

Preventing malaria in pregnancy: a study of perceptions and policy implications in Mukono district, Uganda

ANTHONY K MBONYE,¹ STELLA NEEMA² AND PASCAL MAGNUSSEN³

¹Reproductive Health Division, Department of Community Health, Ministry of Health, Kampala, Uganda,

²Makerere University, Institute of Social Research, Kampala, Uganda and ³Danish Bilharziasis Laboratory, Charlottenlund, Denmark

Although the efficacy of insecticide-treated nets (ITNs) in malaria prevention is well documented, the low coverage of ITNs in malaria endemic countries necessitates investigation on factors that limit access to this intervention. An exploratory study was conducted in Mukono district, Uganda, to assess perceptions and use of ITNs. Results show that malaria is perceived as a serious illness among pregnant women and children, and there is high awareness on the benefits of ITNs. However, ITNs are used by few people, mainly because of their high cost and the perception that the chemicals used to treat them have dangerous effects on pregnancy and the foetus. Other factors that influence the use of ITNs include low utilization of antenatal care, husband's lack of interest in malaria prevention and the perception that adolescent girls and primigravidae are at a low risk of getting malaria. The policy implications of these findings include demystifying the negative perceptions on the chemicals used to treat nets and subsidizing the cost of ITNs in order to increase access to them. These findings provide important lessons for malaria control programmes that aim at increasing access to ITNs by pregnant women in developing countries.

Key words: malaria in pregnancy, perceptions, insecticide-treated nets, Uganda

Introduction

In most countries of sub-Saharan Africa, malaria is highly endemic and due to repeated exposure to malaria infection, people develop a certain degree of immunity to it during the first decade of life (Brabin 1983; McGregor et al. 1983). Despite this immunity, pregnant women, especially primigravidae, have a higher susceptibility to *Plasmodium falciparum* infection, manifested by a higher prevalence and intensity of parasitaemia (McGregor et al. 1983; Steketee 1989).

The serious consequences of malaria in pregnancy are attributed to the sequestration of malaria parasites in the placenta, leading to impeded trans-placental nutrient transport. This, combined with malaria-induced anaemia, compromises foetal growth and results in low birth weight and a subsequent increase in infant and childhood mortality (McCorwick 1985; Bloland et al. 1996; Slutsker et al. 1996; Steketee et al. 1996). As much as 50% of low birth weight (LBW) among primigravidae has been attributed to malaria in some malaria endemic areas (Brabin 1991).

A number of studies have found that insecticide-treated nets (ITNs) provide varying degrees of protection against malaria morbidity, anaemia and LBW (Heggenhougen et al. 2003). In a trial of untreated bed nets in The Gambia, nets were found to reduce the number of infective bites but not enough to reduce morbidity from malaria

(Snow et al. 1988). Following this study, however, it was shown that irrespective of ethnic group, area, habitat and distance from the River Gambia, malaria prevalence decreased with use of ITNs (Aikins et al. 1993; Thomson et al. 1996). The main reason for this was that mosquitoes were not only kept away from the sleeping people, but would die when they came in contact with the insecticide. In subsequent studies, it was demonstrated further that use of ITNs in pregnancy reduces maternal parasitaemia, anaemia and premature deliveries, increases mean birth weight and subsequently reduces neonatal and infant mortality (Dolan et al. 1993; D'Alessandro et al. 1995).

ITNs have a mean protective efficacy against malaria episodes of approximately 50% in highly endemic areas of Africa (Lengeler and Snow 1996); and have also been found to reduce overall mortality among children by 63% in villages using impregnated nets (Alonso et al. 1993). A recent review has similarly shown that ITNs are highly effective in reducing morbidity and mortality from malaria (Lengeler 2004). Bed nets given to pregnant women have been found to be protective to women and their children against malaria in both high and low malaria transmission areas of Kenya (Guyatt and Ochola 2003), and now WHO recommends that in malaria endemic areas, all pregnant women should receive malaria chemoprophylaxis and sleep under ITNs (WHO 1993). Further to this recommendation, in the year 2000 African countries initiated the Roll Back Malaria Strategy to control malaria on the

continent. This recommended increased access to chemoprophylaxis and use of ITNs by pregnant women and children (RBM 2000).

