



RESEARCH REPORT

Uganda Culture of Mosquito Net Use Study

Phase One Findings

Johns Hopkins Bloomberg School of Public Health Center
for Communication Programs
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List of Abbreviations

BCC	Behavior Change Communication
CCP	Center for Communication Programs
FGD	Focus group discussion
IDI	In-depth interview
ITNs	Insecticide-treated nets
JHU•CCP	Johns Hopkins University Center for Communication Programs
JHU	Johns Hopkins University
LLINs	Long-lasting insecticide-treated nets
MIS	Malaria indicator survey
USAID	United States Agency for International Development

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Executive Summary

Background

The Uganda Culture of Mosquito Net Use study is a qualitative, mixed methods approach that seeks to understand the context of net use and net care in four sites throughout Uganda over several phases of data collection. As such, this study utilizes in-depth interviews, focus group discussions, household mapping and sleeping space questionnaires to investigate these questions using different methodologies. One aim of this study is to understand the Uganda-specific issues and challenges related to net use in order to improve communication and messaging. Findings will be shared with donors, government and implementing partners to inform behavior change communication and net distribution activities.

Methods

Phase one of the Uganda Culture of Net Use study was fielded in March 2012 and focused on sites within Nebbi and Luwero districts. Within each district, one peri-urban and one rural site were selected. At each of these sites, researchers visited three households and conducted one focus group discussion. A total of 12 IDIs and 4 FGDs were conducted in addition to 37 questionnaires related to sleeping spaces. The qualitative data was entered into Atlas.ti and coded by a team of three individuals using a codebook developed through a combined inductive and deductive approach. The sleeping space questionnaire data were analyzed using the STATA statistical software package.

Key findings

These data generated interesting findings in terms of net use motivations, barriers and behaviors. Nets seemed to be commonly used and many participants demonstrated an understanding of their protective effect against malaria. In addition, many respondents mentioned nets as an effective means of preventing other nuisance biters including flies and rats. Participants also valued nets above other malaria prevention materials such as sprays and coils, but ranked them in importance after survival goods such as food and blankets. In terms of barriers to use, several respondents mentioned discomfort while sleeping under nets and discussed being hot under them as well as feelings of suffocation. Seasonality was another challenge to net use, as many respondents reported using nets in the high-risk seasons, when mosquitos are readily visible. Many also mentioned “saving nets” for periods of perceived higher malaria risk to prolong the life of the net. Thus, net use appears to be motivated by economic in addition to health reasons. Another interesting and unexpected challenge was the use of nets during funerals. Respondents mentioned that it would be inappropriate to bring a net to use during a funeral and discussed this as socially and culturally inappropriate and would be “showing off.” When asked to assign nets of various conditions, most participants prioritized assigning nets in good

condition to pregnant women and children under five. Adolescent boys and girls were most often allocated mediocre nets, while middle-aged men were most often allocated the worst nets.

Net care was often understood to be synonymous with net washing, proper storage and sometimes retreatment. Findings from the sleeping space questionnaire showed that nets were washed very frequently, with 40% of those observed being washed weekly and there was much confusion around proper washing and retreatment. Net repair was discussed by many of the respondents and was primarily done by mothers. Occasionally nets were brought to a tailor for repair. Of the 24 nets with holes, seven nets were reported to have ever been repaired, six of which were repaired by tying knots.

Recommendations

Phase one of the Culture of Mosquito Net Use study has resulted in a number of communication implications regarding proper net messaging. These messages include highlighting of the importance of net use for all, not only for vulnerable populations. Additionally, communication strategies should underscore the importance of year-long net use and discourage the saving of nets for periods of high malaria prevalence. In addition, this initial phase has generated additional questions and demonstrated the need for another phase of inquiry. The second phase of the Uganda Culture of Mosquito Net Use study will expand from two to four districts and will build on the lessons learned from phase one to include questions about the role of traditional medicine, barriers to net use at funerals and repurposing of nets.

Introduction

Background

Malaria results in considerable disease burden in Uganda, accounting for 25% of mortality among children under 5 years of age (Kiwanuka, 2003). The use of insecticide treated nets (ITNs) or long-lasting insecticide-treated nets (LLINs) is proven to be an effective intervention in preventing the transmission of malaria (Shargie et al, 2010). Despite significant increases from 2006 to 2009, bednet coverage and use, as reported by the 2009 Uganda Malaria Indicator Survey (MIS), are still at moderate levels and well-below targets (MIS, 2009). According to the 2009 MIS, only 47% of households owned at least one ITN, and although rural and urban coverage of ITNs are roughly equal, there is much variation by region, as government campaigns focused the distribution of 6 million nets since 2005 mostly on the northern and eastern regions. Regardless of coverage, nets are underutilized; according to the 2009 MIS, only 33% of children under 5, and 44% of pregnant women, slept under an ITN the night prior to the survey.

