

Knowledge and practices on malaria and its control among pastoralists in Simanjiro District, northern Tanzania

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Abstract: Community knowledge and practice related to malaria is important for the implementation of appropriate, effective and sustainable interventions. This study was carried out to assess knowledge and practices on malaria and identify factors contributing to the low mosquito net coverage in Simanjiro District in northern Tanzania. A combination of direct observation, focus group discussion (FGD) and questionnaire were employed in data collection. A sample of 200 respondents was selected randomly from 5542 people from the study village. The findings show that, although most (75%) of the respondents were informed that mosquitoes transmit malaria, the remaining quarter of respondents reserved a considerable doubt on the link between mosquitoes and malaria. Sixty five percent of the respondents were aware of the use of insecticide treated nets (ITNs). However, the coverage of any mosquito net and ITN was 12.5% and 5%, respectively. Affordability, unavailability and gender inequality were identified to be major factors associated with the low ITN coverage. The study recommends that, an advocated pluralistic approach of ITN delivery which encourages a coordinated public private alliance is required to ensure equitable and large scale distribution of ITNs in the village.

Key words: malaria, mosquito nets, knowledge, practices, Tanzania

Introduction

Insecticide-treated nets (ITNs) have become an important tool in the prevention of malaria in highly endemic areas (Amstrong-Schellenberg *et al.*, 1999; Lengeler, 2004; Killeen *et al.*, 2007). Several controlled trials conducted between 1980s and 1990s showed that ITNs reduce morbidity and mortality from malaria (Lengeler, 2001). Results from subsequent large-scale social marketing of ITNs conducted in south-east Tanzania demonstrated a 27% reduction of child mortality (Amstrong-Schellenberg *et al.*, 1999). Scaling up coverage to at least 80% use by young children and pregnant women by 2010 is a consensus target of the Millennium Development Goals (MDGs), the Roll Back Malaria Partnership, and the US President's Malaria Initiative (RBM, 2005; Anon, 2006).

Large reductions of transmission are required to appreciably reduce malaria burden, particularly in the longer term as exposure and immunity re-equilibrate (Maire *et al.*, 2006). ITNs can address this challenging need through direct personal protection and area-wide suppression of the malaria transmission

intensity that benefits even nonusers (Killeen *et al.*, 2007). Field studies have demonstrated that, ITNs can protect not only the individuals and households that use them, but also members of the surrounding community (Hawley, 2003). This is because ITNs kill adult mosquitoes directly or force them to undertake longer, more hazardous foraging expeditions in search of vertebrate blood and aquatic habitats (Killeen *et al.*, 2007). While targeting individual protection to vulnerable groups has long been a justifiable priority, a recent study has shown that, large scale coverage of all adults and children, rather than just vulnerable groups, can achieve equitable community-wide benefits greater than personal protection (Killeen *et al.*, 2007). It has been further suggested that such communal benefits can make large impacts on disease burden only if appreciable levels of coverage are achieved in the human population as a whole

The government of Tanzania in collaboration with UNICEF, the Global Fund for HIV/AIDS, Tuberculosis and Malaria (GFATM), the President's Malaria Initiative and the World Bank Booster programme, is in the process of scaling up ITN coverage. However,

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experience gained from field studies suggests that knowledge of the problem, affordability and accessibility are among major obstacles for the ITN ownership and use (Victora *et al.*, 2003; Nganda *et al.*, 2004; Magesa *et al.*, 2005). In a previous study conducted in rural areas, knowledge, attitude and behavior practices regarding malaria were shown to influence the ITN ownership (Minja *et al.*, 2001). Different studies have also confirmed a socioeconomically stratified gradient of treated and untreated net ownership and re-treatment rates (Hanson & Worall, 2002; Nathan *et al.*, 2004). In order for large-scale ITN distribution programme to succeed, the knowledge gaps, practices and attitudes that may negatively influence the intervention uptake, need to be identified and addressed. This study was therefore carried out to assess knowledge and practices on malaria and its control among pastoralists in Simanjiro District in northern Tanzania.

