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Abstract

A study of sociocultural determinants of timely appropriate treatment seeking for children under 5 years-of-age suspected of having perceived malaria-related illness (PFMI) employed cultural epidemiological methods with EMIC interviews. EMIC interviews are instruments for assessing representations of illness or specified health problems from the perspective of affected persons, and their family. Caretakers of children with suspected malaria were interviewed about illness-related experiences, meanings, and behaviour in two endemic villages in southern Ghana. We found that only 11% of children suspected of having PFMI received timely appropriate treatment consistent with the Abuja target of treating malaria within 24 hours of illness onset, and 33% of the children received appropriate treatment within 48 hours. Reported perceived causes of *phlegm* predicted timely, appropriate treatment within 24 hours of illness onset ($p = 0.04$) in a multivariate logistic regression model and *playing on the ground* ($p < 0.01$) within 48 hours. Two categories of distress; *paleness or shortage of blood* ($p = 0.05$), and *sweating profusely* ($p = 0.03$) also predicted timely, appropriate treatment within 24 hours in a multivariate logistic regression model. Knowing that mosquitoes transmit malaria was not associated with timely, appropriate help-seeking for the children, even though such knowledge may promote personal protective measures, especially use of bednets. Patterns of distress and perceived causes were related to timely, appropriate help seeking, but not as expected. Effects on health-seeking of illness-related experience, and meaning are complex, and explaining their role may strengthen interventions for childhood malaria.

Key words: Malaria; timely, appropriate treatment; cultural epidemiology; patterns of distress; perceived causes; help-seeking behaviour, Ghana

Running Title: Determinants of treatment delay for malaria

Introduction

Malaria is a threat to more than 40% of the world's population and responsible for more than 300 million acute cases each year, resulting in over 1.2 million deaths in 2002 (WHO, 2004). About 90% of morbidity and mortality occurs in sub-Saharan Africa, and it has been well documented that children under five and pregnant women are at highest risk (WHO, 2000). Malaria is known to constitute 10% of the disease burden of sub-Sahara Africa and accounts for about 25% of all childhood mortality. It is also widely recognized that despite global, national and local initiatives, this situation is not improving quickly enough (Korenromp *et al*. 2003; WHO 2003; Sachs and Malaney 2002; Sachs 2002), and case rate may double over the next 20 years (Bremen 2001) Prompt recognition and effective treatment of malaria is a critical element of malaria control strategies (WHO 2000).

In Ghana, malaria is the most common cause of death in under-five children (MOH 1999). It is ranked first among the ten diseases most frequently seen in most health facilities in the country. According to official drug policy, the first line drug for treating uncomplicated malaria was changed in January, 2005 from chloroquine to amodiaquine in combination with artesunate. However, the ministry is yet to take delivery of these new drugs for distribution (Ghana Health Services 2004), and chloroquine has remained the first line of treatment of malaria in the whole country. Due to widespread poverty, however, many households depend on a combination of herbs and over-the-counter drugs usually consisting of inadequate doses of chloroquine and analgesics (Ahorlu *et al*.1997; Agyepong 1992). In Ghana, as in other parts of sub-Saharan Africa, where malaria is due mainly to *Plasmodium falciparum* and potentially fatal, early and effective treatment saves lives by preventing disease progression to severe malaria (WHO 2003). Dunyo *et al*. (2000) reported from southern Ghana that parasite density was 4 times higher in health centre cases of malaria compared to home diagnosis mainly because cases arrived at the health centre late (between 1-14 days of illness onset)

At the year 2000 meeting of African Heads of States in Abuja, Nigeria, it was declared that by the end of year 2005, at least 60% of those suffering from malaria should have easy access to appropriate, affordable treatment within 24 hours of the onset of symptoms (WHO 2000). Community-level interventions to strengthen home management of children with fever are being promoted in an effort to improve access to prompt treatment, particularly in isolated rural areas (Marsh *et al*. 1999; Marsh *et al*. 2004; WHO 2003). A number of studies have demonstrated that home treatment of malaria improves timely treatment (Sirima *et al*. 2003). Such programmes are not widely implemented in Ghana, especially in our study areas.

