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MOTHERS' KNOWLEDGE ON MALARIA AND VECTOR MANAGEMENT STRATEGIES IN NYAMIRA DISTRICT, KENYA

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## MOTHERS' KNOWLEDGE ON MALARIA AND VECTOR MANAGEMENT STRATEGIES IN NYAMIRA DISTRICT, KENYA

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### ABSTRACT

**Background:** Maternal knowledge on malaria and vector control measures are important because they enable mothers make an informed choice on the method of malaria control to use for their children under five years.

**Objective:** To determine the mothers' knowledge on malaria and vector control measures particularly use of insecticide treated nets.

**Design:** Cross sectional, descriptive study.

**Setting:** Eight health centres in Nyamira District, Kenya.

**Subjects:** Four hundred mothers bringing their children aged five years and below to the child health clinics.

**Results:** Mothers had a problem of defining malaria. Majority of them (91.8%) recognised mosquitoes as causing malaria. About 30% associated malaria with dirt, dirty compounds, dirty food/utensils, unboiled water and uncooked food. Many mothers identified basic malaria symptoms such as headache (70%), fever (68.8%), cold (65%), body or joint pain (65.5%) and abdominal pain/vomiting (0.5%). Mothers (40.8%) were less knowledgeable on most vulnerable groups to malaria. A large number of mothers (55.5%) used nothing to protect themselves and their children under five years from mosquito bites. The radio (69%) tuned in the local language, played a very important role in the mothers' knowledge about the use of mosquito nets and insecticide treated nets.

**Conclusion:** By virtue of the fact that majority of mothers (91.8%) recognised that mosquitoes caused malaria, it was an indicator that they were knowledgeable of its existence. Mothers were also informed of most of the malaria vector control measures particularly use of bed nets and insecticide treated nets. However, the general usage of those measures was very low.

### INTRODUCTION

Human malaria involves the infection of humans with four species of *Plasmodium*: *Plasmodium falciparum*, *Plasmodium malariae*, *Plasmodium ovale* and *Plasmodium vivax*. *Plasmodium falciparum* is the most dangerous species of malaria as it may lead to the death of patients, particularly if diagnosis and treatment are delayed. It is a great risk to under-fives especially in the latter part of first year of life and non-immune individuals (1). The common

symptoms of malaria include: fever, headache, pain in the joints, vomiting, loss of appetite, diarrhoea and convulsions (2). Malaria is responsible for one million deaths of young children each year (3). New analyses confirm that malaria is the principle cause of at least one-fifth of all young children deaths in Africa (4). Malaria is one of the most important causes of mortality and morbidity among infants and young children and infection during pregnancy contributes, primarily in primiparae, to maternal mortality, as well as neonatal mortality and low birth

weights (5). Death on this scale is not the only consequence; malaria undermines the development of the children who survive and the nations that depend on them. In severe cases of cerebral malaria, surviving children are left with epilepsy, spasticity, speech disorders and blindness.

Globally it is estimated that there are 300-500 million malaria clinical cases with 1.5-2.7 million deaths annually with countries in sub-Saharan Africa accounting more than 90% (6). Malaria is Africa's leading cause of under five mortality and constitute 10% of the continent's overall disease burden (7). Approximately 20 million people are exposed to stable malaria transmission in Kenya. It accounts for 30% of all outpatient attendance and 19% of all admissions. About 3.5 million children aged below five years are at risk and 34,000 children die each year (approximately 93 children per day) from direct consequences of malaria infections (8).

Among the four technical elements of the global malaria control strategy included planning and implementing selective and sustainable preventive measures such as vector control, early detection, containing or preventing epidemics (5). The vector control options that are currently available include indoor residual spraying (IRS); use of personal protection measures that include use of insecticide treated materials, repellents (dimethylphalate, pyrethrin and pyrethroids) and domestic insecticides; space spraying; environmental management; larviciding (including use of biocides) and biological control (5). Some of the principles of the RBM are early detection, rapid treatment and multiple interventions, which include use of insecticide-treated nets (4).

The two cross-cutting strategies in the Kenya chapter of RBM include (i) Information, education, and communication to arm the public with preventive and treatment knowledge (ii) Monitoring, evaluation and research to constantly up-date and up-grade control strategies (9). The main aim of these strategies was to reduce the level of malaria infection and

consequent death in Kenya by 30% by the year 2006 and to sustain an improved level of control to the year 2010 (9).

This study was designed to determine the maternal knowledge on malaria and also malaria vector control measures used in Nyamira District.