Following the above recommendations, Uganda's policy on prevention of malaria in pregnancy recommends two doses of sulfadoxine-pyrimethamine (SP) as intermittent preventive treatment (IPT) in the second and third trimester of pregnancy for women of all parities. The policy also advocates that pregnant women should use ITNs.

A recent review on community acceptance of bed nets has shown that various factors influence the use of bed nets, including cultural, behavioural and demographic factors, ethnicity, accessibility, gender relations and seasonality of malaria (Heggenhougen et al. 2003). Several authors have concluded that although ITNs are effective, local perceptions, acceptance and use of ITNs, as well as use of other mosquito methods, are invaluable in malaria control programmes (Thomson et al. 1996; Binka and Adongo 1997; Winch et al. 1997). It is also known that even if ITNs are purchased and used correctly, they must be retreated quite often and therefore the insecticide must be recognized and accepted. Further to this, the local acceptance of the insecticide may be influenced by its toxicity, the local terms used to translate the chemical and the meaning attached to these terms (Winch et al. 1997).

Current use of malaria preventive measures during pregnancy in Uganda is low, with only 34% of women using regular chemoprophylaxis during pregnancy, while 13% of households own a mosquito net (Uganda Bureau of Statistics 2001).

The aim of this study was to explore perceptions, beliefs and practices associated with malaria prevention in pregnancy. Specifically the study examined perceptions on ITNs and mosquito repellents, how adolescents access malaria prevention interventions and the factors that influence access to and use of existing malaria prevention measures. This paper presents the results of the first phase of a larger study that is testing new community approaches for distributing IPT with SP to pregnant women in a rural setting.

Perceptions on the use of ITNs and other malaria preventive interventions have been conceptualized based on the Health Belief Model developed by Becker (1974). In this model, two main factors influence the likelihood that a person will adopt a recommended preventive action. First, a person must feel susceptible and threatened by the disease, with perceived serious consequences. Secondly, the person must believe that the benefits of practicing prevention outweigh the perceived barriers to the preventive action. Therefore, four constructs can be derived from this model: perceived susceptibility, perceived severity, perceived benefits and perceived barriers. The selection of this model to analyze the treatment-seeking pattern for malaria in pregnancy is based on its previous use to predict a number of health-related behaviours like engaging in exercise (Langie 1977),

child vaccination (Bennett and Smith 1992) and compliance with recommended medical regimens (Bradley and Kegeles 1987). In addition, the model constructs have been found to have a high correlation with health-related behaviours (Janz and Becker 1984).

Methods

The study was conducted in Mukono district in central Uganda. The district is one of the largest in the country with an estimated population size of 1 128 500. It has a population density of 179 people per km², and 88% of the population is rural. It has a high fertility rate of 7.2 births per woman and an annual population growth rate of 2.3%. The majority of the population are peasants who depend on subsistence agriculture for food and as a source of income. People living on the lake shores engage mainly in fishing activities. The district is inhabited mainly by Baganda people, the largest tribe in Uganda. Other smaller tribes include Basoga, Badama, Bagisu, Basomya, Banyarwanda, Jaluos, Lugbar and Balulu (Uganda Bureau of Statistics 2000).

This district was selected for the study because the area is hyper- to holo-endemic for malaria, with a high recorded morbidity due to malaria. Because of this high malaria transmission, the district has been selected to test an intervention of new community approaches for distributing malaria prevention interventions. Data collection took place over a period of 3 months from November 2002 to January 2003, after the rainy season, when the population was experiencing intense malaria transmission.

Data were collected using qualitative methods including focus group discussions (FGD) and key informant interviews (KII). The following thematic areas were explored: perceptions on susceptibility and seriousness of malaria in pregnancy; perceptions on use of ITNs and other malaria preventive interventions; and perceived barriers related to the use of malaria preventive interventions.

