

Qualitative assessment of long-lasting insecticidal nets to prevent malaria on Bioko Island, Equatorial Guinea

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This qualitative study sought to examine incentives and barriers to LLIN use, care, and upkeep to inform social and behavior change communication strategies for integrated malaria control. What happened to Permanet 3.0 LLINs supplied via mass distributions, schools, and antenatal clinics? Why did household LLIN ownership decline rapidly after universal distributions? What factors influenced LLIN use, and what caused low rates of use of available LLINs? Restricted randomization was applied to households to find individuals who met inclusion criteria for gender, geography, reported LLIN use or non-use, and pregnancy status. Written informed consent was obtained, and focus groups were recorded. Trained Equatoguinean facilitators used a discussion guide in Spanish to facilitate 7 focus groups designed to maximize diversity across groups. Community-based participatory analysis was used to highlight new themes that emerged each day. Transcripts were prepared and discussion in local languages translated into Spanish, and the authors performed thematic analysis to identify barriers and incentives to LLIN use. Knowledge of LLINs was good and had little impact on use. For the 70% of participants who used LLINs, perceived benefits of LLIN use such as protection against malaria and other vector-borne diseases outweighed barriers. Risk perception was the main factor influencing use: malaria was perceived as a severe illness for pregnant women and children, but not for men. Despite having knowledge of malaria's severity, some participants did not internalize the risk to which they were exposed. Common barriers to use included dissatisfaction with the LLIN product due to design or color, heat, bad odor, pruritus from contact with the net, dirtiness, and discomfort. Non-users considered the relative benefit of LLIN use limited in the context of indoor residual spraying of insecticide and outdoor malaria transmission. Participants recommended strengthening community processes, especially having neighbors promote and reinforce acceptance, use, and proper care of LLINs, and providing regular follow-up of households that received LLINs.

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INTRODUCTION

The Bioko Island Malaria Control Project (BIMCP) in Equatorial Guinea has led periodic distributions of long-lasting insecticidal nets (LLINs) since 2004 as part of an integrated malaria control program. This qualitative study examined knowledge, perceptions, and behaviors around LLINs and their sub-optimal use with the aim to identify incentives and barriers to LLIN use, care, and upkeep to inform behavior change communication strategies. Research questions included:

- What has happened to Permanet 3.0 LLINs supplied via mass distributions, schools, and antenatal clinics?
- Why does household LLIN ownership decline rapidly after universal distributions?
- What factors influence LLIN use, and what causes low rates of use of the available LLINs on Bioko Island?



METHODS

- In all, 45 participants were selected for focus groups (FGs).
- Selection was done from an island-wide household database using restricted randomization, with purposive assignment to FG sessions based on:
 - Male vs. female
 - Urban vs. rural
 - LLIN use vs. non-use
 - Pregnancy status
- FG composition maximized diversity across groups; 6 out of 7 had either gender, LLIN use, or geography in common, with other factors being heterogeneous. A 7th group was heterogeneous by gender, LLIN use, and geography.
- Written informed consent was obtained.
- Trained Equatoguinean researchers facilitated 7 FGs composed of 6-9 individuals each.
- Community-based participatory analysis was used to highlight new themes that emerged during each day of FGs.
- Audio transcripts were prepared, and facilitators and authors performed thematic analysis.

RESULTS

Table 1. Composition of Focus Groups

Group	Women	Men	Urban	Rural	LLIN User	LLIN Non-User
1	4		4		4	
2	6			6	6	
3	8		8		4	4
4		3	3		3	
5		9		9	9	
6		9	9		5	4
7	3	3	3	3	3	3
Total	21	24	27	18	34	11
%	48%	52%	59%	39%	74%	24%

Knowledge and Risk Perception

Knowledge of LLINs was good, but had little impact on use. For the 70%+ of participants who used LLINs, benefits such as protection against malaria and other vector-borne diseases outweighed perceived barriers. Risk perception appeared to be the main factor influencing use; malaria was perceived as a severe illness for pregnant women and children, but not for men. In addition, risk is perceived to be higher on Equatorial Guinea's mainland; one practice that exists is taking LLINs back to villages on the mainland and leaving them there.

Barriers to Use and Local Beliefs

As documented in many prior studies, dissatisfaction with the LLIN product due to design or color, heat, bad odor, itchiness from contact with the net, dirtiness, and general discomfort were common barriers to use. Design and poor appearance of LLINs in the home was another. Younger men in particular cited LLIN design as a barrier to use. However, local beliefs around malaria risk and bed nets added greater specificity to the existing knowledge base:

- Sleeping under a bed net is like sleeping in a coffin*
- People cannot breathe when they sleep under bed nets*
- I have bad dreams when I sleep under a bed net*
- With certain drinks, malaria symptoms go away*
- It is not necessary to use an LLIN every day / only in the season when you see many mosquitoes around*

Participants also mentioned storing extra unopened LLINs in their original packaging, considering it easier to put up new LLINs than to clean them.

Limitations of LLIN Effectiveness

Non-users considered LLINs of limited benefit in the context of outdoor malaria transmission and indoor residual spraying of insecticide (IRS) on Bioko Island. Specifically:

- Some people have fallen ill with malaria despite sleeping under bed nets*

Motivating Factors

Protection against *Anopheles* mosquitoes and other insects while sleeping, recent illness experience in the household, and caring for vulnerable family members motivated LLIN use.

Community Engagement and Language

Participants suggested strengthening community processes by having "neighbors" promote and reinforce acceptance, use, and proper care of LLINs in their communities. They also suggested that neighbors regularly follow-up with households receiving LLINs. Participants recommended more detailed messaging about LLIN use and care in Bubi and Fang languages. Some doubted that the older generation understood all of the information provided about LLINs in Spanish.

DISCUSSION

Findings from this study should be taken into account during the next community mobilization strategy to promote LLIN use on Bioko Island. Similar studies could be done for other BIMCP components.

Recommendations

- Clarify that both LLINs and IRS are desirable, and one does not obviate the need for the other. The interplay between IRS and LLINs as complementary prevention measures offered by the BIMCP needs to be explained and underscored.
- Reinforce men's perception of the severity of malaria, e.g. the notion that they may transmit malaria to family members even if they remain asymptomatic. Seek motivating factors to spur behavior change in men, with attention to special occupations.
- Involve young men, in particular, in the design and/or selection of LLINs to be distributed in the future.



- Develop messages that associate LLIN use with other advantages/benefits besides prevention of malaria, such as the avoidance of nuisance mosquitos, cockroaches, and other harmful pests.
- Use Fang and Bubi to reach the older generation more effectively (i.e. grandparents). Recruit more Fang and Bubi "neighbors" to become influential communicators and social change agents.
- Reinforce messages about LLIN care, including mending and washing, to avoid discarding of LLINs simply because they are "dirty."
- Specify a greater level of detail in the steps for how to clean and care for LLINs correctly.

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