Helman (2000, p 219) points out that although surveillance of the community's health requires attention to health-related cultural beliefs and behaviours, it is difficult to quantify these cultural factors. Consequently, their study has been less attractive for epidemiological studies in the absence of frameworks for assessing relationships between specific cultural factors and particular disease outcomes.

Factors such as distance to the health facility, inadequate drug stocks, and lack of money to pay for services are the most commonly reported reasons for delayed use or failure to use public health facilities (Jowett & Miller 2000; Williams & Jones 2004). Although ethnographic data suggest the use of traditional healers may delay effective treatment, some studies indicate that is not so (de Savigny *et al*. 2004). Questions remain about the role of cultural determinants of health-seeking that delay or promote prompt use of appropriate health care services providing treatment. As suggested in the Africa Malaria Report (WHO 2003), one expects high fever to motivate most caretakers to seek treatment for life-threatening illness in young. Since help-seeking may be influenced by sociocultural factors, we studied sociocultural determinants of prompt or delayed treatment-seeking for childhood illness identified by caretakers or health care providers as malaria. Our research examined the distribution of prompt appropriate treatment in the study communities, and it analysed cultural epidemiological variables specifying illness-related experience and meaning that

explain delayed or prompt appropriate treatment seeking for malaria-related illness in children up to five years of age in rural communities in southern Ghana.

Study Area

The research was conducted from October 2002 to April 2004 in two malaria-endemic villages in Ghana: Galo-Sota in the Keta District and Obosomase in the Akuapim North District. Keta District is located in the coastal savannah vegetation zone in the Volta region, where about a third of the total surface area is covered with lakes and ponds. The district has a population of 137,751 (Government of Ghana national population census 2000). The Anlo people (98.8%) are the vast majority of people living in this district. The Anlo people are a part of closely related dialects forming the Ewe-speaking people of Ghana (Keta District Annual Report 2001). The Anlo people are patrilineal, and predominantly subsistence food crop farmers, but many also cultivate shallot, a tropical spice grown in commercial quantity. Some are also fishermen and petty traders.

Galo-Sota and its environs is a rural village with a population of about 6,000 to 7,000. There is a health post in the centre of the village, which is staffed by a midwife, two community health nurses and two auxiliary workers. Malaria is the most common health problem treated at the community health post in 2002. A tributary of the Volta River passes through the village and divides the village into two, Galo and Sota, which collectively constitute Galo-Sota.

The Akuapim North District in the eastern region of Ghana is situated in the forest zone. The district population is 113,915, according to the last census (National population census 2000). The Akuapim-Twi speaking people predominate, and are mainly food crop farmers and petty traders. Oil palm, a cash crop, is cultivated on a limited scale. The district is currently being prepared as a site for a malaria vaccine trial. A Centre for Scientific Research into Plant Medicine is located in the district (Akuapim North District Annual Report 2001).

Obosomase (population 7,000 to 8,000) is the rural study village in the Akuapim North District. It has a community clinic staffed by a midwife, a community health nurse and one auxiliary staff. As in Galo-Sota, malaria is the most common health problem treated at the community clinic in 2002.

Methods

Field data were collected from October 2002 to April 2004 in the two communities. An EMIC interview was developed locally to study the relationship between sociocultural factors and appropriate treatment seeking for children up to 5 years of age. EMIC interviews are instruments used for assessing representations of illness or specified health problems from the perspective of affected persons, their family or community members. The instrument blends qualitative and quantitative approaches to study illness-related experience, meaning and behaviour (Weiss 2001; 1997). The design of this semi-structured interview was informed by baseline ethnographic data which generated illness narratives indicating locally relevant perceived malaria-related illness (PFMI) categories of distress, perceived causes and help-seeking behaviours. We conducted 100 EMIC interviews in both communities with caretakers of children up to 5 years of age suspected of having PFMI.