The Culture of Mosquito Net Use study is a longitudinal, qualitative, observational study that focuses on understanding “net culture” within the context of household net use, how families care for and value nets, and how nets are allocated within households and extended families. “Net culture” is defined as the shared beliefs, values, norms, and behaviors surrounding mosquito net usage that are passed on and acquired, at least partially, by social influence. Net culture exists where net use is expected, normative, and seen as protective or beneficial for malaria prevention, to prevent nuisance biting, and/or to promote comfortable sleep, within a target population.

In addition to exploring the components of net culture qualitatively through in-depth interviews and focus group discussions, this study tracks net use and the condition of nets over time using a quantitative questionnaire to assess sleeping space allocation within households as well as an index used to measure the size of holes in nets. By tracking net use and net condition over time, researchers hope to gain a better understanding of the aspects of net culture that both promote and hinder net use.

Study aims and objectives

The specific aims of the study are as follows:

1. To understand the context of household net use
2. To identify and explore barriers to consistent net use
3. To explore how families care for and value nets

4. To ascertain how nets are allocated within households and extended families
5. To track both net use in selected households over time and the condition of nets within that household over time using hole index methodology
6. To explore how nets are used throughout rainy and dry seasons

Study results will be used to inform the design of more effective messaging to increase LLIN use, improve care and repair knowledge and practice, and help guide future plans for LLIN distribution in Uganda.

Methods

Study design

Using a longitudinal qualitative approach, households will be followed over a period of two years during four separate phases, in both rainy and dry seasons, in order to assess net use and net condition over time. Since LLIN use can vary between rainy and dry seasons, data will be collected during both seasons with some households entering the study in the rainy season and others during the dry season. Households will be visited one to four times, depending on the phase in which they are randomly chosen to enter the study. Up to 40 households will ultimately participate in the study.

Because this study is primarily qualitative, it is designed to have enough rural and peri-urban households in each region for reasonable representation, rather than statistical significance. In-depth interviews will be conducted in four districts with ten households each in one rural and one peri-urban site (with 5 households in each site), as well as up to 8 focus group discussions (one per peri-urban and rural area) at each visit.¹ New households will be introduced at each visit to allow for identification of biases that may be introduced as a result of study participation. The selected regions and corresponding districts are as follows:

Central-Luwero

Eastern-Kaberamaido

Western-Ibanda

Northern-Nebbi

¹ Only half of the sites were included at the first phase of data collection, so only four FGDs occurred during phase one.

Study population

All study participants were at least 18 years of age and residents of the selected communities in Luwero and Nebbi districts. Households were randomly selected from a list provided by the village head. Once selected, the head of household was asked for consent for the household to participate in the study. This individual was also the person to complete the in-depth interview if possible. If not, another adult member of the household was selected. FGD participants were randomly recruited from the communities, using the same household listing methodology.

Data collection

Data will be collected using mixed methods and will include four different instruments: in-depth interviews (IDIs), focus group discussions (FGDs), a sleeping space map, and a sleeping space questionnaire. In-depth interviews will be conducted with the head of household and include questions pertaining to barriers and facilitators of net use, value of mosquito nets, creation of new sleeping spaces and net prioritization within households. In addition, a map of the household will be used to identify all sleeping spaces and note the type of space (mat, mattress or bed) and whether there was a mosquito net associated with the space. Sleeping spaces will be numbered on the map to correspond with questionnaires for each sleeping space. Questionnaires will note the number and characteristics of people who slept in the space as well as the condition of the net. This will include the use of the hole index methodology, which will account for the number and size of holes. Focus group discussions will be held at the community level with up to ten individuals of the same sex. The FGD guide covers questions similar in nature to the IDI guide.

In March 2012, the first phase of data collection occurred in a total of 12 households in Nebbi and Luwero districts. In Nebbi, data was collected in Nebbi Sub county (rural) and Pakwach (peri-urban). In Luwero, data was collected in Makulubita (rural) and Luwero Town Council (peri-urban). A total of twelve in-depth interviews² were conducted with the heads of selected households and four focus group discussions were conducted with a random selection of community members. As was previously mentioned, these sub counties were chosen as areas that are rather representative of the district. Within the sub counties, households were randomly selected from a household listing from the village chairman.

² These households were randomly selected and will be visited a total of four times (one initial visit- phase 1) plus three follow-up visits), in six month increments, over the remainder of the study (phases 2 through 4).

Data analysis

A team of three staff members from NetWorks coded the data using a combination of inductive and deductively derived codes. This team met to develop the codebook in ATLAS.ti and STATA statistical software and throughout the coding process to standardize the way in which the coding was done, discuss challenges, and revise the coding scheme. At the end of the coding process, the team met to discuss the salient issues and preliminary findings. The following issues are the result of the coding itself and of this synthesis meeting.

Results

Questions in both the in-depth interviews (IDIs) and focus group discussions (FGDs) centered around five main topics: (I) knowledge of malaria prevention; (II) barriers (and motivators) to net use; (III) allocation and creation of sleeping spaces; and (IV) net care and repair behaviors and practices. Several additional topics were included only in the FGDs (V) outside sleeping and other uses of nets. The following topics below reflect the most common themes and responses from the FGDs and IDIs, as well as emergent themes resulting from this round of data collection, included in section VI. Phase two data collection will address these five main topics and incorporate the emergent themes and issues, as appropriate. The sleeping space questionnaire dataset provided the figures on net use, net care and repair, and net washing included in this report.

