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Original Research Article

Knowledge and Practice of Vector Control against Malaria by Mothers of Children Aged 06 to 59 Months Hospitalized for Severe Malaria in the Pediatric Department of the Reference Health Center of Commune I of Bamako

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Abstract: ***Introduction*:** Severe malaria is a public health problem that causes a real socio-economic burden in developing countries. It is associated with high but avoidable mortality thanks to preventive and curative measures. ***Methodology*:** This is a descriptive and cross-sectional study with a prospective survey for the benefit of mothers of children aged 06 to 59 months hospitalized for serious malaria in the pediatric department of the Reference Health Center of Commune I of Bamako from October 2021 to September 2022. ***Results*:** In 12 months, 624 children were hospitalized, including 151 children aged 6 to 59 months suffering from severe malaria. The hospital frequency of severe malaria in this age group from 06 to 59 months was 24.2%. The average age of the mothers interviewed was 27.8 years with a range of 15 to 48 years. Mothers were educated in 84.1%, married in 98.7% and working as housewives in 81.5%. The reason for consulting children was fever (91.4%), anorexia (90.1%), prostration (79.5%). Mothers knew about impregnated mosquito nets and smoke coils as means of prevention against malaria at the same frequency of 99.3%, repellent creams 96.7%, and indoor spraying in 92.7%. In practice, they used smoke coils in 64.2%, repellent cream in 44.4% and mosquito nets impregnated with insecticide in 40.4%. Mothers attributed the cause of malaria to mosquito bites in 91.4%; They had readjusted the way sick children were fed by giving more food than usual (29.8%), splitting meals (21.8%) or using active feeding (14.6%). Most children had severe malaria, neurological form or anemic form at the same proportion of 37.1%. The assessment of the nutritional status of children revealed 18.5% acute malnutrition. The children had received conventional and traditional self-medication in 63.58 and 58.94% of cases respectively before admission. In children, a significant relationship was noted between severe anemic malaria and acute malnutrition (Fisher's exact test = 18.41; p = 0.01). ***Conclusion*:** Mothers of children hospitalized for severe malaria have good knowledge and insufficient practice of insecticide-treated mosquito nets as a means of prevention against malaria.

Keywords: Knowledge, Prevention, Severe malaria, Bamako.

INTRODUCTION

Malaria is the most common and deadliest febrile parasitic disease worldwide. It is said to be serious when it presents at least one of the following elements: altered consciousness, prostration, episodes of convulsions, respiratory distress, shock, severe anemia, significant bleeding, jaundice, hypoglycemia, acute kidney injury or acidosis [1]. The malaria vector is a mosquito of the genus Anopheles, the pathogen is a protozoan of the genus Plasmodium. Five species of Plasmodium have been described in humans, the most widespread, most resistant and most deadly of which is the species Plasmodium falciparum [2].

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Worldwide, in 2020, malaria morbidity was 241 million with an increase in mortality of 12% compared to 2019 reaching 627,000 deaths [3]. In 2021, Africa alone recorded 234 million cases of malaria, including 593,000 deaths. The WHO Africa region accounted for 95% of morbidity and 96% of mortality [4]. In Mali, the prevalence of malaria is 19% [5]. It constitutes the leading cause of consultation, hospitalization and mortality in health establishments [6]. In 2020, according to the statistical directory of the Local Health Information System (SLIS), 2,666,266 cases of malaria were recorded, including 843,961 serious cases and 1,708 deaths [7].

Vector control, as a very effective means against the transmission of malaria, constitutes the essential strategy for the elimination of this disease; from 2000 to 2020, protection of the population at risk increased from 5.8% in 2010 to 2.6% in 2020 [8]. How can we explain this under-protection of populations at risk? The study was initiated with mothers of children hospitalized for severe malaria in order to make a contribution to this question. The objectives of the study were to describe the knowledge and practice of mothers in vector control against malaria and to assess the nutritional status of children hospitalized for severe malaria in commune I of the District of Bamako.