Study participants from different target population groups were selected from five sub-counties of the district taking into consideration their age, education, socio-economic and marital status. This approach enabled data collection from a range of people in order to get the broad picture necessary for a review of the policy for malaria prevention in pregnancy. FGDs were held separately with pregnant women aged 20–49 years, non-pregnant women aged 20–49 years, adolescent girls (both those out of school and those in school) aged 10–19 years and men aged 20–50 years. All participants spoke the local dialect fluently. A total of 10 FGDs were conducted, with a total of 90 participants: 15 adolescents aged 10–19 years, 36 young women aged 20–29 years and 39 men aged 20–50 years. Sixty-three participants had attained some primary education while 27 had secondary education and above. Sixty-eight were married and engaged in peasant agriculture and petty trade. In addition to the FGDs, 40 KIIs were conducted targeting

opinion leaders, local council officials, elderly midwives, retired women teachers, drug shop owners, traditional birth attendants, pregnant and non-pregnant women.

Tape-recorded FGDs were transcribed in Luganda and later translated into English by two research assistants. To avoid loss of data, during analysis frequent comparisons were made between the transcripts in Luganda and the English version, and relevant sections of tapes listened to in order to get appropriate quotes. Data were initially coded separately for the Luganda and the English versions of the transcripts and thematic areas obtained. Manual analysis of the data was done. Similarities and differences among the different data sets were identified and noted.

Results

Perceptions on susceptibility and seriousness of malaria in pregnancy

Malaria in this community is known locally as *omusujja gw'ensiri* (fever caused by mosquitoes) and is perceived as the leading cause of ill health among children and pregnant women. The main reason given by participants as to why pregnant women and children are vulnerable to malaria was that their bodies are weak, a reference to low immunity against disease. In this community, adolescents, primigravidae and men were not perceived to be at risk of malaria.

The study explored health-seeking behaviour among adolescents as an important group to target for malaria prevention. All participants in the 10 FGDs and all the key informants interviewed considered adolescents and primigravidae as people at no special risk from malaria. Over three-quarters of participants in all the FGDs, including those with adolescents themselves, perceived pregnant adolescents as a group least likely to use health services like antenatal care; and it was also reported that non-pregnant adolescents were a group least likely to use existing health services. This is because the main response to pregnancy among adolescents is to try to have an abortion, by whatever means. Generally, adolescents do not want their parents to know that they are pregnant. They also fear being dismissed from schools when it becomes known that they are pregnant. This fear drives them underground and limits their access to treatment and preventive services. The expressions below illustrated this fear:

“Pregnancy in adolescents brings conflict between parents and the girl, parents mistreat girls who get pregnant, and the girl may feel bad and resort to abortion. I may consult my parents to give me help and if they chase me to go to the man responsible for the pregnancy, who may be poor, I may decide to go and consult. I know how to abort; I know some herbs which can cause abortion. To abort I can go to a drug shop or a clinic and I buy some pills.” (16-year-old adolescent at Buikwe)

“When you do not attend antenatal care at health units and you go to deliver at health units, midwives cannot deliver you.” (20-year-old pregnant woman at Najjembe)

Our analysis indicates that pregnant adolescents realize the importance of seeking preventive care for malaria compared with non-pregnant adolescents. However, although there are several constraints that limit access to services, like stigma against adolescent pregnancy and the negative attitude of health workers.

In further discussions with adolescents, it was revealed that the common source of information for adolescents is their peers. Through information sharing, adolescents were aware of the dangers of getting pregnant, and they also knew that young people are not yet prepared to carry the stress of pregnancy. However, they did not know the danger malaria poses to pregnant adolescents and how to prevent it.