Knowledge of Malaria Prevention

Net Use

Data was collected on 37 sleeping spaces, 26 (70.2%) of which had nets associated with them. Of these 26 nets, 16 (61.5%) were currently hanging at the time of the data collection. More nets were currently hanging in Luwero (86.6%) than in Nebbi (27.27%).

Table one: Net currently hanging

Is the net currently hanging up?	Luwero	Nebbi	Total
No	2	8	10
	13.3%	72.7%	38.5%
Yes	13	3	16
	86.7%	27.3%	61.5%
Total	15	11	26
	100%	100%	100%

Most respondents expressed the knowledge that using nets is highly effective in reducing or preventing malaria. Echoing this, the most frequently cited responses related to net use behaviors were that using nets prevents malaria. Respondents nearly as often mentioned using nets to promote comfortable sleep (by preventing other nuisances such as insects, rodents, snakes, falling debris, etc.). As one respondent reports:

“They are a lot of other reptiles like snakes, caterpillars so it prevents them from biting you- especially if the mosquito net is tucked under a mattress. Yet if you do not have a mosquito net it comes straight into your bed. It helps so much in prevention of the mosquito bites.”
 -Luwero, urban, IDI

Several respondents mentioned net use as an economic decision in that the cost of prevention is less than the cost of treatment at a health center. This was simply stated by a rural participant:

“Mosquito nets are not very expensive compared to what one would spend on treating malaria.”
 -Luwero, rural, IDI

Data analysts coded several negative opinions surrounding net use (these will be covered in more detail below in the “Barriers to Net Access and Use” section) including: difficulty hanging, discomfort while using a net, lack of knowledge on proper use, seasonality of use, cost, and shape.

Other Prevention and Treatment

Though most respondents mentioned nets as the most effective means of preventing malaria, there were a number of responses regarding biomedical and traditional treatment methods. A number of respondents mentioned the importance of visiting a health center when one notices signs and

symptoms of malaria in order to access ACTs. Several respondents mentioned keeping a supply of ACTs in the household in the event that someone presents with signs and symptoms of malaria. Fewer respondents mentioned using ACTs only as a last resort after traditional methods of treatment have been exhausted. Regarding traditional treatment and prevention, most respondents mentioned the use of traditional herbs as a first line treatment for malaria due to the fact that they are free and plentiful and easier to access than ACTs, though not the primary means of treatment. Environmental mitigation as a means of vector control was cited by multiple respondents including slashing grass around the household, removing standing water, and planting away from the home.

“Then another thing, to ensure mosquitoes are driven away, compounds should be kept clean, they should not be left bushy. Also, stagnant waters that collect in holes around compounds should not be allowed to form; and other things that allow mosquitoes to breed around the compound.”

-Nebbi, rural, IDI

Discussion of environmental means of prevention demonstrates a certain amount of community understanding of malaria etiology as well as the intersection between net use and other means of prevention.

Value of Nets

For the values exercises, participants were first provided with eight photos of items used to prevent or treat malaria and were told to rank them in order from most valuable to least valuable. These items included a free net, a net that was purchased, ACTs (Coartem), insecticide spray (Doom), antimalarials (Fansidar), a mosquito coil, neem (used to represent traditional, local herbal treatment methods) and a fan. Following this ranking two household items, a blanket and food items, were added. Participants were asked to re-rank the photos from most to least valuable. At this point, respondents were asked to divide all of the items into two piles- those that they were willing and those that they were unwilling to pay for.

When provided with a list of malaria prevention items that they would be willing or unwilling to pay for, most placed nets (both free and bought) first in the willing-to-pay-for category. Some respondents distinguished between free nets- those provided by the government (often referring to them as “government nets”)- versus bought nets. Opinions seemed to be divided on free nets- some stated they believed free, or government nets were of subpar quality to bought nets. Others stated they preferred

government nets because they were free. Nonetheless, it should be noted that several respondents voiced concerns with both free and bought nets, placing them in the unwilling-to-pay-for category. The main reason free, government nets were placed in this category was due to the belief that they should always be provided for free by the government. The main reason for placing bought nets in the unwilling-to-pay-for category was that they were too expensive. For example, a respondent noted:

“I would have wanted to always use a mosquito net but I do not have the money to keep buying them whenever they grow old.”

-Luwero, rural, IDI

This quote demonstrates that while respondents reported that they were not willing or able to pay for nets, these nets were still seen as valuable for protecting their health and their sleep.

When the household items food and blanket were added, most respondents placed food first stating that food is the most necessary item for proper health and to fight disease. Respondents most often placed blankets after food, as blankets are seen as another necessary item for survival. As one respondent explains:

“As I have already explained, food is very important in our lives. No one can be healthy without food, whether they sleep under a mosquito net and they have all the drugs that can treat them. Likewise, a blanket is very important because it is the one that provides warmth and then I use the net for providing the protection from being bitten by mosquitoes. Drugs are also very important because they are the ones we use for treatment, which is why I put them close to the blanket.”