MATERIAL AND METHODS

This was a descriptive and cross-sectional study with a prospective survey of mothers of children hospitalized for severe malaria. The study extended over the period from October 2021 to September 2022, it was carried out in pediatrics, at the Reference Health Center of commune I of Bamako. The Reference Health Center of commune I is a second-level public establishment in the health pyramid of Mali. Its main mission is to support the implementation of the national health policy. During data collection, all mothers of children aged 06 to 59 months hospitalized for severe malaria were interviewed; 151 mother-child pairs were thus included in the study. Mothers who did not consent to the study or were urgently referred to hospital were not included. The data were processed and analyzed using SPSS version 25 software and then entered into World 2019 software. All variables were subject to descriptive and sometimes analytical analysis using the KHI 2 test or Fischer's exact test. (for small numbers) to compare the proportions. The significance level retained was 0.05. Consent from the administration of the Reference Health Center of Commune I was obtained before the start of the study. The ethics and anonymity of the participants were preserved.

RESULTATS

The pediatric department hospitalized 624 children aged 0 to 14 years in 12 months, including 151 children aged 06 to 59 months for severe malaria, i.e. a hospital frequency of 24.2%. The assessment of the nutritional status of hospitalized children revealed 18.5% acute malnutrition.

Table I: Distribution of mothers and children according to sociodemographic profile

Sociodemographic profile	Frequency (n=151)	Percentage
Age of Mothers		
< 18 years old	3	2
18 to 35 years old	125	82.8
> 35 years old	23	15.2
Age of children		
6 to 11 months	14	9.3
12 to 24 months	52	34.4
> 24 months	85	56.3
Gender of children		
Male	88	58.3
Female	63	41.7
Level of education of mothers		
Unschooled	127	84.1
Fundamental	19	12.6
Secondary/tertiary	5	3.3
Marital status		
Bride	149	98.7
Not married	2	1.3
Profession of mothers		
Housewife	123	81.5
Saleswoman	16	10.6
Others*	12	7.9
Mothers' residence		
Commune I	114	75.5
Outside commune I	37	24.5

*= Seamstresses, Students, hairdressers, artists, housekeepers.

- The average age of the mothers interviewed was 27.8 years and the average age of the children was 34.3 months

-The majority of mother-child couples, i.e. 75.5%, resided in commune I of Bamako.

Table II: Distribution of mothers according to the reason for consulting the child

Reasons for consulting children	Frequency	Percentage
Fever	138	91.4
Anorexia	136	90.1
Vomiting	110	72.8
Abdominal pain	53	35.1
Chills	40	26.5
Prostration	120	79.5
Altered consciousness/drowsiness	101	66.9
Convulsion/agitation	97	64.2
Headache	38	25.2
Diarrhea	41	27.2
Nausea	31	20.5
Others*	89	58.9

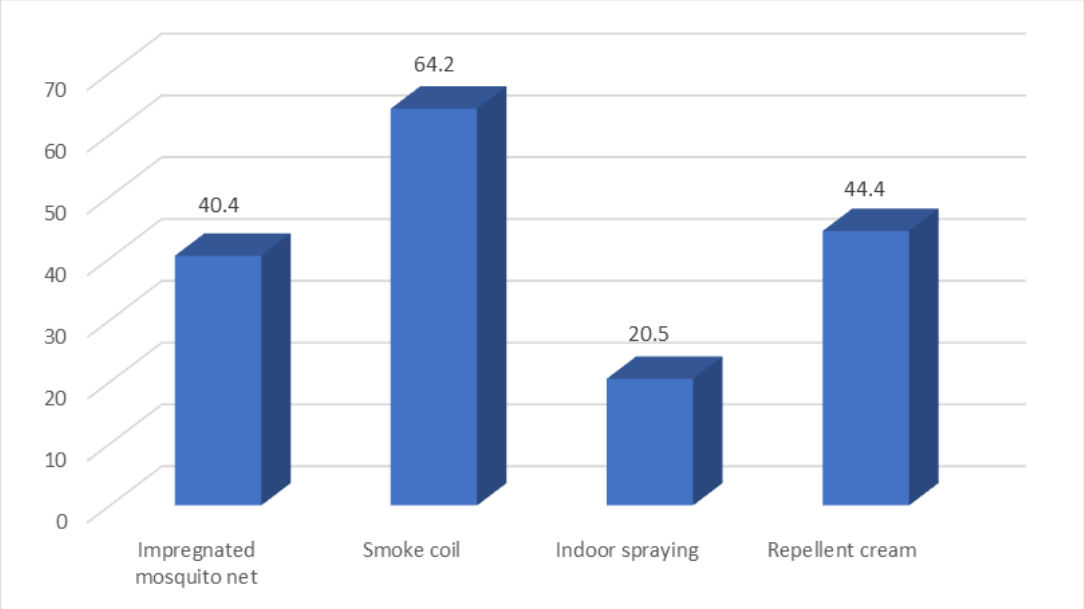
*= Constipation, Dark urine, Weight loss, plaintive cries, jaundice, pallor, whining, dizziness, asthenia