Perceived benefits and barriers related to use of ITNs

In all the FGDs and the KIIs conducted, participants and key informants knew that mosquito nets were a useful preventive measure against malaria, and that pregnant women and children were supposed to sleep under nets since they are the most vulnerable groups. However, the availability and use of the nets in this community was found to be very low. Over three-quarters of participants in all the FGDs and KIIs reported that very few people in the community use mosquito nets; for example:

“For us here we do not use mosquito nets... I also do not have one.” (17-year-old adolescent at Buikwe)

Furthermore, the following statement illustrates the perceptions on the availability of mosquito nets in this community:

“For me I have lived in this area for long, I have never known any one using a mosquito net.” (24-year-old woman at Kimenyedde)

The factors associated with low use of ITNs were explored by asking participants and key informants what constraints exist in this community to the prevention of malaria with ITNs. In all the 10 FGDs and the KIIs conducted, it was emphasized that the cost of ITNs followed by their non-availability were constraints to their use. Similarly, over half of participants in all the 10 FGDs thought that the chemicals used to treat the nets were very harmful to adults, children and pregnant women. This fear was confirmed by key informants who said this was a widely held perception in the community. People in this community had heard from the radio that bed nets are treated with chemicals which kill mosquitoes. In all the FGDs conducted, the name and type of the chemical was not known, neither did it have any local terminology. The difference between treated and non-treated nets was also not known. People believed that all nets were treated

with a chemical. Over half of the participants in all FGDs seemed to believe that ITNs are treated with chemicals which affect pregnant women, especially their breathing, and that if the chemicals can kill mosquitoes instantly, they can also kill people. We explored whether this perception of the chemicals was different among users and non-users of ITNs. We found this perception was held mainly by non-users, although users also believed it in addition to reporting the feeling of excessive heat and suffocation at night due to use of ITNs.

The quote below summarizes the fear in this community of chemicals used to treat nets:

“We fear we may die because these chemicals are poisonous.” (35-year-old woman at Kimenyedde)

Another constraint mentioned by over three-quarters of women participants in all FGDs was uncaring husbands. Men were expected to care for their spouses in all aspects, including helping them to seek treatment and prevention for malaria, such as paying for ITNs. In this regard, the expressions below show men's perceptions on their vulnerability to malaria and how this may influence their attitude towards malaria treatment and prevention:

“We leave them [nets] to women and children because, as we told you, men are resistant, we have strong blood.” (35-year-old man at Ngogwe)

“Mosquito nets are not a priority to people in this area, people (mainly the men) would rather use the money to buy nets to drink local brew.” (32-year-old non-pregnant woman at Kimenyedde)

Despite the above expression from a male participant, over three-quarters of women in all FGDs complained that men did not care about the health of their wives and their children. Men were reported not to prioritize the issue of health, as the latter quote above shows. Women thought that men use their money on items like alcohol and forget about buying nutritious foods and providing health care to their families. Women participants at Kimenyedde sub-county said that they fear to buy mosquito nets because their husbands would question them about the source of the money. This is because women in this community are not expected to have money, or if they have money, the husbands feel obliged to know its source. More than half of women participants in all the FGDs expressed fear that if a woman bought a net, the husband would suspect that she got the money from another man.

In addition to the fear of the chemicals used to treat ITNs and the cost of purchasing them, the few respondents who used ITNs complained of too much heat and discomfort experienced while sleeping under the nets:

“For me I use it but I feel like suffocating. It brings a lot of heat.” (35-year-old woman at Kimenyedde, user of ITNs)

“Some pregnant women say that mosquito nets cause a lot of heat and discomfort, yet they want to relax at night but the nets limit them.” (17-year-old adolescent at Buikwe, non-user)

From the study findings, it was reported that very few households (less than a tenth) in this community use mosquito repellents. The study explored the perceptions related to their use, especially by pregnant women. The common household mosquito repellents were known by their trade (brand) names as *Doom*, *Coils* and *Mobil*. In all FGDs conducted, participants said that these repellents have a *bad smell* that makes pregnant women vomit. This belief was expressed by women who had been pregnant before and had experienced the bad smell. Over two-thirds of the female participants in all FGDS expressed fear that the chemicals in the mosquito repellents could be harmful to pregnant women's health and their foetuses, because the chemicals were believed to be poisonous and when pregnant women breathed them the foetus in the womb would die. On further exploration, it was found that this fear was not based on evidence of severe outcomes due to use of mosquito repellents. It was also noted that burning of mosquito coils causes difficulty in breathing. The experience was expressed by eight respondents in two of the 10 FGDS conducted. However, a majority of key informants (over two-thirds) did not express this fear, indicating a difference in awareness among respondents regarding this preventive measure.

