Community behavior in malaria prevention after the implementation of intervention programs in Purworejo, Magelang, and Kulonprogo Regencies

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Abstract

Background: Purworejo, Magelang, and Kulonprogo are the three known regencies that have not yet received a Malaria elimination certificate in Central Java and Yogyakarta. Therefore, interventions system in the form of health education are required in these regions. Aims: The purpose of this study is to determine the community practice in preventing Malaria following the provided intervention in the form of counseling by religious and community leaders. Settings and Design: This research adopted a quasi-experimental approach and was performed in Purworejo, Magelang, and Kulon Progo Areas, Central Java Province, and Daerah Istimewa Yogyakarta. Methods and Material: The provided interventions in the form of counseling were conducted at community groups in the study sites in 6 villages, 3 districts, with 384 people. And were carried out by educating the community through their leaders on the importance of preventing the spread of malaria through health instructions, related movies, distribution of smartbooks, and training on the practice of hunting Anopheles larvae. Statistical analysis used: Data analysis was performed using the chi-square test in identifying the differences in community knowledge before and after conducting the intervention. Results: The results showed that intervention in the form of counseling changed the communities' behaviour towards malaria in the three districts (p<0.05). This involved their protective efforts against mosquito bites, night out activity, and installation of bed net and sleeping inside it. Conclusions: The health education
given by the community and religious leaders was effective in producing better prevention efforts against Malaria.

**Keywords:** malaria, behaviour, counseling

**Key Messages:**

The provided intervention in the form of counseling changed the communities' behaviour towards malaria in Purworejo, Magelang, and Kulonprogo Districts. Also, the health education given by the community and religious leaders was effective in producing better prevention efforts against Malaria.


**Introduction**

In the last 15 years, the world has made great strides in the fight against malaria. Therefore, the incidence of this infection decreased by 41%, while its mortality rates was reduced by 62% between 2000 and 2015, according to the World Malaria Report. However, there are many countries that are still working to eliminate it, including Indonesia. The elimination of malaria has been announced in Indonesia with a national target by 2030 and for Java-Bali it is targeted for 2023. Also, the government establishes a policy for this process to be carried out comprehensively, in an integrated manner with development partners including social, professional, and community organizations, the business world, and donor agencies. Malaria elimination is carried out in stages from districts/towns, provinces, or islands to the rest of Indonesia depending on the situation and current resource conditions. The malaria elimination target for Central Java Province is in 2023. The cases in Central Java in general showed a downward trend from 2014-2016, in line with the goal range. Purworejo is a regency in Central Java that has not obtained a certificate of malaria elimination, and borders KulonProgo which is part of the Province in Yogyakarta. Kulonprogo is also a region with malaria problems that has not yet obtained a certificate for malaria elimination. This area is also known as the cross-border between Purworejo, Magelang, and Kulonprogo Regency.

The success of the malaria elimination program relies particularly on the cooperation of several parties, including community involvement. However, this requires awareness and good knowledge from societal components. Public awareness make the community to carry out prevention effort, seek and obtain care for their illness. The malaria control program is highly complex and...
depends on region level involvement. The effectiveness of an intervention program, such as the
distribution of insecticide-treated bed nets depend on the degree of community participation, and
whether or not they are willing to sleep in the mosquito net. The community's willingness to take part is
strongly affected by their awareness and perceptions. The behaviour related to malaria control in daily
activities is often defined by other variables that are often not in line with their understanding and
perceptions. The important key elements are empowerment and fostering a sense of responsibility
among community members regarding the importance of participation in malaria control programs.

Many intervention systems, neglect this and concentrate mostly on parasites and their vectors. Health
education has long been considered an important approach in the implementation of community-
based malaria prevention and control interventions in Indonesia. And have been traditionally
championed through counseling, which is a professional advice and guidance given to a person
(client) by a trained personnel (usually counselor), to assist in exploring, discovering, and clarifying the
style of living more positively, satisfactorily, and resourcefully in the society. The purpose of this
study is to determine the community practice in preventing mosquito bites following the provided
intervention in the form of counseling by religious and community leaders.

Subjects and Methods

Study area and design

This study used a quasi-experimental approach, and was carried out in three districts in the cross-
border incision, namely Purworejo, Magelang, and Kulonprogo Regency. In Magelang, the research
was located in the working area of Salaman I, namely Ngargoretno and Paripurno Villages. The
research in Purworejo was carried out in Tepansari Village, Loano District, Banyuasin Community
Health Center, and Somorejo Village, Bagelen District, Dadirejo Health Center Area. Meanwhile, the
research location in Kulonprogo was located in Kalirejo Village, Kokap District, the working area of
Community Health Center Kokap 1, and Pagerharjo village, Samigaluh Sub-district, Community Health
Center Samigaluh 2. This research was conducted from February-November 2018.