Respondents were purposively selected based on either the respondent's own identification of the illness as malaria-related or a clinic or hospital diagnoses. Two inclusion criteria were required: (1) a child in the participant's care has been ill (symptomatic) with PFMI for at least 3 days, (2) the child in the participant's care has recovered and become symptom-free for PFMI within the last 7 days prior to the day of interview. A few children identified in the community with suspected PFMI for less than 3 days were referred to the clinic for free treatment, but not included in the study. None of the caretakers contacted refused to participate in the study. Interviews were conducted by the first author in the local languages, and data were recorded by a research assistant who has a degree in Sociology and was trained in qualitative and quantitative research methods. The EMIC instrument was

pre-tested to gain experience and refine it. The pretesting showed it was unnecessary to tape record the interviews. Interviews were conducted by an interviewer and a second person completed the data sheet, both coded items and narrative reports.

Data analysis

Data from the two communities were pooled for this analysis. Qualitative narrative data were entered into a word processor (Microsoft Word) and imported in a format that allows automatic coding by interview item in MAXqda, a programme for textual analysis. These data were analysed to clarify aspects of illness-related experience, meaning and behaviour. Variables of interest in the quantitative data-base were imported into MAXqda as selection variables. This enabled us to perform a phenomenological analysis of relevant coded segments from selected respondents to complement and clarify the meaning of categories that were analysed with quantitative methods.

Quantitative data were entered in Dos EpiInfo 6.04 and subsequently analysed with the windows updated version 3.3. We examined the frequencies of spontaneous and probed coded cultural epidemiological variables of perceived signs and symptoms (PS), perceived causes (PC), self-help at home (SH) and outside help-seeking (HS). We then computed prominence values for PC and PS variables for analysis of association with timely appropriate help seeking. To specify the relative prominence of each category of malaria-related illness experience, meaning and behaviour, spontaneous responses to open-ended questions were assigned a prominence of 2, a prominence of 1 if mentioned only after probing, and a prominence of 0 if not mentioned at all. The single most important PS and PC contributed an additional value of 3 to the prominence, yielding a total prominence for each category ranging from 0 to 5. Prominence was computed for HS and SH variables based solely on whether they were reported spontaneously or in response to probes as used for the current PFMI.

We analysed appropriate treatment, defined by consulting a trained provider (i.e., any person who received any form of a recognised training, formal or informal, on recognition or diagnosis, and management or treatment of illness, including village health workers). We analysed determinants of treatment within 24 and 48 hours, and after72 hours. The use of 24 hours was based on the target set by African Heads of States and Governments in the Abuja declaration (WHO 2000). Going by this definition of appropriate treatment, only two reported sources – community clinics and government hospitals, met the criteria and were labelled appropriate treatment in the analysis. We then computed the bivariate relationship between appropriate help seeking and cultural epidemiological explanatory variables denoting prominence of PS, PC, HS, and SH variables for these time frames. Variables for consideration in logistic models to identify determinants of appropriate treatment-seeking within selected time frames were identified by suggestive bivariate relationships ($p \leq .20$, Wilcoxon text).

Results

Data from the two communities were pooled for this report because analysis shows that, apart from the local terms and names used to describe the conditions, similar experience, meanings and behaviours were reported by the two ethnic groups. Various local names and terms were used to describe the febrile illness studied, as shown in Table 1. These names were used interchangeably to refer to conditions such as hot body, yellowish urine, yellowish eyes, vomiting, cold and shivering, bodily pains, weakness, refusal of food, easily startled, paleness, weight loss etc.

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Caretakers studied included 98 women (98.0%) and 2 men. The mean age (± sd) of respondents was 29.4 (± 7.9) years, ranging from 16 to 52 years, and the median age was 27 years. Respondents were made up of 50.0% Akuapim Twi speaking and 50.0% Anlo Ewe speaking people. A great majority of respondents were married (79.0%), and 8.0% had

never been married; 9.0% were separated or divorced and 4.0% were widowed. Most respondents had some education (77.0%), and the mean (± sd) years of education was 5.4 (± 4.0) years, ranging from 0 to 13 years; the median number of years was 6. Thus, 23.0% of respondents had no education. Household income was reported to be regular and dependable (16.0%), possibly regular and dependable (44.0%), uncertain (14.0%) and irregular or undependable (26.0%). Main occupation of respondents was petty trading. Most frequently reported occupations reported for spouses were fishing or farming, or professional activities such as masonry and carpentry.