Sources of information on prevention of malaria in pregnancy

The common source of information on malaria prevention in pregnancy is the radio, followed by health workers, newspapers, posters, meetings in local communities and peers, especially among adolescents. Television was mentioned by a few participants (less than a quarter) as a source of information in eight of the 10 FGDs.

Over three-quarters of participants in all FGDs mentioned that they trusted information from health workers because health workers are knowledgeable and can reach the people and provide face to face explanations. However, radio messages are also trusted because for many years the radio has been a source of official and authoritative information in Uganda with a wide coverage. Almost all participants (about nine out of 10) in all the FGDs and all the key informants had heard several messages on malaria treatment and prevention. The messages covered the benefits of sleeping under ITNs, and improving environmental hygiene to prevent breeding of mosquitoes. A few participants (less than a third in all FGDs conducted) had heard that Fansidar can be used as a preventive measure during pregnancy, and these were people who had previously used it.

Perceptions on other malaria preventive measures

In all FGDs and KIIs conducted, participants and key informants knew that there were various ways of

preventing malaria, like clearing bushes around homes, keeping good environmental hygiene, disposing of empty tins and broken pots, draining away stagnant water, pouring oils on water ponds, digging deep pit latrines, closing windows and doors early in the evening, and eating a proper diet to make the body stronger. Despite having this knowledge, the malaria prevention practices in this community were reported to be poor (see Table 1). For example, it was mentioned that most people do not close windows and doors early in the evening, they do not frequently clear bushes around their homes, and they make no effort to remove broken pots and stagnant water. The main reasons given by most of the participants (about seven out of 10) in the FGDs for not practicing preventive measures were laziness for environmental measures and economic constraints in the case of ITNs and mosquito repellents that have to be purchased. For example:

“We do not put a lot of emphasis on what we are told to do due to laziness.” (39-year-old non-pregnant woman participant at Kimenyedde)

Among other reasons given by participants for poor practices regarding malaria prevention and treatment were ignorance, lack of awareness and the high cost of accessing services at health units. In all the FGDs, more than three-quarters of participants said that they could not afford to buy ITNs or the cost of accessing services at health units. This was confirmed by all the key informants. But it was also noted by a few participants (about three out of 10) in three of the FGDs that some people simply do not bother to take care of their health:

“Some people here do not give life a priority; people, especially men, prefer to use the money for drinking alcohol than buying mosquito nets.” (32-year-old female respondent at Kimenyedde)

It was noted that poor malaria prevention practices by some people have a negative influence on others. Three male participants at one FGD at Mukono Trading Centre noted that they have neighbours who do not clear bushes or they plant maize gardens which are breeding places for mosquitoes. It was also thought that the government was supposed to protect the people from malaria by providing drugs in dispensaries and clean water, such as from boreholes which are not breeding places for mosquitoes.

From the discussions in all the FGDs, it was apparent that attendance of antenatal care in this community is poor, and this results in limited access to information on malaria prevention in pregnancy, such as the benefits of IPT and ITNs. In all the FGDs, participants said that the majority of women (approximately eight of every 10) go to health units at least once in order to get a maternity card, so if they have problems at the time of delivering, they can present the card as evidence that they attended antenatal care. It was further noted in most of the FGDs (eight out of 10) that many pregnant women (over half) deliver at home with help from traditional birth attendants

(TBAs) while few deliver at health units (Table 2). Over three-quarters of the participants in all FGDs (both male and female) gave the following reasons for pregnant women not delivering at health units: normally women deliver at home without problems, there is strong belief in the effectiveness of TBAs, and TBAs are accessible and understand women's problems. The majority of key informants (over three-quarters) noted that the poor quality of care at health units, the costs involved in seeking antenatal and delivery care, and ignorance of women were the main factors that prevent women from delivering at health units. The expression below summarizes the reason why women prefer delivering with the help of TBAs:

“We prefer to deliver at home or with TBAs because they know how delivering a child pains, so they care for you; but in hospitals, they abuse you.” (from the FGDs)

Other reasons why pregnant women do not use antenatal care services at health units included: lack of money to cover transport and the cost of drugs; fearing that health workers would abuse them either because of their poor attire, their strong beliefs in using herbs or their going to seek care at health units when it is late; lack of knowledge on the importance of good health during pregnancy; and fear of injection pain and of getting HIV through contaminated needles. Some participants (about three in 10) in four FGDs reported that they had had all their deliveries at home with no problem, and therefore they did not see the need for attending antenatal care and delivering at health units.

In this community, all participants in the 10 FGDs and all the key informants were aware that it is more important to use preventive measures against malaria than wait to fall sick and be incapacitated by the disease or face the burden of seeking treatment. The main determinant factor for this choice was the perceived low costs incurred in practicing preventive measures. Table 3 shows the enabling and disabling factors in relation to use of preventive measures. The reasons given for not taking treatment as a first option include fear of expired drugs and inappropriate doses prescribed by drug vendors.

Discussion

The results of this study show that people in this community are aware of the dangers of malaria and the various ways it can be prevented. They also know that malaria mostly affects pregnant women and children and that ITNs are beneficial in reducing the burden of malaria. However, there is low use of ITNs and other malaria preventive interventions in this community. This was partly attributed to the high costs of ITNs and negative perceptions on the chemicals used to treat them, especially among non-users, and to poor utilization of health services, particularly antenatal care and delivery care, leading to missed opportunities.

Table 1. Current practices regarding malaria prevention in pregnancy among women in Mukono district, Uganda

Ways of preventing malaria in pregnancy	Current practice	Reasons facilitating the practice	Reason prohibiting the practice
<i>Environmental hygiene practices</i>			
Improving environmental hygiene	Rarely done	Does not require money	Lack of awareness, ignorance; neighbours who do not clear the bushes on their land
Pouring oil on stagnant water	Very rarely done		Involves costs to purchase the oils; trenches, ponds being scattered make spreading the oil difficult
Disposing of empty tins and containers	Rarely done	Does not require money, reduces mosquito nuisance	Lack of awareness, ignorance
Draining stagnant water	Rarely done	Reduces mosquito nuisance	Quite cumbersome; requires much labour
<i>Household practices</i>			
Using mosquito repellents	Very rarely used	Easily available in shops	Costly; fear of dying due to chemicals; the smell makes some people vomit
Using coils	Rarely used	Easily available in shops	Harmful to health; causes chest congestion and they have a bad smell; costly
Bed nets	Rarely used	Useful to pregnant women; influence from the media	Cost; chemicals used to treat them are thought to be harmful; causes a lot of headaches
Smoking houses	Usually done	No costs incurred	Lack of awareness, ignorance; fear of the effect of smoke on health
Closing windows and doors	Usually done	No costs incurred; awareness/knowledge of its usefulness	Lack of awareness, ignorance
<i>Treatment-seeking practices</i>			
Self-treatment with chloroquine and Panadol	Commonly done	Less costly compared with treatment at health units; long distances to health units; rudeness of some health workers	
Going to health workers before self-treatment	Rarely done	Health workers have skills, equipment, laboratory; proper treatment available	Fear of complications; costly; long distances, long queues; expired drugs, lack of drugs; rudeness of health workers
Use of local herbs	Commonly done	Trust in local herbs; easily available; does not require money; cultural influence	

Table 2. Choice of place of delivery among pregnant women in Mukono district, Uganda

Place of delivery	Reasons facilitating choice of place	Reasons inhibiting choice of place
Home	Previous history of delivering at home without problems; no costs; placenta and umbilical cord disposed of properly	Very risky, especially in emergencies; use of herbs
Health units	Skilled personnel; provide information; can handle emergencies	Midwives are rough and rude; usually very far; costly especially for Caesarean section
Traditional birth attendants	Handle patients with care; less costly; easily accessible	Cannot handle emergencies like bleeding