Intervention Procedure

The intervention was carried out with 384 people each in 6 villages of 3 districts. And was conducted
by educating the community through their leaders on the importance of preventing the spread of
malaria through health education, movies, distribution of smart books, and training on hunting
Anopheles larvae. The combination of the three methods was carried out due to the varying conditions
of the community, to cover all components of the society with various variations in understanding both
readings, listening, seeing, writing, and field practice. The public knowledge, attitudes, and behaviour
about malaria are the output of this activity, which were measured before and after the intervention through interviews. At intervals of 2 months after the intervention, interview exercises were carried out, hoping that community leaders would have time to perform socialization in their regions. There were 384 respondents in each village; the samples were taken using a systematic sampling method (based on the number of residents in RukunWarga and Tangga).

**Data Analysis**

Data analysis was performed using the chi-square test to identify differences in community knowledge before and after the intervention.

**Results**

The characteristics of respondents based on age, sex, education level and occupation of the three regencies were shown in Tables 1 to 4. Table 1 showed that most of the respondents were in the 26-65 year age group. In Magelang, 56.9% of the 784 of them were in the range of 26-45 years, while in Purworejo and Kulonprogo more than 40% were in the range of 46-65 years. Table 2 showed that based on gender, most of the respondents were women in Magelang (78.6%), Purworejo (58.0%), and in Kulonprogo (67.5%).

Table 3 showed that most of them had the latest education at the Junior High School level. Meanwhile, those that never went to school were mostly found in Purworejo Regency.

Table 4 showed that they were mostly housewives, meanwhile, most of the respondents in Purworejo Regency work as farmers. The results of the bivariate analysis of the community's behaviour before and after the intervention were shown in Table 5. There were differences in the behavioral components of their protective efforts against mosquitoes' bites before and after the intervention in Kulonprogo and Purworejo. Also, there were differences in the behaviour of installing mosquito nets in Purworejo before and after the intervention and in the three districts where the survey was located.

**Table 1: Characteristics of Respondents by Age Group**

<table>
<thead>
<tr>
<th>No</th>
<th>Regencies</th>
<th>&lt;11yo</th>
<th>12-25 yo</th>
<th>26-45 yo</th>
<th>46-65 yo</th>
<th>&gt;65yo</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Magelang</td>
<td>0.1</td>
<td>13.1</td>
<td>56.9</td>
<td>27.6</td>
<td>2.3</td>
<td>784</td>
</tr>
<tr>
<td>2</td>
<td>Purworejo</td>
<td>0.4</td>
<td>6.7</td>
<td>37.4</td>
<td>42.3</td>
<td>13.2</td>
<td>778</td>
</tr>
<tr>
<td>3</td>
<td>Kulonprogo</td>
<td>0.1</td>
<td>8.3</td>
<td>38.4</td>
<td>43.7</td>
<td>9.5</td>
<td>782</td>
</tr>
</tbody>
</table>

### Table 2: Characteristic of Respondents by Gender

<table>
<thead>
<tr>
<th>No</th>
<th>Regencies</th>
<th>Gender (%)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>1</td>
<td>Magelang</td>
<td>21,4</td>
<td>78,6</td>
</tr>
<tr>
<td>2</td>
<td>Purworejo</td>
<td>42,0</td>
<td>58,0</td>
</tr>
<tr>
<td>3</td>
<td>Kulonprogo</td>
<td>32,5</td>
<td>67,5</td>
</tr>
</tbody>
</table>

### Table 3: Characteristic of Respondents by Level of education

<table>
<thead>
<tr>
<th>No</th>
<th>Regencies</th>
<th>Level of Education (%)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>1</td>
<td>Magelang</td>
<td>1,0</td>
<td>6,4</td>
</tr>
<tr>
<td>2</td>
<td>Purworejo</td>
<td>4,5</td>
<td>11,6</td>
</tr>
<tr>
<td>3</td>
<td>Kulonprogo</td>
<td>1,9</td>
<td>6,9</td>
</tr>
</tbody>
</table>

Information:

1. Uneducated
2. Primary School
3. Junior High School
4. Senior High School
5. Diploma
6. Bachelor
7. Others (Post Graduate)

### Table 4: Characteristic of Respondents based on employment

<table>
<thead>
<tr>
<th>No</th>
<th>Regencies</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
<th>(9)</th>
<th>(10)</th>
<th>(11)</th>
<th>(12)</th>
<th>(13)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Magelang</td>
<td>2,6</td>
<td>1,5</td>
<td>45,8</td>
<td>0,4</td>
<td>0,1</td>
<td>4,5</td>
<td>6,0</td>
<td>0,3</td>
<td>24,0</td>
<td>4,3</td>
<td>10,5</td>
<td>0,0</td>
<td>0,1</td>
<td>784</td>
</tr>
<tr>
<td>2</td>
<td>Purworejo</td>
<td>2,6</td>
<td>0,9</td>
<td>29,6</td>
<td>1,2</td>
<td>0,1</td>
<td>4,4</td>
<td>8,6</td>
<td>0,3</td>
<td>38,7</td>
<td>5,1</td>
<td>6,8</td>
<td>0,0</td>
<td>1,8</td>
<td>778</td>
</tr>
<tr>
<td>3</td>
<td>Kulonprogo</td>
<td>3,1</td>
<td>1,0</td>
<td>40,3</td>
<td>1,3</td>
<td>0,0</td>
<td>2,8</td>
<td>7,0</td>
<td>0,1</td>
<td>29,9</td>
<td>5,2</td>
<td>5,9</td>
<td>0,0</td>
<td>3,3</td>
<td>782</td>
</tr>
</tbody>
</table>