-Luwero, urban, IDI

Nets-both free and paid- followed food and blanket, followed by malaria treatment tablets – both Fansidar and Coartem. Respondents consistently placed electric fans, Doom insecticide spray, mosquito coil, and neem in the unwilling- to-pay-for category. The reasoning from some was that these were less effective and cost money. Doom was seen as only minimally effective and somewhat expensive, whereas fans were considered expensive and not useful due to lack of electricity in many households. Many stated they were unwilling to pay for neem as it could be easily found for free in their community.

Barriers and Motivators

Barriers to Net Access and Net Use

Respondents described a number of barriers, including both barriers to net access and barriers to net use. In the access category, respondents most often cited cost and lack of availability of nets; in the use category, respondents most often mentioned discomfort while using nets (being too hot or feelings of suffocation while under a net). For example, one man discusses his feelings of suffocation in addition to other challenges.

“I don’t like to sleep under a net everyday because the net is too long and the bottom usually touches the floor hence making it dirty. I also feel like am suffocating when I sleep under a net.”

-Luwero, urban, FGD, male

Other, though less frequently mentioned, barriers to use included: lack of proper bedding to properly accommodate a net, lack of enough space in the home to hang a net, the risk of nets catching fire, and low perceived risk of malaria. Complications from insecticide (i.e. rash or itchy skin) were mentioned by several respondents, though not very frequently stated as barriers to use. Many respondents mentioned a combination of inadequate conditions as barriers to net use. For example, inadequate space within the household in addition to inadequate bedding to accommodate nets. A number of respondents mentioned the inability to properly care and/or maintain their net, due to lack of education and knowledge regarding proper care and maintenance behaviors. It is unclear whether the lack of knowledge surrounding care and repair was a true barrier to net use, though it certainly represented a challenge for respondents. As such, proper care and maintenance behaviors should be addressed, and proper messaging surrounding care and maintenance will be important for increasing self-efficacy to promote proper net use.

Motivators to Net Use

As was mentioned previously in the “Net Use” section, respondents cited health and comfort as benefits of using nets. Most cited sleeping under a net as the best way to prevent malaria and to protect from mosquito bites as well as other nuisances while sleeping (insects, snakes, rodents, debris, etc.). Many went further to state other notable external benefits of using a net- namely that prevention by using a net is significantly cheaper than treating malaria and that using nets contributes to observed greater health in their family and community. Additional positive responses, though mentioned less frequently, included the perceptions that nets look good, are easy to use, and protect against the cold.

Seasonality of Net Use

Many respondents stated misperceptions surrounding the need to use nets all year around. Respondents discussed that seasons determined whether or not they should use a net based upon the visibility of mosquitoes and the associated perception of malaria. Many stated that mosquitoes were highly visible during the wet season, necessitating the use of a net. In contrast, mosquitoes were less visible during the dry season and therefore net use wasn't obligatory. When probed on this, many explained that seasonal net use could prolong the life of a net by reducing the amount of time the net is used. Since many do not know when they will receive their next net or be able to afford a new net, they choose to only use the net during times of perceived high mosquito/malaria prevalence. As one respondent stated:

"I don't sleep under a net in the dry season because my net is not in good condition; it is old so I decide to preserve it for the wet season since the dry season doesn't have mosquitoes."

-Luwero, urban, FGD, male

Still, many respondents stated the importance of using a net during all seasons due to the risk of malaria all year around.

"Mosquitoes are not usually many during the dry season but they are always there. Those few that are there in the dry season are equally dangerous as the many which are there in the rainy season hence the need to sleep under a mosquito net even during the dry season."

-Luwero, rural, FGD, female

Intra-household Allocation of Nets and Sleeping Space Creation

To understand how households allocate people to sleeping spaces and nets, participants were presented with a fictive scenario. They were provided with four sleeping spaces (two beds, a mattress and a mat), three nets of varying quality (good condition, mediocre condition, and torn), and ten family members. Family members for this exercise were selected to include a range of ages and sexes including a neonate, a pregnant woman, elderly people, children, and adolescents. Participants were told to allocate the individuals as well as the nets to the four sleeping spaces and then were asked about the reasons for their selections.

Allocation

Most allocated the best sleeping spaces to pregnant women and children under-five. They rationalized this choice by stating that these groups were the most vulnerable due to the health effects

resulting from malaria and generally having “weaker” or “more vulnerable” bodies. The elderly were split between allocation to the best and worst sleeping spaces. The reasoning provided for allocation to the best sleeping space, was that they were most vulnerable; the reasoning provided for allocation to the worst sleeping space was that they had already lived a full life. One FGD respondent in support of prioritizing the elderly for the use of mosquito nets reported:

“For me if I had an old man in my family and young people, I would give a mosquito net first to the old man because if he got sick, I would still be the one to suffer with the medical bills. Treatment for old people is normally more expensive than that of young ones.”