At the time of interview, 56.0% of the children were symptomatic for 3 days or more, and the mean (± sd) days of illness was 5.5 (± 1.6); 44.0% had been asymptomatic for 7 days or less with the mean (± sd) of days 4.8 (± 1.7). The ages of the children ranged from 1 to 5 years (mean (± sd) of 2.1 (± 7.9). The sick children included 38.0% females and 62.0% males.

Overall, only 11.0% and 33.0% of the children received appropriate treatment within 24 and 48 hours respectively from the onset of symptoms of malaria-related illness, leaving 67% of the children either receiving appropriate treatment after 72 hour, or no treatment at all by the time of interview. Majority of the caretakers (67.0%) purchased drugs from various licensed and unlicensed sellers for their children, and out of this number, only 9.2% sought appropriate treatment within 24 hours, and 29.4% within 48 hours. Fifty-five percent, (33.0% reported spontaneously and 22.0% after probing), said they used tepid sponging, and among them, 51.5% (33.3% for spontaneously and 18.2% after probing), sought appropriate help within 48 hours. Other self-help actions included use of leftover antimalarials, other drugs, and herbal medications; these were reported only by a few caretakers, and they were unrelated to timely, appropriate treatment seeking. Eighty-nine percent of the caretakers either sought help from the *government hospital* or *community clinic*, among them only 16.9% and 44.9% went to these providers within 24 and 48 hours respectively. The

distribution of appropriate health seeking for children up to 5 years of age among caretakers reporting various categories of PS, and PC are presented in Tables 1 and 2.

{Insert Table 1 & 2 about here}

The Two most common causes of malaria-related illness reported spontaneously were *mosquito bites* (69.0%) and *heat from the sun* (58.0%). Most caretakers (69.0%) reported these categories of PC but did not bring children to treatment within 48 hours of illness onset. Illness narratives indicated that caretakers classified malaria caused by mosquitoes or heat as 'ordinary' malaria that could be dealt with at home, either with biomedicine bought from the shops or herbal preparations. The two most common causes reported after probing were *worm infections* (54.0%) and *houseflies* (52.0%). In this case, 33.3% and 42.3% received appropriate treatment within 48 hours of illness onset, slightly higher percentages than those who reported mosquitoes and heat, but not statistically significant. Narratives explained that worms and houseflies were associated with dirt or filth in the stomach, because houseflies contaminate foods before they are eaten. Malaria-related illness attributed to these causes was considered more serious than illness caused by mosquitoes or heat from the sun. It was also reported that dirt in the stomach could cause convulsions, which they considered very serious.

Categories of PS and PC with bivariate significant or suggestive relationship ($p \leq .20$) to appropriate help seeking within 24 and 48 hours, and after 72 hours (or none at all) were examined in logistic regression models to correct for confounding. The results of these analyses are presented in tables 3-5. Logistic regression models also considered SH and HS but none of these variables remained in the models. Furthermore, no PS variables remained in the models for appropriate treatment seeking within 48 and after 72 hours. PS prominence variables related to appropriate health seeking within 24 hours included *sweating* and *paleness/shortage of blood*. One respondent indicated the motivation for timely help-seeking: "It is the drastic rate at which my child is losing weight that is bothering me, and it is because he is not eating well and therefore is short of blood. You can even see how he is looking white and pale, as if there is no blood in his body."

The prominence of *phlegm* as a perceived cause showed a strong relationship to timely, appropriate help seeking for children under 5 years-of-age. The dynamics of the relationship were explained in the following representative qualitative account: “It is the difficulty in breathing due to choking from phlegm in the chest that is most troubling for me, because it could easily kill the child, or it leads to convulsions.” PC variables, *playing on the ground* and *Phlegm* were significantly associated with appropriate help seeking within 48 hours of onset of illness. The following are representative respondents’ comments: “Over here mosquitoes worry us a lot so it is a factor, but I think that my child has picked something from the ground and ate it when playing, which makes the condition more dangerous. What the child eats can also bring on this condition, so we must always be careful about food for children.”