- Fever was the most frequent reason for consultation with 91.4%

Table III: Distribution of mothers according to the known anti vector means

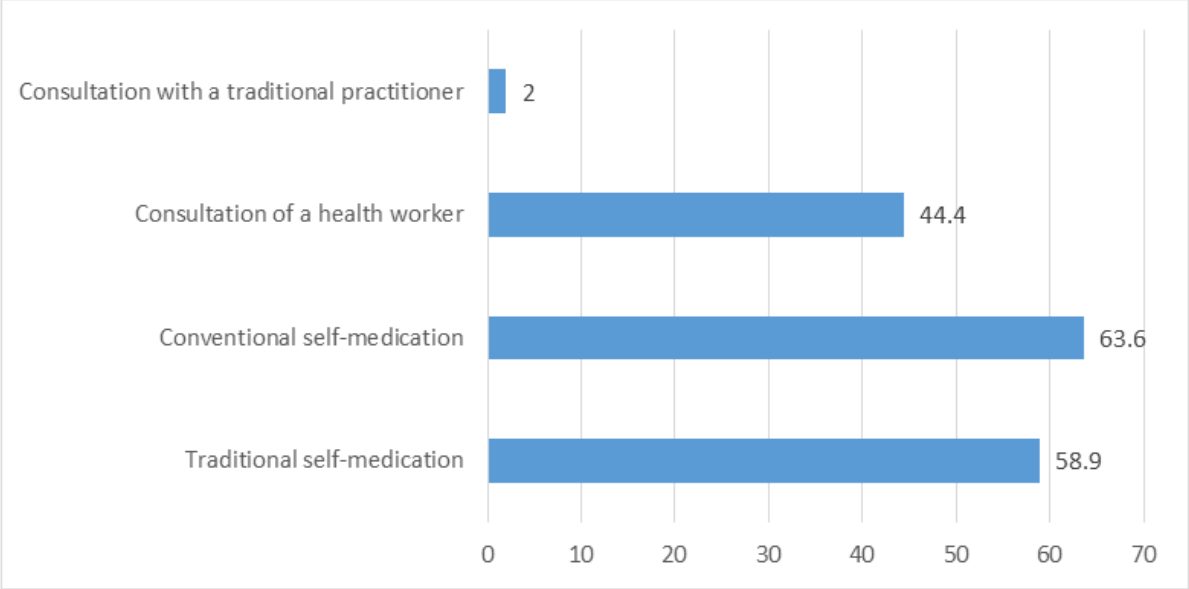
Anti vector means	Frequency (n = 151)	Percentage
Impregnated mosquito net	150	99.3
Smoke coil	150	99 .3
Indoor spraying	140	92.7
Mass spraying	64	42.4
Repellent cream	146	96.7

Mothers knew about the impregnated mosquito net and smoke coils as means of prevention against malaria in 99.34% of cases and repellent creams (96.7%).



Graph 1: Distribution of mothers according to vector control methods used

In practice, the majority of mothers used smoke coils in 64.2% of cases followed by repellent creams in 44.4% of cases.