-Luwero, rural, FGD female

However, other respondents reported that they did not believe that the elderly should be prioritized for nets. Another respondent discusses the long life that the elderly have already had as the rationale for not providing them with a net.

“Like for me, even if I die I have no problem. So, for us old people, we remain last.”
-Nebbi, urban, IDI

Adolescent boys and girls were most often allocated mediocre sleeping spaces, while middle-aged men were most often allocated the worst sleeping spaces. Sleeping space allocation and net allocation paralleled each other. Pregnant women, children under 5, the elderly (though they were split roughly equally between allocation to the best net and the worst net) were consistently allocated to the best nets. Occasionally, men were given the best net as the head of household. Many stated it was important to keep the head of household healthy because they are the primary wage earner. Adults over the age of 18 and sometimes the elderly were allocated mediocre or worst nets. It is useful to note that many respondents stated their discomfort in having to prioritize during the allocation exercises. The justification respondents provided for allocation to the worst or mediocre sleeping spaces and nets was often that they were the “left over” nets or sleeping spaces after having allocated to the high priority groups. Thus many rationalized their choice as making the best choice possible within the limitations of finite space and resources. As one respondent mentioned:

“The nets are not enough and there is nothing much to do about it. I cannot create another net for them to sleep under. Since the nets are not enough, I have decided to put them on a mattress so that they can sleep comfortably even when they have no mosquito net.”

-Luwero, rural, IDI

Sleeping Space Creation

Most respondents stated that new sleeping spaces were created when new members enter the family (i.e. birth) and for visitors. Additional responses mentioned often were when there are sick family members and when a husband and wife are not getting along. Several mentioned creating new spaces for comfort (i.e. a larger sleeping space on the floor), and for “older” children, though respondents provided no specific age threshold for when this occurs. Very few mentioned creating new spaces for funerals, despite the increase in demand for sleeping spaces during funeral times.

Net Care and Repair

Care

Responses relating to net care concerned mainly preventive and protective behaviors to prolong the life of a net. A large number of responses concerned washing of nets. Positive and negative opinion codes were given whenever the respondent provided a response that the coders felt conveyed either a positive or negative attitude regarding care. It is useful to note that, under the care and repair theme, most negative responses concerned net washing and proper care after washing a net. As such, there should be messaging specifically addressing net washing and proper care during and after washing. As one respondent clearly stated:

“...then to add on that they need to give us some education about how to use it. You know, there are some people even don’t know about how it should be washed. Some people wash it and they take it inside the house with all the water dripping from it. Then other people say it should not be dried under the sun and others say it be dried under the shade, while others also say it should be dried under the sun... People get confused about how well they should use the net. The best thing would be that some people should educate us on how we should use the net, better than how we are using it now.”

-Nebbi, rural, FGD, female

Some responses relating to washing included: washing nets whenever they are dirty as part of routine maintenance, not having proper instructions on washing, difficulty re-hanging after washing, the loss of insecticide due to washing which cannot be retreated due to lacking insecticide to retreat. It is

evident that most responses concerning washing displayed the confusion surrounding proper washing, and data analysts coded many negative opinions on washing.

Nets appeared to be washed very frequently according to the sleeping space questionnaires. Approximately 40% of nets were reported to be washed every week (see table two). According to the questionnaire, of 23 nets with reported information, 22 (95.7%) were washed by women. This person was most often the spouse of the head of household (16 cases of 23). It is almost evenly split as to whether the person who washes the net sleeps under it at night; in 13 cases (56.5%), the respondents indicated that the person who washed the net also sleeps under that net. Most of the nets in both districts were dried in the shade (see table three)

Table two: Frequency of net washing

How often is this net washed?	Luwero	Nebbi	Total
Never	2	1	3
	13.3%	9.1%	11.5%
About once or twice a year	4	0	4
	26.7%	0%	15.4%
About 3-4 times per year	3	0	3
	20.0%	0.00%	11.5%
About 5-6 times per year	0	1	1
	0%	9.1%	3.9%
About once per month	2	1	3
	13.3%	9.1%	11.5%
About once per week	4	6	10
	26.7%	54.5%	38.5%
Don't know	0	2	2
	0%	18.2%	7.7%
Total	15	11	26
	100%	100%	100%

Table three: Net drying

How is this net dried?	Luwero	Nebbi	Total
Outside in the sun	5	4	9
	38.5%	40.0%	39.1%
Outside in the shade	7	6	13
	53.9%	60.0%	56.5%
Don't know	1	0	1
	7.7%	0.0%	4.4%
Total	13	10	23
	100%	100%	100%

Net retreatment was also mentioned by a number of respondents; most respondents who mentioned net retreatment mentioned duration between retreatment – ranging from monthly to depending on expiry date of the chemicals. When asked about how to take care of nets, a respondent reported:

“It also means re-treating it periodically so as to strengthen it because the chemicals in the nets reduce or completely disappear with time due to washing.”

-Luwero, urban, FGD, male

Most other respondents also mentioned retreatment as part of routine maintenance, indicating a significant level of confusion around which nets should be retreated and how often, with the potential that people are improperly re-treating nets.