{Insert Table 3-5 about here}

When PC and PS variables with indicative bivariate relationships to appropriate health seeking within 24 and 48 hours were put into a logistic regression model, two PC variables, *phlegm* and *cannot say*, and two PS variables, *sweating* and *yellowish urine*, had borderline relationships to timely, appropriate help seeking within 24 hours. However, two PC variables, *playing on the ground*, and phlegm were highly related to appropriate help seeking within 48 hours. PC variable, *playing on the ground* had related negatively to appropriate treatment seeking after 72 hours. Also, two PC variables, *phlegm* and *unripe fruit* had suggestive negative relationships to appropriate treatment seeking after 72 hours.

{Insert Table 6 & 7 about here}

Discussion

Other studies have shown that people may not seek early appropriate treatment for PFMI because of barriers imposed by poverty, such as inability to pay for both the direct and indirect cost of treatment, distance from treatment source, poor accessibility (including transportation problems), provider attitudes towards patients and inadequate drug stocks, (Jowett & Miller 2000; WHO 2003; Williams & Jones 2004). Our study however, shows that

factors relating to experience, meaning and behaviour, or what Helman (2000, p 219) called cultural factors, must also be considered among determinants of prompt appropriate and effective treatment of young children. A majority of the children studied did not receive timely appropriate treatment; as only 11% of the children met the Abuja target of receiving appropriate treatment within 24 hours (WHO 2000). This must be worrying indeed, as it demonstrates that in rural communities, represented by our study areas, the target of 60% of suspected malaria patients (children under five) receiving appropriate treatment within 24 hours of illness onset may not be met by the close of 2005. Even getting children into appropriate treatment within 48 hours was well below the target set in Abuja (WHO 2000).

Although home-based treatment is increasingly emphasised in Ghana as an effective tool for controlling malaria mortality, it remains more a policy consideration that has not yet been implemented in the study communities. As these changes are implemented, however, future studies should consider not only timely, appropriate outside help-seeking, but also home-based treatment as a desirable outcome for preventing childhood mortality from malaria.

Our study shows that sociocultural factors are not just a function of magico-religious beliefs or even lack of the understanding of the role of mosquitoes in the transmission of malaria. It is a more complex interaction between beliefs, experience, meaning and behaviours that requires more careful consideration of their influence on timely, appropriate treatment seeking for children. Findings presented in this report suggest that even when effective home treatment as a strategy for malaria control becomes widely available to the majority of the population, with community activities that impart skills and ability to use it, delay to initiate treatment may nevertheless affect prompt, appropriate and effective treatment. This is because delay in getting a child into treatment does not depend only on drug availability or money to buy them but also socio-cultural factors that influence a decision to seek treatment, is a “selective process” (Zola 1966). This selectiveness is influenced by sociocultural variables emanating from experience, meaning and behaviour associated with perceived malaria-related illness in children. Our study communities have

health posts centrally located, but the majority of the people did not go there for timely appropriate treatment, and this could not be blamed solely on poverty or inability to pay for drugs and services, or traditional beliefs about care, as other studies also suggest (De Savigny *et al*. 2004).

Our finding that the Abuja target is largely unmet compares with reports from other parts of sub-Saharan Africa, for instance, Nsungwa-Sabiiti *et al*. (2004) reported from Uganda that although, home-based management improves access, antimalarials are likely to be used for only those fevers where 'western' treatment is perceived appropriate implying continued delayed and under-treatment of potential malaria. Amin *et al*. (2003) reported from Kenya that only 2.3% of fevers were treated within 24 hours of onset with the nationally recommended first-line drug (SP) for the management of uncomplicated malaria and Holtz *et al*. (2003) reported from Malawi that 37.4% of recently febrile children received prompt, appropriate treatment. Marsh *et al*. (2004) reported from Kenya that (where drug retailers were trained to help administer treatment) 28% of fever cases received prompts treatment within 24 hours.

However, in Burkina Faso, 56% of fever cases received treatment promptly after training women opinion leaders in the use of pre-packaged antimalarials, chiefly chloroquine, and an antipyretic (Sirima *et al*. 2003). The question remains whether similar levels can be achieved in public health delivery programmes outside of study settings? To improve access to and use of prompt, appropriate treatment requires more careful attention to local experiences, meanings and behaviours for sustainable public health actions.