Keterangan:

1. Unemployment
2. Students
3. Housewives
4. Civil servants
5. employees of state-owned enterprises
6. private employees
7. Entrepreneur / Trader
8. Services
9. Farmer
10. Farm workers
11. Laborer
12. Fisherman
13. Others

### Table 5: Analysis of Behavioral Components of Malaria Before and After Intervention

<table>
<thead>
<tr>
<th>Variables</th>
<th>Magelang</th>
<th>Purworejo</th>
<th>Kulonprogo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active night out</td>
<td>P value 0.23</td>
<td>0.576</td>
<td>0.057</td>
</tr>
<tr>
<td>Efforts to protect from mosquito bites</td>
<td>1</td>
<td>0.00001</td>
<td>0.197</td>
</tr>
<tr>
<td>Mosquito nets installed</td>
<td>0.50</td>
<td>0.00001</td>
<td>0.865</td>
</tr>
<tr>
<td>Sleep with a mosquito net</td>
<td>0.08</td>
<td>0.285</td>
<td>0.992</td>
</tr>
</tbody>
</table>

Discussion

Malaria prevention efforts should be carried out, especially in endemic areas, towards its elimination. The community awareness and engagement were the keys to the prevention effort's success. In order to increase its public awareness and understanding, there were needs of health education offered at different levels of the society. This research included initiatives in the form of malaria prevention strategies through health education, movies, distributing smartbooks, and providing skills in the practice of hunting Anopheles larvae. The results of interview on the knowledge of attitudes and behaviours regarding malaria showed a higher level of education among respondents in Kulon Progo Regency compared to the other two districts. The pre-intervention survey in Purworejo District showed a low percentage of prevention behaviour compared to the other two districts, however, after the intervention their knowledge and practice increased. This was in line with previous research which stated the importance of health education in increasing public awareness and knowledge about malaria.\textsuperscript{12, 13} It was suggested that there was at least an additional session, for instance, 2-3 months after the initial, to act as a re-enforcement.\textsuperscript{13}

In this study, majority of respondents understood that malaria was avoidable and also an infectious disease. However, some knowledge was still limited, for example, they did not understand what type of mosquito transmit malaria. Previous research stated that Purworejo community awareness was still minimal, as they did not understand that mosquitoes transmit malaria.\textsuperscript{9} Research in Kulonprogo showed the same results, the community understood that malaria was transmittable, however, they were unaware of the mosquito type.\textsuperscript{10} The research conducted at Purworejo in 2015 found that 54% of malaria awareness was good because of their education and their exposure experience.\textsuperscript{11} Malaria prevention behaviour should be following the level of individual knowledge. And behaviour is the result of all human experiences and interactions with the environment which are manifested in knowledge, attitudes, and actions.\textsuperscript{12} The behavioral components before and after the intervention in Purworejo showed that there was a difference in a better direction than the other two districts. Malaria control was only successful when the community admitted that the disease was their problem and has the willingness to participate in its prevention and control. Changing the actions of people, or getting them to consider a new strategy, is not a simple job. Studies on people's awareness in Bukit Menoreh region have been performed previously. Ikawati reported that the source of information about malaria in the Magelang region was obtained from health workers, village cadres, administrators, relatives/families, and movies.\textsuperscript{3}

Efforts to control malaria have been carried out by the community, however, some were not appropriate, such as refusing to spray insecticides, and irregular treatment behaviour. Ikawati stated
that there was still lack of awareness and understanding at the research site, some even underestimated and considered it natural. Socialization and health education were carried out by community leaders, however, they were deemed inadequate to increase public knowledge and awareness. This was in line with the research of Andriyani in Kulonprogo, which indicated that socialization is capable of reaching all levels.\textsuperscript{12} The program for elimination was unsuccessful, because there was no financial support and commitment from the local government.\textsuperscript{1}

Overall, knowledge disparities also existed among the people of age 50 with inappropriate understanding of malaria etiology and health services. Younger people generally have the opportunity to gain knowledge from their school curriculum on health education.\textsuperscript{14} Efforts to educate people over 50 years of age are important because they have a responsibility to implement malaria control interventions in their families and communities.\textsuperscript{15} The results showed strong evidence that extension programs were successful in enhancing the efforts at the study sites in managing malaria. All previous studies have consistently concluded that initiatives in health education were successful in the control of this infection. The drawback of this analysis was that it did not determine what variables affect the changes in community behaviour in the three districts regarding malaria control. Therefore, further detailed studies and periodic observations are needed to determine the success of interventions with health education in the community.

\textbf{Acknowledgment}

We are grateful to the Head of Banjarnegara Health Research & Development Centre and those who have helped in collecting data in the field during the research. And also to the Head of Bantul District Health Office, the staffs and the Public Health Centre in the study sites.

\textbf{References}