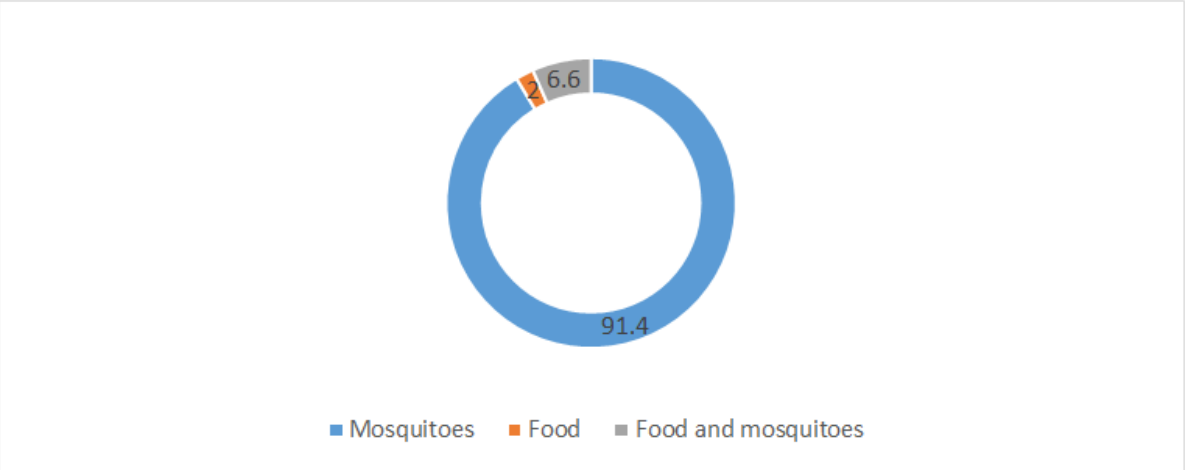
Graph 2: Distribution of mothers according to type of healthcare use before admission

The children had received conventional and traditional self-medication in 63.6 and 58.9% respectively before admission.

Table IV: Distribution of mothers according to the feeding method adopted for the sick child

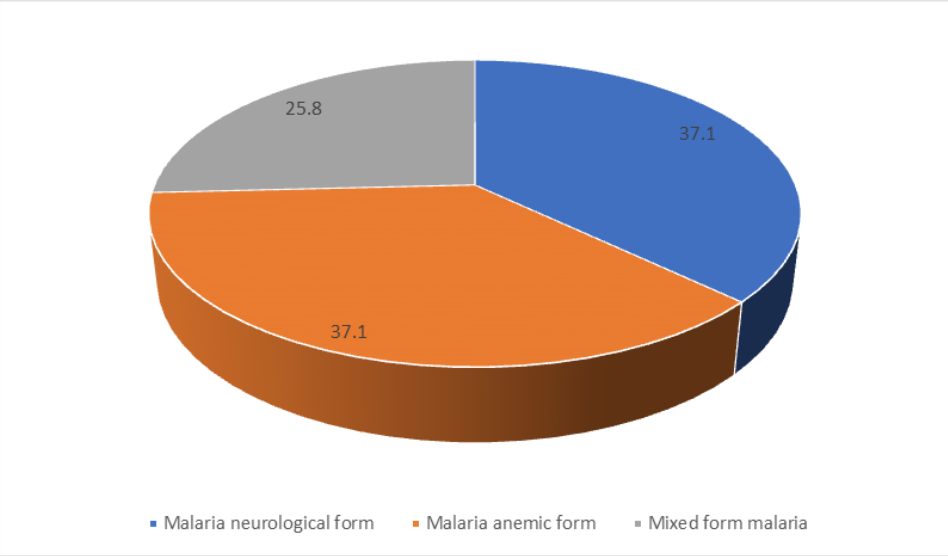
Feeding method adopted	Frequency	Percentage
Feed more than usual	45	29.8
Reduce the quantity of food	21	13.9
Divide the quantity of food	33	21.8
Force to eat	30	19.9
Encourages eating	22	14.6
Total	**151**	**100**

Mothers readjusted their sick child's feeding method by giving more food than usual in 29.8% of cases, or by splitting the quantities in 21.8% of cases.