Respondents described ways to care for nets so that they would develop fewer holes: reinforcing nets along the bottom to prevent tearing, and the importance of protecting nets from fire by keeping away from flames. Mentioned less often were repairing holes quickly as they appear, proper hanging and storage, and keeping away from children. In general, there seems to be confusion regarding net care behaviors (as was also mentioned previously in the barriers section). As such, there should be messaging targeting when, if ever or how often to retreat a net, as well as proper care instructions surrounding re-treatment.

Repair

Net repair probing focused on eliciting any corrective behaviors carried-out to prolong the life of a net. Most respondents mentioned sewing their net, patching their net, and tying knots in their net. Others discussed repairing their net at first sign of damage and specifically discussed materials used to repair nets (usually needle and thread). One woman in an FGD stated:

“I can not say that there is a specific time of repairing nets. Repair is done when need arises and it all depends on the user or the person in charge of mending it. In this case mothers are the responsible people.”

-Luwero, rural, FGD, female

This quotation highlights the gender roles in repair that were also mentioned by several respondents. Mothers were most often mentioned as responsible in the household for repairing nets. Several respondents mentioned bringing nets to the tailor to be repaired, though more respondents reported self-repairing their nets.

Of 24 nets with holes or completely repaired holes, seven nets were reported to have ever been repaired (See table four). Of these seven nets, all were reported to be repaired by females, most often (6 of 7) by the spouse of the head of household. For five of these seven nets, the person who repaired the net did not typically sleep under it. Finally, in six of the seven nets, repair was reported to be done by tying knots.

Table four: Net repair (evidence of repair for nets with holes or completely repaired

Is there evidence that this net has been repaired?	Luwero	Nebbi	Total
No	10	7	17
	71.4%	70.0%	70.8%
Yes	4	3	7
	28.6%	30.0%	29.2%
Total	14	10	24
	100.0%	100.0%	100.0%

Of the 26 total nets, only three were reported to have been modified. In one case, the ring at the top of the conical net was removed. In the remaining two cases, a new entry way was created in the net.

Additional Issues

Other Uses of Nets/User Determined End of Preventive Usefulness of Net

Respondents mentioned a variety of other uses for nets. Most stated that the condition of the net was the deciding factor in when to repurpose a net, though no definitive time period was given for when a net is repurposed. The most common other uses mentioned were: screens or curtains, fishing, gardening, and fencing (to keep animals and plants contained). Other less-often mentioned responses were: to prevent termites by placing on the ground (net chemicals kill termites, according to respondents), to prevent falling dirt and debris by placing on the ceiling, cushioning or filling mattresses or pillows, bundling grass or hay, for bed sheets, and for patching.

Social Life of Nets

As previously mentioned, most respondents mentioned the “age” of a net as the deciding factor in when to repurpose it. It is important to note that “age” in this context does not refer to a number, but rather a state or condition of the net. Most people mentioned throwing away or burning old nets, though some mentioned repurposing as a more viable option. In urban Nebbi, one woman shared her opinions on repairing versus repurposing old nets:

“With large holes on the mosquito nets you can only mend using pieces of clothes, but also when the mosquito nets stay for two years, even if you mend it, the patches become many. This means that the net is old. What you can do is only to divert it for other use like for pillows.”

-Nebbi, urban, FGD, female

Most mentioned proper care as important for prolonging the life of a net. Very few mentioned throwing nets away at the sight of a hole.

Funerals

Funerals were mentioned by a fair number of respondents, though generally neutrally. Most respondents who mentioned funerals stated that nets were not used during funerals due to social and cultural norms, such as the perception one is “showing off.” Still others mentioned practical reasons, such as the lack of space due to additional people and more sleeping spaces needed for visiting friends and relatives. Most who mentioned funerals also mentioned sleeping outside and suggested that hanging nets outside poses challenges, thus it is not done. Because funerals were not identified negatively or as a barrier by respondents, it is unclear how this issue of net use during funerals would be addressed due to the potential sensitivity of this social and cultural practice and the norms surrounding it. As one respondent stated:

“It is very difficult to think about a mosquito net in situations like that. Vigils are situations of sorrow. You cannot think about a net when the reason you are sleeping outside is a result of death of a community member. People will look at you differently if you took a net to sleep in on a vigil. They might actually think you are showing off.”

- Luwero, rural, IDI

Emergent Themes

The following themes emerged inductively out of the Phase 1 data collection and were not originally included as a part of the IDI/ FGD guides. Because these responses were not solicited by interviewers, they will be important to consider in message design as they are likely to resonate well with the population.

Shape

Most respondents preferred conical nets over rectangular nets. Reasons for this preference included: the shape is more versatile, rectangular nets take up too much space; rectangular nets require too much time to hang and take down. To illustrate this, one respondent noted:

“Rectangular nets are not easy to hang up because they necessitate having four different corners where nails or poles can help to support the net and they tend to occupy too much space and make the bedroom look untidy.”

-Luwero, rural, FGD, female

A number of respondents preferred rectangular nets, however, stating that: rectangular nets are larger and accommodate larger family size, rectangular nets are easier to tie-up when there are children around; rectangular nets provide more space between persons and the net, hence less ability for mosquitoes to bite.