## MATERIALS AND METHODS

This was a cross sectional descriptive study, whose study population comprised mothers bringing their children under five years to the child health clinics. Purposive sampling was used to identify the four study divisions in the district (Nyamira, Ekerenyo, Nyamaiya and Borabu divisions) and then all the eight government health centres were included in the study. Probability proportion to size was used to determine the number of samples included in the study from each division and health centre. Simple random sampling was then used to select the mothers who participated in the study each day from the mothers who brought their under five children to the child health clinics.

Primary data were collected from respondents through personal interviews using an interview guide. Additional qualitative data were obtained through Focus Group Discussions. Data were analysed by use of SPSS computer package and the results were presented in descriptive and inferential methods.

## RESULTS

*Socio-demographic characteristics of study population:* Four hundred mothers were interviewed. About 60% were in the age bracket of 21-30 years. Eight four point three percent were married and 56.5% had one child under five years.

Majority of the mothers (56.8%) had primary level of education and only 4.3% had post secondary level of education. A large proportion of mothers (53.3%) were housewives (Table 1).

**Table 1***Distribution of all subjects according to selected socio-demographic characteristics of study population (n = 400)*

| Characteristic                   | No. of subjects | (%)  |
|----------------------------------|-----------------|------|
| Age (years)                      |                 |      |
| ≤20                              | 108             | 27.0 |
| 21-30                            | 241             | 60.3 |
| 31-40                            | 50              | 12.5 |
| ≥41                              | 1               | 0.3  |
| Marital status                   |                 |      |
| Married                          | 337             | 84.3 |
| Single                           | 49              | 12.3 |
| Separated                        | 14              | 3.5  |
| No. of children under five years |                 |      |
| 1                                | 226             | 56.5 |
| 2                                | 143             | 35.8 |
| 3                                | 29              | 7.3  |
| 4                                | 2               | 0.5  |
| Level of education               |                 |      |
| None                             | 7               | 1.8  |
| Primary                          | 227             | 56.8 |
| Secondary                        | 149             | 37.3 |
| Post-secondary                   | 17              | 4.3  |
| Occupation                       |                 |      |
| Skilled worker                   | 16              | 4.0  |
| Unskilled worker                 | 37              | 9.3  |
| Peasant farmer                   | 105             | 26.3 |
| Housewife                        | 213             | 53.3 |
| None                             | 29              | 7.3  |

*Maternal knowledge on malaria:* Most mothers (53.3%) defined malaria just as a disease, while 6.5% did not know anything about malaria. About 92% of the mothers said that mosquitoes cause malaria and

majority of them identified the basic malaria symptoms as shown in Table 4. About 41% of the respondents recognised children under five years as the most vulnerable group (Tables 2-4).

**Table 2***Distribution of subjects according to how they defined malaria (n = 400)*

| Definition                                      | No. of subjects | (%)  |
|---|-----------------|------|
| It is a disease                                 | 213             | 53.3 |
| Mosquitoes cause malaria                        | 100             | 25.0 |
| By symptoms                                     | 46              | 11.5 |
| Protozoan parasitic disease of genus plasmodium | 2               | 0.5  |
| By mosquitoes and dirty compound/utensils/food  | 10              | 2.5  |
| Lack of food                                    | 1               | 0.3  |
| Disease for children                            | 1               | 0.3  |
| Ignorant (Didn't know)                          | 27              | 6.6  |

**Table 3***Distribution of subjects according to how they perceived the cause of malaria (n = 400)*

| Cause                                      | No. of subjects | (%)  |
|--|-----------------|------|
| Mosquitoes                                 | 367             | 91.8 |
| Stagnant water                             | 33              | 8.3  |
| Cold                                       | 53              | 13.3 |
| Rain                                       | 17              | 4.3  |
| Sugar cane                                 | 25              | 6.3  |
| Bushy environment                          | 17              | 4.3  |
| Cooking fat                                | 1               | 0.3  |
| Dirty compound/utensils/food/uncooked food | 120             | 29.9 |

**Table 4***Distribution of subjects according to how they gave malaria symptoms (n = 400)*

| Symptom                 | No. of subjects | (%)  |
|-------------------------|-----------------|------|
| Headache                | 280             | 70.0 |
| Fever                   | 275             | 68.8 |
| Cold                    | 260             | 65.0 |
| Body/joint pain         | 246             | 61.5 |
| Abdominal pain/vomiting | 2               | 0.5  |
| Loss of appetite        | 115             | 28.8 |
| Shivering               | 65              | 16.3 |
| Dizziness               | 30              | 7.5  |
| Body weakness           | 19              | 4.8  |
| Coughing                | 10              | 2.5  |
| Diarrhoea               | 8               | 2.0  |
| Inactivity              | 6               | 1.5  |
| Ignorant                | 1               | 0.3  |

*Maternal knowledge and use of malaria vector control measures (Tables 5-7):* Most mothers (55.5%) did not use anything to protect themselves from mosquito bites and 0.3% boiled drinking water as a control measure against mosquitoes and malaria. Majority of mothers (80.3%) knew about mosquito nets and

insecticide treated nets. The study revealed that radio (70%) tuned in vernacular played a very important role in the respondents' knowledge about use of mosquito nets and insecticide treated nets. Mothers were willing and wanted to purchase ITNs.