Graph 3: Distribution of mothers according to knowledge of the malaria vector

Mothers clearly attributed malaria to mosquito bites in 91.4%.



Graph 4: Distribution of children according to type of severe malaria

The majority of children had severe malaria, neurological form or anemic form in 37.1% of cases.

Table V: Distribution of children according to nutritional status at admission

Nutritional status	**Frequency**	**Percentage**	
Good	123	81.5	81.5%
Moderate acute malnutrition	12	7.9	Global acute malnutrition 18.5%
Severe acute malnutrition	16	10.6	
Total	**151**	**100**	**100**

In 18.5%, children hospitalized for severe malaria had acute malnutrition.

Table VI: Relationship between the clinical form of severe malaria and malnutrition

Nutritional status	**Malaria neurological form**	**Malaria anemic form**	**Mixed form malaria**	**Total**
Good	54 (43.90%)	37(30.1%)	32(26%)	123(100%)
Moderate acute malnutrition	0	9(75%)	3(25%)	12(100%)
Severe acute malnutrition	2 (12.5%)	10(62.5)	4(25%)	16(100%)
Total	**56(37.1)**	**56 (37.1)**	**39(25.8)**	**151(100)**

Fisher's exact test =18.41; P=0.01)

DISCUSSION

Sociodemographic data of mothers of children hospitalized for severe malaria.

The majority of mothers of children hospitalized for severe malaria were aged 18 to 35 years in 82.8% of cases with an average age of 27.8 years; they were out of school in 84.1% of cases, married (98.7%) and housewives in 81.5% of cases. These results differ from those of SHEY N. D. *et al*., who reported in 2013 a rate of 48.91% of mothers aged 25 to 29, they were out of school and housewives in 3.26% and 9.78% respectively [19]. On the other hand, the results are comparable to those of other studies which reported 55.8% of mothers aged 25 to 34 years [18], with an average age of 26.79 years and 90.7% married [20], unschooled 90.6% [18], housewives in 89.8% and 94% [20, 18]. The results produced in Mali are comparable and differ from those of Senegal, this can be explained by the difference between schooling rates.

The mother-child pairs resided in the same municipality where the study was carried out in 75.5% of cases. This result is comparable to that of COULIBALY B. N. [21] who had 71.0% of children residing in the same municipality. On the other hand, DIARRA A. K. [22] noted that 65% of patients came from outside the municipality. This difference depends on the periods of study.

Sociodemographic data of children hospitalized for severe malaria.

The children were over 24 months old in 56.3% of cases with an average age of 34.3 months and a sex ratio of 1.4 in favor of boys. The same trend was reported in 2020 where 72.1% of children were aged 24 to 59 months with a sex ratio of 1.1 in favor of boys [18]. KEITA M *et al.*, DOLO H., TRAORE Y. and KAREMBE C. had respectively found a comparable sex ratio of 1.02; 1.03; 1.4 and 1.5 in favor of boys [10, 12,

9, 23]. This male predominance has no explanation. In 2010, GOÏTA A [24] reported a sex ratio of 1.2 in favor of girls. The vulnerable targets of malaria are the same regardless of the environment.

Epidemiological and clinical data from children hospitalized for severe malaria

The hospital frequency of severe malaria in the 06 to 59 month age group was 24.2%. TRAORE Y., in 2021[9] based on retrospective data from 2016 to 2020 found a hospital prevalence of severe malaria at 18.6% in children aged 0 to 14 years. KEITA M *et al.*, [10] in 2022 reported a 32.05% higher frequency of hospitalizations. The main reasons for consulting children were: fever (91.4%), anorexia (90.1%), prostration (79.5%), vomiting (72.8%), alteration of consciousness (66.9%). KEITA *et al*., [10] in their study in 2022, fever was the most frequent reason for consultation with 34.2% of cases.