“For me I find the square shaped mosquito nets are good, because with children, you can tie even six strings instead of four, at the four corners, and in the two sides. This has maximum pulling effect that widens the inside of the nets making it able for two people to sleep comfortably.”

- Nebbi, urban, FGD, female

When asked about net transformations, more respondents stated they had transformed a rectangular net into a conical net than vice versa.

Misconceptions

Respondents had many misconceptions regarding malaria etiology and prevention. A large number of respondents mentioned drinking dirty water as a cause of malaria. Respondents also mentioned improper hygiene, eating bad food, and a dirty environment (especially surrounding latrines) as causes of malaria. Additionally, several respondents mentioned that children in their community had been

vaccinated against malaria and several mentioned that immunization for measles conferred protection against malaria. With regard to this, a Luwero respondent said:

“I used to hear community leaders telling parents to take their children for immunization. I think among the many things, children were also being immunized against malaria. Am not sure though but they kept telling us to take our children for immunization because this service was provided free of charge. We were also encouraged to take our children to immunize them against measles because it is believed that a child who is immunized does not get severely affected by malaria as that one who is not immunized.”

-Luwero, urban, IDI

Confusion about the diseases for which children are being immunized poses a problem for malaria control efforts. If parents believe that children are no longer susceptible to malaria, they may no longer take other precautions.

Based upon these responses, it is possible that there is some confusion surrounding the symptoms and diagnosis of malaria in both the lay and medical communities. There were also a number of misconceptions surrounding prevention of malaria, largely echoing the misconceptions about causes of malaria. A large number of respondents stated that avoiding unclean water or boiling water was a means of malaria prevention. Proper hygiene, avoiding bad food, and immunization were also mentioned as means of prevention, though by fewer respondents.

Other Payment Issues

Some respondents cited the high cost of replacing nets as a barrier to year-round use. As was mentioned previously in the barriers and seasonality sections, wear and tear of year-round use is a factor in net use decisions due to the economic implications of replacing nets more frequently the more they are used. Additionally, several respondents cited the cost benefit of weighing what is provided for free versus what they have to pay for in the community (i.e. free nets vs. free treatment at clinic). For example, if nets are free, they take nets; if treatment is free, they may forego paying for nets as they can get treatment for free at the clinic.

Discussion

Communication implications

The first phase of the Culture of Net Use in Uganda study provides important insights into communication needs in Uganda. Specifically, behavior change communication (BCC) is needed on the following themes and issues:

Beliefs around Malaria Prevention and Barriers to Net Access and Use

Education and messaging on the symptoms, and transmission patterns of malaria

Respondents mentioned a number of misconceptions concerning malaria transmission and symptoms. Though most people know that mosquitoes transmit malaria, other causes were also cited. Based upon this research, it is unclear whether these misconceptions are a result of a gap in the information being provided by the medical community, whether individuals are misinterpreting the information, whether respondents believed there were multiple causes of malaria, or a combination of these. Because misconceptions can impact the preventive behaviors people seek and/or delay treatment seeking, there is still a need to communication around symptoms and transmission patterns of malaria. The belief that dirty water, food, and improper hygiene can cause malaria is a common misconception. Perhaps more education surrounding the lifecycle of malaria, including transmission patterns and symptoms would be useful at the programmatic level during distribution campaigns.

Care and Repair messaging with additional attention paid to washing and re-treatment issues

The most salient care and repair issues to be addressed concern washing and re-treatment of nets. Many respondents stated that they have not been provided with instructions on how to properly care for their net, particularly in regards to washing. Issues such as how often to wash one's net, what to wash with, and how to dry should be addressed. The confusion around whether LLINs need retreatment should be addressed. Additional care and repair messages should reinforce and model positive care and repair behaviors such as proper handling and storage to prevent holes and tears, and repairing any holes promptly upon discovery.

Messaging surrounding quality of free, government-issued nets

Many respondents stated that free nets were of inferior quality to purchased nets because free nets had larger mesh size. Respondents expressed their concern that larger mesh size was a problem for

malaria transmission, due to the fact that mosquitoes can more easily enter the net. This should be addressed because, in fact, these nets do have slightly larger mesh size to promote better air circulation through the net. The misconception that this allows mosquitoes to penetrate the net should be addressed and dispelled. It is unclear how much of a barrier this quality issue is to net use, as many respondents also stated that they use these nets because they are free and, thus, this perception of quality issue may not be a significant barrier to use. Nonetheless, the issue of mesh size is one to consider in messaging during distributions as the perception that free nets are less effective may impact net use.

Reinforcement of the importance of net use throughout all seasons

There were many stated misconceptions surrounding the seasonality of net use. Many respondents stated that due to the fact that malaria risk perception is lower during periods of less rain, people “save” their nets for use during periods of perceived higher malaria risk (the rainy season). Messaging should reinforce the importance of using nets throughout all seasons due to the fact that malaria transmission occurs during all seasons. Data have shown that there is actually an increased level of threat during the dry season as the vectors that are able to survive to feed are more virulent. Thus, elevating the perception of malaria risk in the dry season may be an important first step to increasing intention to care for and repair nets. Thus, messaging surrounding care and repair during all seasons- rainy and dry- and that all season care and repair will protect the net and protect you is likely to be an important, and effective, message.