It was encouraging to find that mosquitoes were reported as a leading perceived cause (91% of all respondents), contrary to what earlier reports showed in other communities in southern Ghana (Ahorlu, *et al*. 1997; Agyepong 1992). Local endorsement of this cause may encourage acceptance of personal protective measures, such as insecticide treated nets in Ghana, where bednet usage has been very low, and used mainly to prevent nuisance mosquitoes (Adongo et al. 2005; Binka & Adongo 1997; Ahorlu *et al*. 1997). Knowledge that mosquitoes cause the illness, however, did not necessarily translate into

timely, appropriate treatment seeking, since only 11% of 91 children whose caretakers reported mosquitoes as a cause actually received such treatment within 24 hours.

These findings show that health promotional and educational efforts should not focus too narrowly on correcting wrong perceptions, ideas and practices in the local population. More direct attention is required to encourage caretakers to get children into timely treatment no matter what they perceive to be the cause of PFMI. Whether explained locally as caused by *mosquitoes*, *heat from the sun* or *phlegm* or *playing on the ground*, or something else, the message should focus on the potential of PFMI to progress into a life-threatening condition regardless of the cause. Our interest in PFMI experience, meaning and behaviour is not so much to change incorrect ideas, but rather to promote behaviours that contribute to children's health.

Our findings also show that although poverty and its related consequences are important barriers to timely, appropriate treatment, they are not the only barriers. Furthermore, the impact of cultural factors on timely appropriate health seeking cannot be dismissed as solely a result of ignorance. Patterns of distress and perceived causes were related to timely, appropriate help-seeking but not as expected. Effects on health-seeking of illness-related experience, and meaning are complex, and explaining their role may strengthen interventions for childhood malaria. Our findings show that perceived risk and vulnerability related to observed danger signs and symptoms determine treatment seeking much more than cognitive features of perception, terminology and classification or economic, geographical and access barriers and this depart from what was reported from Malawi where Nsungwa-Sabiiti *et al*. (2004) showed that fever classifications determined the type of treatment sought for childhood fevers.

Findings are generally applicable to the Twi and Ewe speaking populations of southern Ghana. However, beyond the various local names and terms used to describe febrile conditions and the emphasis on timely treatment covered in this report, findings are similar to what was reported in other studies from southern Ghana (Agyepong 1992; Ahorlu

19997). Findings reported here addressed some operational needs of the current malaria control programme at the local level and therefore should be interpreted with caution beyond the study localities, especially outside the ethnic groups studied.

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Ethical Review

This study was approved by the institutional review boards of Noguchi Memorial Institute for Medical Research and the Swiss Tropical Institute. It was also reviewed by WHO/TDR ethical review committee.

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Table 1. Local terms and their approximate English equivalents[1]

Obosomasi (Twi speaking)		Galo-Sota (Ewe speaking)	
Twi Terms	**Approximate English equivalents**	**Ewe Terms**	**Approximate English equivalents**
Atridii	Hot body, yellowish urine, yellowish eyes,	Asra	Hot body, yellowish urine, yellowish eyes,
Ebun	Vomiting, cold, and shivering, bodily pains,	Nudza	Vomiting, cold and shivering, bodily pains,
Feve	weakness, refusal of food, easily startled,	Fever	weakness, refusal of food, easily startled,
Malaria	paleness, weight loss, etc	Malaria	paleness, weight loss, etc

[1]Local terms and names for PFMI have no single equivalent in English, and were used interchangeably to represent similar conditions. “Malaria” and “fever” have also been incorporated in local usage as terms and names.

Table 2. Distribution of timely, appropriate health seeking among caretakers reporting various perceived signs and symptoms (PS)