Materials and Methods

Study area

The cross-sectional study was carried out in January 2005 in Orkesumeti village in Simanjiro district, northern Tanzania. The village constitutes the headquarters of Simanjiro district and has an estimated population of 5,542 inhabitants according to national census of 2002 (URT, 2002). The village population consists mainly of Maasai pastoralists and few other tribes and the economic activities done in the area is mostly livestock keeping and some small-scale crop farming. The area experiences bimodal rainfall, and the main rains starts from January - March while short rains starts from September-December. The study area has been described in detail by Nyaruhucha *et al.* (2006).

Data collection

Both qualitative and quantitative data were collected. Qualitative data was collected through three focus group discussions (FGD), each with separate groups of men, women (aged 31-60 years) and youths (aged 18-30 years). The participants were purposively selected with the help of village head and assisted with prominent Maasai elders, so that all sections of the village were represented. The youth group was planned such that there were equal numbers of males and females. Discussions were directed by a question guide and moderated by the investigators. Each lasted for about two hours and focused on local

knowledge on the causes of malaria, awareness on the use and possession of ITNs, malaria treatment seeking behaviour, availability and affordability of ITNs and distribution of powers of spending within the household. Observations were made in the household and in the market to obtain information on availability, price and use of ITNs.

Quantitative data was collected using interviewer-administered questionnaire that was administered to 200 of 690, randomly selected households. The heads of the households (or their representative in cases the head was not available) from the selected households were interviewed. To avoid bias, the participants to the FGDs were excluded from questionnaire interview, since they already were informed of the study. The questionnaire was designed focusing on the same variables that were used in FGDs, with few socio-demographic characteristics including age, religion, gender and education.

Data analysis

Both quantitative and qualitative data from primary sources were edited and coded. The hand sheets were prepared and data entered into a computer. Data analysis was done using Statistical Package for Social Science (SPSS) programme and results generated in frequency tables.

Results

Qualitative data

In all FGDs malaria was very well known. When participants were asked about the common disease in the area they consistently mentioned malaria. The symptoms pointed out to be associated with the disease were those common in biomedical diagnosis, such as fever, headache, inappetence and joint pains. When asked about the cause of malaria, majority of people felt that malaria is transmitted by mosquitoes, and some of them even attempted to cite *Anopheles* as major vector of the disease. However, some people mentioned stagnant water as the main cause of malaria. When they were asked why they think stagnant water is the cause of malaria, they logically based their argument on the existence of plenty of stagnant rain water during March-May in the area, which coincides with high malaria transmission season.

The discussions showed that many people were informed about the use and benefits

of bed nets. Some of the sources of information frequently mentioned by respondents include contemporary news such as radio and television; others mentioned hospital at the time of admission or caring for a sick friend or relative. Somewhat surprisingly, despite the convincing results on the awareness, the discussions clearly showed that there were very few people possessing and using at least a bed net, leave alone ITNs which were even fewer. Some of the discussants said that they did not use mosquito nets because of the high price (they could not afford the prices) while others indicated that they were not available in the village. It was also clear that some participants had reservations with effectiveness of the ITNs as one Orkesumeti youth was quoted in the discussion saying...*"Since ITN doesn't provide a full protection but rather 50%, the villagers are less interested in such imperfect interventions"*. In fact, some of the discussants insisted that whether one sleeps under bed net or not, he/she will suffer from malaria.

There was a group consensus that majority relied on biomedical option which includes health care facilities (hospital, health centre, dispensary). A few others relied on traditional healers using different approaches including herbal concoction while some relied on both. Some of the medications frequently mentioned were chloroquine and sulfadoxine-pyrimethamine, although few of them could mention even quinine.

Almost all group discussions indicated that both the price and ITN availability appeared to contribute to the low household ITN ownership. Some participants declared to have never heard about ITN and thus could not comment on availability, whereas those who knew about it said that the selling outlets for

the ITNs were rare or very rare in the village. With regard to the market price of ITNs, most of discussants indicated that, the price of about US\$4 for a single ITN was very high and unaffordable to them. A direct observational survey of the price of ITNs and the number of outlets serving the area found that the market value of ITN in the area ranged from US\$3.8-4.0, and there were only two vendors selling ITNs in the area.