**Table 5***Distribution of mothers according to the use of various malaria vector control measures (n = 400)*

| Control measure                            | No. of mothers | (%)  |
|--|----------------|------|
| None                                       | 222            | 55.5 |
| Nets                                       | 135            | 33.5 |
| Repellents                                 | 27             | 6.8  |
| Cloths                                     | 4              | 1.0  |
| Draining stagnant water                    | 3              | 0.8  |
| Cleanliness/collecting tins/cleared bushes | 8              | 2.0  |
| Boiled water                               | 1              | 0.3  |
| Anti-malarial drugs                        | 2              | 0.5  |

Table 6

*Distribution of mothers according to their sources of knowledge about mosquito nets and insecticide treated nets (n = 400)*

| Source               | No. of mothers | (%) |
|----------------------|----------------|-----|
| Radio                | 280            | 70  |
| Health clinics       | 60             | 15  |
| Press                | 4              | 1   |
| Community leaders    | 4              | 1   |
| Religious leaders    | 3              | 0.8 |
| Health workers       | 3              | 0.8 |
| Television           | 3              | 0.8 |
| Organised seminars   | 2              | 0.5 |
| Organised promotions | 13             | 3.3 |
| People who have nets | 23             | 5.8 |
| Shop/markets/vendors | 10             | 2.5 |

Table 7

*Recommendations given for bed net/ITN possession (n = 265)*

| Cause                                      | Frequency | (%)  |
|--|-----------|------|
| Sold through MCH clinics                   | 6         | 2.3  |
| Be availed in local shops                  | 13        | 4.9  |
| Put compulsory for postnatal and antenatal | 2         | 0.8  |
| Don't know                                 | 51        | 19.2 |
| Educate people                             | 1         | 0.4  |
| Given on credit                            | 1         | 0.4  |
| Given free                                 | 82        | 31.3 |
| Promote their use                          | 23        | 8.7  |
| Lower/subsidise prices                     | 58        | 21.9 |
| Going to buy                               | 28        | 10.6 |

*Analytical results:* Knowledge on most vulnerable groups was significantly related with possession of insecticide treated nets ( $X^2 = 18.631$ ,  $df = 7$ ;  $p = 0.009$ ). Having an insecticide treated net for a child was highly related with knowledge about the use of insecticide treated nets ( $X^2 = 21.641$ ,  $df = 1$ ;  $p = 0.000$ ). Mothers who had heard about insecticide treated nets were less likely to use them for their children compared to those who had heard about them ( $RR = 0.742$ ;  $95\% CI = 0.683, 0.805$ ). The level of education was independent of the knowledge about the use of insecticide treated nets ( $X^2 = 3.515$ ,  $df = 3$ ;  $p = 0.319$ ). Marital status of the respondents was not related to knowledge about the use of insecticide treated nets ( $X^2 = 0.281$ ,  $df = 2$ ;  $p = 0.869$ ).

## DISCUSSION

The mothers' literacy level was low as evidenced by the number that completed elementary education. This in one way or another affected mothers' knowledge on what malaria is, what causes (transmits) it, its symptoms, and who are most vulnerable to the disease.

Most mothers (53.3%) said that malaria was just a disease, meaning that it covers a number of different diseases. Many others said that dirt, dirty compound, dirty food/utensils, unboiled water, uncooked food, lack of food, germs and so forth caused malaria. This was actually related with illiteracy and level of education. Therefore this showed that most mothers

were less knowledgeable of what malaria was, a finding, which corresponds with that of WHO (10).

The local term used to refer to malaria was *esosera* (yellow substance vomited when one is sick). This meant that malaria was as a result of taking dirty water contaminated with algae (simple plant) in it. However, majority of the young generation did not know of the term. Lack of specificity of local term used to refer to malaria has been reported (11,12). It must be noted that when people think of other causes of malaria other than mosquitoes, then the control measure considered are other than to control or reduce mosquitoes and their effect. This explains the reason why some mothers in the group discussion would say that to reduce malaria you take clean, boiled water, cooked food and use clean utensils. In such situations a lot of health information education and communication campaigns should be considered to remove misconception and beliefs on malaria and create demand for advocated control strategies.