Sleeping Space Allocation and Sleeping Space Creation

Messaging surrounding new sleeping space creation and importance of placing nets over all sleeping spaces (even during special occasions such as funerals, new babies, etc.)

Respondents mentioned the issue of net use and space creation quite frequently. The message that “new spaces always need nets,” will be an important call to action message and should be reinforced. Most respondents mentioned funerals as times when new spaces are created and nets are not used, mainly due to cultural reasons. Less clear is net use over new sleeping spaces created for other reasons (new babies, older children, visitors). Thus, perhaps a more broad message such as “new spaces always need nets” may be appropriate.

Other/Emergent Issues

Reinforcing the message that prevention is cheaper than treatment

Many respondents mentioned that prevention costs less than treatment as a motivating factor in net use. As such, messaging surrounding the economic decision-making that occurs when one is weighing cost and use decisions is likely to resonate with the population. Messages encouraging prevention through net use both as a means to promote health (of one's family and community) as well as promoting economic savings and making smart economic decisions will be important.

Messaging to address the issue of “saving nets” for rainy seasons when transmission is perceived as higher.

As was mentioned previously in the “Beliefs” section, messages on the importance of “all season net use” should be reinforced. Because many respondents stated that they are not using nets during the dry season due to both less perceived risk and as a cost saving measure, both of these issues should be addressed simultaneously. Because people's decisions are based on a combination of factors (perception of risk, economic concerns), both of these factors should be addressed in messaging.

Reinforcing the multiple benefits of nets – health- prevention of malaria, family and community health improvement; comfort- promoting a good night sleep; and cost-effectiveness- cost of prevention less than cost of treatment. Respondents stated a number of motivating factors including health, comfort and cost-effectiveness that promote net use, and these should be reinforced.

Instructions on how to transform nets (if desired) into preferred shapes and how to reinforce the top of the net, since many people seem to prefer conical nets

Though respondents showed a slight preference for conical nets, most respondents who discussed net transformations spoke of rectangular to conical net transformations. Messaging on net transformations – both rectangular to conical as well as other types of transformations – should include visual elements that allow audiences to see for themselves how nets can be adapted to fit sleeping spaces or different types of rooms. Messaging should also emphasize the importance of repairing any holes that develop as a result of the adaptation, as part of an overall net repair platform. Concerning rectangular to conical transformations, messaging should focus on proper reinforcement of the top of the net to prevent tears at the top. This is particularly important as mosquitoes enter from the top of the net. Regarding other types of transformations, the use of poles to prop up nets or to secure nets to

the floor should be discussed, with particular attention paid to reinforcements surrounding areas where poles or other propping objects meet the net, to prevent tearing.

Study limitations

The Uganda Culture of Mosquito Net Use Study utilizes multiple methods to gain an understanding of net culture in several sites throughout Uganda. The use of these various methods coupled with the phased data collection is likely to generate a comprehensive understanding of the net use context across Uganda. However, the study is primarily qualitative in nature and is therefore not meant to be representative of all of Uganda or even of the selected districts. Results must be interpreted with an understanding that responses are specific to the households and communities in which the study was fielded. However, study sites were purposively sampled with the help of local officials, in order to select sites that were similar to other sub-counties within the same district. In addition, Phase two in January 2013 will include two additional sites and will provide a better understanding as to how net use behaviors, challenges and perceptions vary across Uganda. A second limitation with regard to the sleeping space questionnaires must also be noted. Data was collected on a total of only 37 sleeping spaces. While these data can offer interesting information about possible trends and differences between sites, the small sample size does not allow for definitive conclusions about net use or care behaviors.

Conclusion

The first phase of the Uganda Culture of Mosquito Net Use study yielded a wealth of diverse experiences regarding net use, care, and repair behavior and beliefs in Uganda. In many cases, the information from various respondents was complex, if not sometimes contradictory. Therefore, it was critical to delve into the reasons behind certain opinions or behaviors. For example, respondents mentioned that they sometimes used nets only in the rainy season, when malaria risk was high. When probed on this behavior, these respondents sometimes mentioned that they did this in order to prolong the life of their nets; caring for a net meant not using it. This was even more important to the respondents since many of them could not afford to purchase nets and did not know when the next mass distribution would occur. Phase one of the Uganda Culture of Mosquito Net Use was critical for understanding the behaviors and some of the underlying rationale. Phase two of this study, to be fielded in January 2013, will further probe into some of these issues, particularly the social norm against

the use of nets during funerals, other uses for nets and the repurposing of nets, traditional medicine for prevention or treatment and its implications for net use and community perceptions of insecticide. Through the use of this iterative approach, we are most likely to understand the breadth and depth of net culture in Uganda. This information will be critical to the improvement of malaria communication throughout the country.

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