Quite strikingly, there was a unanimous agreement in all groups indicating that only the father was responsible for covering costs of malaria treatment and prevention. Some participants said it was the father because he owns everything in the family. Some of them added that everything including cattle and crops (maize and beans) from the farm were in the hand of the father, and hence, ideally he makes decision to purchase virtually everything in the household. An open question revealed that the availability of money in the village was seasonal and restricted to the time when subsistence produce was sold in the dry season and for the livestock keepers when a non-milking cow was available for sell.

Quantitative data

Of the 200 respondents interviewed, the majority (85%) were males (age range= 15 to 75 years). Most (67.5%) were Christian. Their levels of education ranged from no formal education at all, to the limited formal education which comprises of those who attended standard one to six but for one reason or another they could not complete primary school education. The majority (70%) had primary education and few had secondary education. None of the respondents had higher level of education (Table 1).

Table 1: Socio-demographic information of the respondents (N=200)

Variable	Response	Number (%)
<i>Age (years)</i>	15-35	50 (25.0)
	36 – 55	120 (60.0)
	56 – 75	30 (15.0)
<i>Gender</i>	Females	30(15.0)
	Males	170 (85.0)
<i>Religion</i>	Christians	135 (67.5)
	Moslems	25 (12.5)
	Traditional beliefs	40 (20.0)
<i>Level of education</i>	No formal education	20 (10.0)
	Limited formal education	30 (15.0)
	Primary education	140 (70.0)
	Secondary education	10 (5.0)

About 75% of the respondents correctly identified mosquitoes as responsible for malaria transmission (Table 2), while the rest 25% mentioned stagnant water as the main cause of malaria. The awareness of ITN use was found to be high (65%) among the respondents (Table 2). Despite of the majority of respondents being aware of the benefits of ITN, household ownership and its use were unexpectedly very low. Of the 12.5% respondents, only 5% were actually using ITNs while the rest 7.5% were using untreated bed nets. The majority (57.5%) of the respondents claimed to be seeking biomedical health attention. About one-third (35%) of the respondents who had never heard about ITNs before the study were equally uninformed about their availability, the rest 25% and 40% said the outlets selling ITNs were either rare or very rare, respectively. Majority (52.5%) of the respondents said that the present market price of ITNs was very high. Thirty five percent of the respondents had no idea whether the prices were high or low (Table 2). Almost all of the respondents (99%) said the father was responsible for buying ITNs whilst only 1% mentioned the mother as being responsible.

campaign organized by the government to improve the health of rural populations in the 1970s with a focus on widespread diseases like malaria (Hall, 1978). Although most people attributed malaria to mosquitoes, some of them could not clearly link between mosquitoes and malaria transmission. Similar findings were previously reported in south-eastern Tanzania (Minja *et al.*, 2001). It follows that the disease is therefore considered normal and could only be treated but not prevented. Such inclination has huge implication in the uptake of ITNs and other interventions. Clearly for risk reduction interventions such as ITNs to be backed by communities education on the link between mosquitoes and malaria need to be emphasized.

It has been proposed elsewhere that malaria treatment choices are affected by knowledge of the problem (Karanja *et al.*, 2002; Nyamongo, 2002). In the present study, a quarter of the respondents associated malaria with stagnant water, although this was not directly linked with breeding sites for malaria vectors. Poor linkage between mosquito and malaria transmission is likely to have two impacts; firstly

Table2: Respondents awareness of the causes of malaria and use of ITNs (N=200)

Variable	Response	Number (%)
<i>Causes of malaria in the area</i>	Mosquito	150 (75.0)
	Stagnant water	50 (25.0)
<i>Awareness of use ITNs</i>	Aware	130 (65.0)
	Not aware	70 (35.0)
<i>Use of bed nets</i>	Use of treat bed nets	10 (5.0)
	Use of untreated bed nets	15 (7.5)
	No use of treated bed nets	175 (87.5)
<i>Source of treatment</i>	Biomedical treatment	115 (57.5)
	Herbal concoction	40 (20.0)
	All the two	45 (22.5)
<i>Availability of ITNs in the area</i>	Rare	50 (25.0)
	Very rare	80 (40.0)
	Never heard	70 (35.0)
<i>Price of ITNs in the area</i>	High	105 (52.5)
	Reasonable	25(12.5)
	No idea	70(35.0)
<i>Responsibility of buying ITNs in the family</i>	Father	198 (99.0)
	Mother	2 (1.0)