Table 3. Choice between prevention and treatment for malaria in pregnancy among pregnant women in Mukono district, Uganda

Behavioural practice regarding malaria in pregnancy	Reasons for choice	Reasons mitigating behaviour practice
Taking prevention measures as a first option	It is less costly in terms of money and time The effect of the disease is far less if prevented Prevention makes treatment easier if you get malaria Makes malaria less severe	Poverty Ignorance Lack of concern Not making life the first priority Lack of awareness
Taking treatment as a first option	Mosquitoes are everywhere Inadequate awareness on benefits of prevention	Very expensive when malaria is severe and requires hospital admission Expired drugs Improper dosage
No action taken	Religious practices	Strength of belief in one's faith

Both pregnant and non-pregnant adolescents were perceived not to be at risk of malaria, and were found least likely to benefit from malaria prevention interventions due to the stigma surrounding adolescent pregnancy in this community. Similarly men were perceived to be at less risk of malaria and were found uncaring in malaria prevention. Our findings further show that there is a perception that men do not care for the health of their spouses and do not prioritize health issues. This is an area in which we recommend further investigation.

Few studies have documented perceptions regarding use of ITNs in malaria prevention. A study carried out in Mbarara district, Western Uganda, found that mosquitoes were perceived as a cause of malaria but at the same time use of bed nets was low (26%). People who did not use bed nets cited discomfort due to heat and humidity; and the high cost of ITNs as reasons for non-use (Nuwaha 2002). In Western Kenya, community reactions were assessed before the introduction of permethrin-treated bed nets. Although malaria was found to be an important disease, ITNs were believed to be only partially beneficial because of the perception that malaria had multiple causes, and further to this, fear was expressed that the chemicals used to treat ITNs were associated with use of family planning (Alaii et al. 2003a). After a randomized controlled trial of ITNs, mothers in the intervention villages were more knowledgeable on benefits of ITNs, resulting in good care of nets and re-treatment with insecticide (Alaii et al. 2003b).

The results of our study are not only consistent with the above findings but have highlighted that people perceive chemicals used in treating nets to be associated with poor pregnancy outcomes and to have an effect on children. In order to increase access to ITNs, this perception will have to be demystified through education on how the chemical used to treat nets works. We found negative perceptions on chemicals mainly among non-users. It would be of interest to find out about community discussion groups where users of malaria prevention interventions narrate their experiences, and assess how this motivates the non-users.

The findings of this study further show that the cost of ITNs and mosquito repellents is an important barrier for their use. This finding is also consistent with previous studies which have shown that the cost of ITN impregnation, regular re-impregnation and the availability of ITNs are determinant factors for use of ITNs in malaria prevention (Lengeler and Snow 1996; Kroeger et al. 2002). However, a study in The Gambia found that use of ITNs was correlated with ethnic group, age and polygamy, but not with education, income, occupation or ownership of items which indicate high social status (Aikins et al. 1993). This highlights the importance for malaria prevention of other factors like perceptions and beliefs on ITNs.

An important factor contributing to poor quality of care at health units has been identified by this study. This is poor communication skills among midwives and the way

they handle pregnant women who come to deliver at health units. It is possible that the low antenatal care attendance observed in this study is associated with the perceived poor quality of care at health units. One could argue that malaria preventive interventions currently delivered through health units are not accessible in this district and therefore there is no motivation to use them. An important finding is that most people in this community trust information given to them by health workers. There is therefore an opportunity for health promotion programmes to use this channel by providing refresher courses to health workers to update both their knowledge and their skills in communication and counselling on prevention of malaria in pregnancy.

Similarly, this study has documented that a large proportion of women are attended to at delivery by TBAs. This highlights an opportunity for identifying ways of involving TBAs and other community resources persons in increasing coverage of ITNs and other malaria prevention tools like IPT.