Severe anemic malaria and cerebral malaria were the most common clinical forms of malaria with the same rate of 37.1%. Our results are comparable to those of Keita M *et al*., [10] who reported 42.7% anemic malaria and 34.2% cerebral malaria. The clinical form most represented in the studies [9, 11] was the severe anemic form of malaria in 21.5% and 42% of children under 5 years of age, respectively.

Among cases of severe malaria, 18.5% had the comorbidity of acute malnutrition and severe malaria. This prevalence of acute malnutrition is higher than that observed by DOLO H. in a 2014 study (12.4%) [12]; however, these two results are higher than those reported in the general population by the EDSM-VI in 2018 [13] and the SMART survey in 2022 [14] which were 9% and 10.2% respectively. In Moundou, Chad, among children suffering from malaria, the prevalence of malnutrition was comparable to that encountered in the general population [15].

The study found that children with severe anemic malaria were most affected by acute malnutrition (Fisher's exact test = 18.41; p = 0.01). Conversely, in the Democratic Republic of Congo, children with high nutritional indicators were associated with high prevalence of malaria [16]. DIARRA N. [17] reported in 2014 a significant relationship between marasmus and malaria (X2 = 8.910; P = 0.003). In Mali, in 2020, the prevalence of malaria did not vary significantly according to nutritional status, the rate of global acute malnutrition was 1.0% of children suffering from malaria compared to 2.1% of children without malaria [18].

Knowledge of vector control methods by mothers

Mothers attributed malaria to mosquito bites in 91.4%. A comparable result was reported by other authors who had respectively 94%, 94.8%; 84.6% and 79.35% of mothers who attributed the cause of malaria to mosquito bites [2, 24, 25, 19].

In addition to health aspects, the means of vector control best known to mothers were impregnated mosquito nets (99.34%), smoke coils (99.34%), repellent creams (96.7%), indoor spraying. (92.7) and mass spraying (42.4%). Other authors reported 86.6%; 64.2%; 33.69% of mothers know about impregnated mosquito nets as means of vector control [2, 25, 19]. This strong knowledge of impregnated mosquito nets among mothers can be explained by the strengthening of awareness around impregnated mosquito nets. In 2020, the anti-malaria program distributed 74% of the 272 million insecticide-treated mosquito nets [4]. These distributions undoubtedly constituted awareness-raising opportunities.

Mothers' practice in terms of vector control and care of sick children:

Before their admission to pediatrics, mothers used conventional and traditional self-medication in 63, 6 and 58.9% respectively, they had consulted a health worker in 44.4%. According to a study carried out in 2012 in Mali, medicinal plants represented 80% of self-medication [20]. In Douala, a study reports the use of self-medication in 18.47% and street medications in 22.82% [19]. The difference between these results can be explained by the difference between the study locations.

Concerning vector control against malaria, the majority of mothers used smoke coils in 64.2%, repellent creams 44.4% and impregnated mosquito nets in third position with 40.4% of cases. . These results differ from those of the EIPM [6] in 2015 and TRAORE A.C. [26] in 2014 which respectively reported 64% (the night preceding the survey) and 73.3% use of mosquito nets impregnated by population. In Douala, it was noted that 82.60% of mothers have a mosquito net in the household, but 66.30% of mothers use it [19]. This observation requires research into the factors behind the underuse of impregnated mosquito nets in order to improve the protection of mother-child couples against malaria.

Mothers readjusted their sick child's diet by giving him more food than usual in 29.8% of cases, by splitting the quantities in 21.8% and by encouraging the child to eat in 14.6%. %. These results are higher than the 11.1% of mothers who gave more breastfeeding to their children suffering from diarrhea [25].

CONCLUSION

Mothers of children hospitalized for severe malaria have good knowledge and insufficient use of insecticide-treated mosquito nets as a means of prevention against malaria. The proportion of malnourished children remains high in cases of severe malaria. Innovative awareness-raising strategies are necessary to obtain optimal adherence among mothers to the use of insecticide-treated mosquito nets against malaria and its medical and socio-economic consequences.

Conflict of Interest: This work does not suffer from any conflict of interest.

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