	Total sample		Percentage of respondents reporting category In each treatment delay group[2]					
			≤24 hours		≤48 hours		≥ 72 hours	
Number:	**100**		**11**		**33**		**67**	
perceived signs and symptoms[1]	**Spont**	**Probe**	**Spont**	**Probe**	**Spont**	**Probe**	**Spont**	**Probe**
Breathlessness	3	12	33.3	0.0	66.7	41.7	33.3	58.3
Chills and rigors	10	6	10.0	0.0	20.0	33.3	80.0	66.7
Crying	32	12	18.8	0.0	46.9	25.0*	53.1	75.0*
Diarrhoea	16	13	18.8	7.7	37.5	23.1	62.5	76.9
Easily startled/frightened	16	20	18.8	5.0	37.5	20.0	62.5	80.0
Headache	8	2	12.5	0.0	37.5	50.0	62.5	50.0
Hot body	86	10	12.8	0.0	32.6	30.0	67.4	70.0
Joint and bodily pains	3	12	0.0	8.3	0.0	41.7	100.0	58.3
Lose of appetite/refusal of food	58	14	10.3	7.1	31.0	35.7	69.0	64.3
Paleness/shortage of blood	12	21	16.7	19.0*	50.0	33.3	50.0	66.7
Sleepiness	7	5	0.0	0.0	0.0	0.0	100.0	100.0
Sweating	9	24	44.4	8.3**	55.6	33.3	44.4	66.7
Vomiting	17	3	5.9	0.0	35.3	33.3	64.7	66.7
Weakness	37	15	8.1	26.7	29.7	46.7	70.3	53.3
Weight loss	20	33	5.0	15.2	20.0	42.4	80.0	57.6
Yellowish eyes	46	20	13.0	10.0	34.8	30.0	65.2	70.0
Yellowish urine	40	22	20.0	0.0*	32.5	31.8	67.5	68.2

[1]Listed in alphabetical order

[2]Percentage in treatment delay groups of the number from the total sample reporting each specified category. Level of significance with reference to the total sample, indicating variables included for testing in the logistic regression model; p-value based on computation of prominence (see methods section): *p<.20, **p<.05.

Table 3. Distribution of timely, appropriate health seeking among caretakers reporting various categories of perceived causes (PC)

	Total sample		Percentage of respondents reporting category In each treatment delay group[2]					
			≤24 hours		≤48 hours		≥ 72 hours	
Number:	**100**		**11**		**33**		**67**	
Perceived causes[1]	**Spont**	**Probe**	**Spont**	**Probe**	**Spont**	**Probe**	**Spont**	**Probe**
Airborne/exposure	11	6	9.1	0.0	27.3	33.3	72.7	66.7
Cannot say/don't know	4	1	50.0	0.0**	50.0	0.0	50.0	100.0
Evil eyes or sorcery/charm	2	23	0.0	13.0	0.0	47.8	100.0	52.2
Fatty/oily food	18	46	16.7	8.7	27.8	37.0	72.2	63.0
Heat from the sun or fire	58	15	8.6	6.7	31.0	26.7	69.0	73.3
Hereditary	5	40	0.0	12.5	0.0	35.0	100.0	65.0
Houseflies	19	52	5.3	13.5	26.3	42.3	73.7	57.7
Impure water	12	4	16.7	0.0	58.3	0.0	41.7	100.0
Mosquitoes	69	22	11.6	9.1	30.4	40.9	69.6	59.1
Others	6	0	0.0	0.0	33.3	0.0	66.7	0.0
Part of God's creation	0	5	0.0	0.0	0.0	60.0	0.0	40.0
Personal hygiene/not clean	18	12	11.1	16.7	33.3	50.0	66.7	50.0
Phlegm	3	14	33.3	28.6**	66.7	64.3**	33.3	35.7**
Physical exertion/hard work	22	3	4.5	0.0	22.7	33.3	77.3	66.7
Playing on the ground	18	9	16.7	22.2*	61.1	55.6**	38.9	44.4**
Sanitation/dirty environment	13	14	15.4	21.5*	46.2	50.0*	53.8	50.0*
Spirits (witches, ancestral etc)	3	34	0.0	17.6	0.0	38.2	100.0	61.8
Unripe/premature fruits	5	29	0.0	13.8	60.0	44.8**	40.0	55.2**
Worm infections	9	54	33.3	7.4	55.6	33.3*	44.4	66.7*

[1]Listed in alphabetical order

[2]Percentage in treatment delay groups of the number from the total sample reporting each specified category. Level of significance with reference to the total sample, indicating variables included for testing in the logistic regression model; p-value based on computation of prominence (see methods section): *p<.20, **p<.05.