Our results have indicated that people fear there are expired drugs on the market and that drug vendors will give them improper dosages, especially for treatment of malaria. There is a need to explore further the perceptions on expired drugs, drug resistance and how these perceptions influence the use of SP for IPT among pregnant women.

Knowledge on perceptions of malaria in adolescents is a neglected area; yet the adolescent pregnancy rate in Uganda is high at 32% (Uganda Bureau of Statistics 2001). This study has documented a widespread perception that adolescents are not vulnerable to malaria. This might be partly explained by the stigma surrounding adolescent pregnancy. Similar findings were found in Nigeria where premarital pregnancy was resented, associated with shame and most parents hid their daughters. Thus the adolescents were more likely to resort to self-medication rather than using services at health units (Okonofua et al. 1992). The policy implications of these findings include the need to increase awareness about the dangers of malaria among adolescent primigravidae by focusing attention on adolescents themselves, their peers, parents, health workers and community resource persons. Ways of reaching pregnant adolescents earlier need to be identified.

Although most people in the study community knew ways of preventing malaria, the findings documented that this knowledge is not used in daily practice (see Table 1). The reason for this seems to be that people, including pregnant women, are not really concerned. Several explanations can be given for this behaviour. It is known that in highly malaria endemic areas, people get used to sickness, and with time, they adapt to the disease. It is therefore possible that malaria is not seen as life-threatening and deaths due to malaria may not be attributed to malaria itself but to other causes. It also possible that people get so used to poverty, sickness and death due to malaria and other

diseases that they no longer care about their fate. There is a need for more research to investigate why people who perceive a disease as a common cause of ill health do not take adequate preventive measures.

This study has been able to show that negative perceptions on ITNs are held by most people who have not used them and do not have first-hand experience. It would be interesting to try an intervention where users of ITNs narrate their experiences to non-users and test how this may influence the use of ITNs in the community. Similarly, it would be of interest to find out what questions people ask when they are purchasing ITNs. This will enable policymakers to design a health promotion package targeting people who go to ITN distribution points.

This study was, however, not able to show how the perceptions on ITNs and other malaria prevention interventions vary with the season of the year, since this could be related to the prevalence of malaria. We recommend this area for further research.

Using the Health Belief Model (Becker 1974) to analyze our data, several factors that influence the use of ITNs and other malaria prevention interventions have been identified. These include the high perception of the seriousness of malaria and its effect on pregnant women and children, the high perceived benefit of ITNs in protecting children and pregnant women against malaria, and the high awareness of the prevention of malaria as a better and cheaper option compared with treatment. Inhibitory factors include fear of the chemical that is used to treat nets, the high cost of ITNs and the high cost of accessing health services, uncaring husbands, unavailability of ITNs in communities and low quality of health services.

The policy implications of these findings include the need to develop to a health promotion package based on these factors, especially demystifying the negative perceptions on the chemicals used in treating nets (ITNs) in order to increase access to this intervention. The perceived high costs of ITNs should provide lessons to programmes that aim at increasing access to ITNs for pregnant women in malaria endemic countries. Adolescents as a group need to be specially targeted. Health workers and parents need to be involved in the health-seeking behaviour of adolescents. There is also a need to target men regarding the health-seeking behaviour of pregnant women, especially in use of ITNs and IPT.

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Biographies

Anthony K Mbonye, MBChB, MA, MPH, is Acting Assistant Commissioner of Health Services in the Reproductive Health Division, Department of Community Health, Ministry of Health, Kampala, Uganda.

Stella Neema, BA, MA, Ph.D., is a Senior Research Fellow at Makerere University Institute of Social Research, Kampala, Uganda.

Pascal Magnussen is a Senior Research Scientist at DBL-Institute for Health Research and Development, Charlottenlund, Denmark.

Correspondence: Pascal Magnussen, Senior Research Scientist, Danish Bilharziasis Laboratory, Jaegersborg Allé 1D, DK-2920, Charlottenlund, Denmark. E-mail: pm@bilharziasis.dk