malaria in anendemic region, 2017

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Related to the source of knowledge about malaria, the majority of children (76%) did not haveformal education in elementary school on the topic. A small percentage (14%) obtained information from health workers, while the rest (10%) came from families. The results of a survey of 24 elementary schools showed that none (0%) had curriculum that provided content about malaria.

Table.1: Results of survey of elementary school students's knowledge about malaria in an endemic region, 2017

No	Knowledge of elementary school students	Percent (%)	No	Knowledge of elementary school students	Percent (%)
1	Have heard of malaria diseases		7	Mosquito control	
	ever heard	95%		no control	.8%
	never heard	5%		herbal fogging	25%
2	Knowledge of malaria			net	70.8%
	correct	87%		bed cover	3.3%
	incorrect	13%	8	Knowledge about vector of malaria	
3	Knowledge of malaria vectors			Aedes aegypti	73.3%
	flies	2%		Anopheles	25%
	cockroach	0%		culex	.8%
	mosquito	98%		all mosquitoes	.0%
	mouse	0%	9	Knowledge of breedingplace	
4	Presence or absence of family members who have suffered from malaria			bathtub	3.3%
	there are malaria sufferers	47%		cans	59.2%
	no malaria sufferers	53%		river/ponds	5%
5	Knowledge of the type of Anopheles mosquito			all surface water	32.5%
	correct	12%	10	Mosquito biting time	
	incorrect	88%		morning	4.2%
6	Knowledge of risk factors for mosquito density			noon	1.7%
	environmental hygiene	12%		afternoon	13.4%
	the existence of resting and breeding	60%		night	80.7%
	ventilation quality	8%	11	Local content on malaria	
	roof quality	20%		no	100%
				yes	0%

IV. DISCUSSION

Community knowledge is fundamental in controlling malaria [9]. Increased knowledge must begin in childhood basic education because children are the successors in controlling malaria. The results of this survey of elementary school students shows that knowledge of malaria control is still insufficient. The knowledge needed relates to the ecology of how Anopheles begins to breed and its suitable breeding grounds [8].

The majority (95%) of elementary school students had heard about malaria in general; this shows that the term malaria is very well known due to the large number of malaria cases. As an endemic area, the incidence of malaria is often experienced by the community. Frequent communication between people and parents about malaria allows elementary school students to often hear reference to the term. Although knowledge about malaria among elementary school-aged children is not sufficient, familiarity with the term will facilitate further education about malaria.

Elementary school students have some correct knowledge about malaria; they are more familiar with the term "hot disease." This knowledge was obtained from their parents, who use language about malaria that includes the term heat, referring to the high fever accompanying the disease. It is very possible that children can absorb knowledge about malaria from three sources of information, namely, formal education, the environment in the home (family), and the outside environment (friends). Child and environmental interactions provide education and knowledge, which is carried out every day. This relates to knowledge transfer through social interaction, in accordance with Bloom's theory about behavior change [11, 12].

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In the survey, 47% of the children stated that they had family members who suffer or suffered from malaria. These data show that in endemic areas almost half of the population has experienced malaria. The high number of sufferers can occur due to potential transmission, with the presence of sufferers and mosquitoes as malaria-borne vectors [10].

Even though elementary school students already understand mosquitoes as a vector, they have no understanding of Anopheles mosquitoes. Only 12% of the children knew the malaria-transmitting species (Anopheles). In reality, there are hundreds of species of mosquitoes that live in each region. Each mosquito species has specific physical and bionomic characteristics. Each mosquito species has the potential for transmission of certain diseases. Diseases that can be transmitted include dengue fever by *Aedesaegypti* mosquitoes, (cikunguya) by*Aedesalbopictus*,filarial by culex, and malaria by Anopheles. It is understandable if elementary school students cannot distinguish among various species of mosquitoes. However, knowledge of species is needed to control species that are at risk for the spread of malaria [12].

Other knowledge about environmental conditions that affect the density of mosquitoes is only held by around 60% of the children. Knowledge about density is rarely delivered to and understood by elementary school students. Knowledge about the characteristics of the Anopheles species is only understood by 25% of surveyed school children. Likewise,only 5% of respondents had knowledge about breeding sites and resting places. These low levels of knowledge can be understood because there is no transfer of knowledge to elementary school students. The absence of information about how to avoid the bite of the Anopheles mosquito is an inhibiting factor in controlling malaria [13].

The theory of education that increasing knowledge can be achieved in various ways still recognizes the importance of including malaria content in local elementary school curriculum. The provision of knowledge about malaria must begin at an early age [14]. This is in accordance with the opinion that the vector control approach should be integrated, requiring knowledge from an early age. Elementary school students are nearing the age of development when they can obtain knowledge about malaria. Increasing public knowledge about malaria must also be done vastly. Knowledge can be delivered through content about the local environment. The importance of this local content is in accordance with the results of research for other regions in Indonesia.

The content can be included in natural science subjects related to the Anopheles mosquito and its habitat. Knowledge about behavior of people can appear in the content included in social science lessons [15]. This curriculum content must be provided to all communities through early education. The content that can be provided for the local curriculum is as follows: (1)knowledge about malaria transmission; (2)knowledge about malaria vectors; (3)vector life environment; (4) community behavior; (5)prevention of malaria transmission; (6)handling malaria sufferers; (7)prevention of mosquito bites; (8)control of malaria vectors; (9)utilization of technology for malaria vector control; and (10)prevention of malaria as a cultural issue.

School children's knowledge and Integrated Vector Management

In theory, integrated vector management (IVM) involves integrating components in controlling malaria. Malaria treatment tends to be curative for malaria sufferers [16]. Curative handling is awaiting the arrival of the patient, so that treatment is never complete. The source of transmission is never stopped. Preventive handling is carried out so as not to result in transmission. Malaria elimination can only be achieved through simultaneous preventive and curative handling.Preventive and curative handling are carried out on each component to includea human component, larval control, adult mosquito control, control of mosquito habitat ecology, and treatment of malaria sufferers.

The human component focuses on efforts to prevent contact with malaria vectors, control vector populations, and conduct environmental management. Education is one way to increase public knowledge. The provision of local content on malaria for elementary school students is one of the strategic aspects in implementing IVM. Basic education will provide knowledge that creates a culture of preventing malaria in the community. The need for early education is in accordance with the results of this research, suggesting that knowledge is important for behavior change.

V. CONCLUSION

Knowledge of elementary school students in malaria endemic areas about the Anopheles mosquito as a contagious vector remains low. Local content about malaria is needed in the elementary school curriculum in endemic areas to support the application of IVM.

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