Table 4. Logistic Regression analysis of perceived signs and symptoms (PS) as determinants of timely, appropriate help-seeking within 24 hours

Perceived signs and symptoms[1]	**Odds Ratio**	**95%**	**C.I.**	**P-Value**
Paleness/shortage of blood	1.98	1.00	3.94	0.05**
Sweating	2.57	1.11	5.94	0.03**
Yellowish urine	1.60	0.79	3.21	0.19

[1]Listed in alphabetical order**.**
**p ≤ .05.

Table 5. Logistic Regression analysis of categories of perceived causes (PC) as determinants of timely, appropriate help-seeking within 24 and 48 hours

Perceived causes[1]	Within 24 hours				Within 48 hours			
	Odds Ratio	95%	C.I.	P-Value	Odds Ratio	95%	C.I.	P-Value
Cannot say	1.97	0.87	4.47	0.11	1.13	0.48	2.64	0.79
Dirty environment	1.18	0.61	2.29	0.63	1.10	0.63	1.91	0.74
Phlegm	3.17	1.07	9.33	0.04**	3.07	1.03	9.15	0.04**
Playing on the ground	1.21	0.74	1.96	0.45	2.10	1.29	3.44	<.01**
Unripe fruit					1.99	0.88	4.51	0.11
Worm infestations					0.86	0.53	1.38	0.53

[1]Listed in alphabetical order.
**p < .05.

Table 6. Logistic Regression analysis of categories of perceived causes (PC) as determinants of appropriate help-seeking after 72 hours

Perceived causes (PC) [1]	**Odds Ratio**	**95%**	**C.I.**	**P-Value**
Cannot say	0.89	0.38	2.08	0.79
Dirty environment	0.91	0.52	1.58	0.74
Phlegm	0.33	0.11	0.97	0.04**
Playing on the ground	0.47	0.29	0.77	<.01**
Unripe fruit	0.51	0.23	1.16	0.11
Worm infection)	1.17	0.72	1.89	0.53

[1]Listed in alphabetical order
**p ≤ .05.

Table 7. Logistic Regression analysis of perceived signs and symptoms (PS) and perceived causes (PC) as determinants of timely, appropriate help-seeking within 24 and 48 hours

Perceived signs and symptoms (PS) & perceived causes (PC)[1]	Within 24 hours				Within 48 hours			
	Odds Ratio	95%	C.I.	P-Value	Odds Ratio	95%	C.I.	P-Value
Cannot say (PC)	2.60	0.92	7.35	0.07*	1.05	0.43	2.55	0.91
Crying (PS)					1.06	0.67	1.69	0.80
Dirty environment (PC)	1.61	0.75	3.43	0.22	1.17	0.63	2.19	0.62
Paleness/shortage of blood (PS)	2.12	0.83	5.44	0.12				
Phlegm (PC)	3.14	0.83	11.90	0.09*	3.83	1.02	14.40	0.05**
Playing on the ground (PC)	1.13	0.66	1.93	0.65	2.53	1.35	4.72	<.01**
Sweating (PS)	2.17	0.85	5.52	0.10*				
Unripe fruit (PC)					1.92	0.77	4.78	0.16
Worm Infestation (PC)					0.75	0.44	1.27	0.28
Yellowish urine (PS)	2.12	0.96	4.70	0.06*				

[1]Listed in alphabetical order
*p ≤ .10.
**p ≤ .05.

Table 8. Logistic Regression analysis of perceived signs and symptoms (PS) and perceived causes (PC) as determinants of appropriate help-seeking after 72 hours

Perceived signs and symptoms (PS) & perceived causes (PC)[1]	**Odds Ratio**	**95% C.I.**		**P-Value**
Cannot say (PC)	0.87	0.38	2.03	0.75
Crying (PS)	0.87	0.56	1.35	0.53
Dirty environment (PC)	0.95	0.54	1.67	0.85
Phlegm (PC)	0.34	0.11	1.04	0.06*
Playing on the ground (PC)	0.47	0.29	0.77	<.01**
Unripe fruit (PC)	0.51	0.22	1.14	0.10*
Worm infection (PC)	1.16	0.72	1.87	0.55

[1]Listed in alphabetical order
*p ≤ .10.
**p ≤ .05.