Nevertheless, majority of the mothers (91.8%) associated malaria with mosquito bite. This was attributed to a lot of promotional campaigns through radios in vernacular and community meetings. Even though mothers had the knowledge of bed nets/ITNs, their usage still remained too low, as nets were not a priority. As mentioned earlier the little money gotten went to food, school, clothing and nothing was set aside for medical care and effective tools of malaria control like use of bed nets.

It was clear from the study that most mothers had a good knowledge of the symptoms of malaria. They correctly identified the basic malaria symptoms as fever, headache, coldness, body/joint pain, vomiting, diarrhoea, and refusal to eat (loss of appetite). However, mothers could not mention any severe complication, which go with severe malaria such as coma, convulsions, severe anaemia, renal failure, hypoglycaemia, fluid/electrolyte imbalance, pulmonary oedema, hypovolaemic shock, hyperparasitaemia, malaria haemoglobinuria (coca cola coloured urine) and disseminated intravascular coagulopathy (DIC-spontaneous bleeding).

Good knowledge on malaria symptoms were associated with the fact that partly at least the mother, the baby or any other member of the family had experienced malaria attack before and partly, they might have heard it from either the radio in vernacular, community meetings, church meetings or the press. You can reduce healthcare seeking

constraints of the affected population by among other things increasing public awareness of malaria symptoms to encourage early reporting at health facilities and support for malaria control activities by using radio, press, community meetings, religious leaders, local language and so forth (13).

Most mothers who had nets and were attacked by malaria felt that the nets were not helping them and hence got discouraged from using them, as they made no difference. The problem is likely to be associated with poor usage of nets, going to bed late (after 10.00 p.m), torn nets, occasionally not using nets, some parts of the body exposed like hands and legs before going to bed among other reasons.

Despite the fact that most women identified the basic malaria symptoms correctly, little did they know that those were actually malaria symptoms as malaria was a representative of any other disease. Very few women were knowledgeable on the most vulnerable groups to malaria. This was connected with their low level of literacy. Knowledge on most vulnerable groups was highly related with ITN possession. Mothers who knew that children under five years and pregnant women were the most vulnerable groups to malaria, had the highest chance of having/using a bed net/ITN for their children. There was a likelihood of families having a net and not using it on children because they did not understand the vulnerability of their children to malaria. Mothers whose children had previously suffered from malaria had the lowest chance of having used a bed net.

From the group discussion most women would not explain the factors behind the high malaria vulnerability of children under five years. This further reflected on their low level of literacy. Children under five years of age have not yet developed protective level of immunity because they have had a limited exposure to malaria. In areas of high transmission, young children are both at high risk of malaria infection and vulnerable to severe malaria disease when infected (4).

Modern methods of vector control were mainly used in the study area unlike the traditional ones. Elsewhere (14), communities used both traditional and modern methods of vector control. The methods, which were used in the study area, included mosquito nets, mosquito repellents such as coils, sprays, and others employed environmental management methods such as collecting tins, clearing bushes around the house, and draining

stagnant waters. Use of modern methods of vector control might not be the only indication of the community's willingness to change their social norms but also being ready to use more effective methods of vector control like use of ITNs. However, there might be a negative influence of traditional means of repelling the vectors on modern ones (15).

Most women who did not use anything to protect themselves and their children from nuisance mosquito bites were willing to have mosquito bed nets/ITNs but were crippled with lack of money. Mothers who used other methods for protection other than mosquito nets felt that those methods were cheaper and easy to apply which made it difficult for them to purchase bed nets/ITNs. On the other hand those who used sprays and coils confessed that their effect was for a while, as the mosquitoes would come back upon disappearance of the smell from the room. This further suggested that the mothers were willing to adopt any new control strategies, which would be more effective, for example use of ITNs (Table 7).

The amount of money used to buy the smallest tin of spray in the area and which would be used for a whole month was more than half of the cost of a mosquito net. Therefore buying it twice in a month meant spending more money than acquiring a mosquito net, which would be used many months. Insecticide treated nets are low-cost and highly effective way of reducing the incidence of malaria in people who sleep under them (16). The study showed that mosquito repellent users were not consistent in the application of spray and coils. Upon the repellent getting finished, they forgot to buy another and until they heard of several mosquitoes making noise in the house and which depended on whether there was money immediately or not.

In conclusion maternal knowledge on malaria and vector management strategies was very important in controlling malaria. A lot of health information, education and communication campaigns should be conducted in the area to remove the misconceptions and beliefs on malaria and create demand for advocated control strategies such as ITNs, repellents, clothes, etc. Standard/uniform prices and subsidies for malaria control strategies should be set and the consumers informed of those prices and their rights through radio, press campaigns, promotion, TBAs, MCH clinics among others.

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