Discussion

In the study area malaria seemed to be quite a familiar disease and villagers were remarkably aware of its mode of transmission. This is likely to have been contributed to mass education

such people are unlikely to support promotion and use of ITNs and secondly, they are likely to seek malaria treatment from traditional healers. Therefore, education on the link between stagnant water (as conducive breeding site for mosquitoes) and mosquitoes and malaria is very

important, for the ITN intervention to be fully supported by the recipient population. Most of villagers who participated in the study were knowledgeable about the use of ITNs, although there was a low net ownership and usage. Similar findings on low net ownership have been reported elsewhere in Tanzania (Mboera *et al.*, 2008a,b). However, other studies have reported a relatively higher net ownership in east and south-east Tanzania (Minja *et al.*, 2001; Marchant *et al.*, 2002; Nganda *et al.*, 2004). The difference in bed net ownership between the present study and the previous ones in Kilombero and Kibaha may probably be explained by the differences in malaria endemicity (Mboera *et al.*, 2008b) socioeconomic status (Magesa *et al.*, 2005) and accessibility to health services (Mboera *et al.*, 2006, 2008a).

In other studies, low bed net ownership has been attributed to low affordability and inaccessibility of the community (Nathan *et al.*, 2004; Magesa *et al.*, 2005). Consequently, affordability of mosquito nets has been shown to be a major factor limiting wide and equitable coverage of mosquito nets, particularly in rural settings characterized by the poorer segments of the population (reviewed by Magesa *et al.*, 2005). Lack of knowledge and negative attitude also seemed to affect ITN ownership. Some villagers were less convinced of the effectiveness of ITN in protecting a sleeper from malaria and believed that although the disease can easily be treated it can not be prevented. Already some studies have reported the impact of lack of knowledge as well as negative perception on the uptake of interventions such as ITN (Makemba *et al.*, 1996; Minja *et al.*, 2001).

As described earlier, the study community comprises of predominantly subsistence livestock keepers and crop farmers and hence, for most of the households, the price of nets was prohibitive. It will be important to consider strategic ITN promotional activities during harvesting season that target the time when a number of household purchasing power is relatively high. Apart from the above listed barriers to ITN ownership, few numbers (all from commercial sector) of outlets selling ITNs in the village was also cited as contributing factor during group discussions. The only two retail shops in study area were likely to create monopoly which almost always is characterized by high prices. Evidence suggests that bed nets

are highly attractive commodity once available within a reasonable distance and at a low price (Lengeler *et al.*, 1996; Fraser-Hurt & Lyimo, 1998; Hanson & Jones, 2000). It is widely accepted that, determination of distribution mechanisms that will assure high coverage with the ITNs, especially in rural areas, remain the greatest challenge. The World Health Organisation strategic framework for the scaling-up ITNs advocates a pluralistic approach which encourages the use of multiple distribution strategies in the rural areas (WHO, 2002).

The unique male dominated division of powers among different classes in family members reserving absolute purchasing powers to the father presents yet another obstacle to achieving good coverage in the net ownership among the Maasai population. It is interesting to learn how the Tanzania National Voucher Scheme (TNVS, 2006) would work under such practices, where pregnant mothers attending antenatal clinics receive vouchers with subsidized prices, but to request the money from their husband. It is important to educate women to ensure they are empowered to be able to contribute to the decision making process on health and other socio-economic issues. Cultural values of the communities including norms and taboos seemed to quite well support the biomedical measures on malaria case management. The majority of respondents showed preference to biomedical treatment, with few of them preferring traditional healers. The observed high levels of support to the biomedical malaria treatment approach potentially indicates that once educational programmes are conducted to clear some few inherent doubts related to malaria epidemiology, interventions are likely to be strongly supported by the affected community.

This study has shown that most of the respondents were aware of both the cause of malaria and the use of ITNs for malaria control. However, they poorly linked mosquito with malaria transmission. The low net coverage was associated with inaccessibility and inability to afford the price of nets. Our findings highlights challenges associated with ITN uptake and distribution mechanisms that will provide enabling environments for scaling up actions that would make ITNs accessible and affordable to the rural segments with low socioeconomic class.

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