

# First Knowledge, Attitude and Practices (KAP) Survey of Mosquitoes and Malaria Vector Control at Household Level in Lobito Town (Angola)

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## Abstract

A classical cluster sampling survey (420 households) was implemented in 2011 in Lobito town (Angola) to make a situation analysis of current use of mosquito net, and other mosquito control method, at household level after and before another scaling-up of LLIN in the framework of the National Malaria Control Programme (NMCP). Three main points clearly appeared (i) 94% of people implement mosquito control at household level considering mosquitoes as a nuisance due to bite (83%) and noise (63%) while their importance as vector of diseases are quoted by 22%, (ii) the mostly used method for mosquito control at familial level was still the domestic insecticide canister (# 60%) and mosquito coils (36%) while « one mosquito net/family » at least was reported from more than 50% of households and (iii) nets were mainly used to protect babies (>50%) showing a great sensitization and knowledge of the risk of malaria in babies after the first step of LLIN by NMCP targeting « at risk » groups.

The main reasons reported for the non-use of mosquito nets were « lack of comfort » and « too hot » while the cost was not considered as a main reason for non-getting net. More than 80% of interviewed people were aware of LLIN and almost 70% « ready to use » if available. These information are of great importance for NMCP which did large scale distribution of LLIN targeting « less than 5 years children » and « pregnant women » and has to further elaborate and develop adapted IEC programme for the targeted universal coverage.

## Introduction

Malaria is still the main cause of morbidity and child mortality in Angola [1,2]. According to official statistics there had been 2,283,097 cases in 2006; then 2,726,530 in 2007 and 3,432,424 cases considered as malaria in 2008 (with 1,246,884 cases of children <5 years). A comprehensive Malaria Control Programme for Malaria Elimination was launched including for vector control operations scaling-up of Long Lasting Insecticide Treated Nets (LLINs) as well as Inside Residual Spraying [3] and larviciding with *Bacillus thuringiensis*. Officially, since 2005 near 4 million LLIN were distributed, (45,889 in 2005; 984,760 in 2006; 1,495,165 in 2007 and 1,471,200 in 2008) targeting mainly “at risk people” i.e. less than 5 years old children and pregnant women. A national study conducted in 2006-2007 showed that 33% of households surveyed had a net but only 18% of children actually slept under Insecticide Treated Net (ITNs).

The efficiency of LLINs is obviously linked to the actual community participation [4] and one of the main issues is to get and then to maintain an universal coverage [5]. This point requires sound information of usual knowledge, attitude and practices (KAP) of targeted population in term of malaria and mosquito control at family

and individual level to adapt message of sensitization accordingly. Therefore several such KAP surveys were implemented in Ethiopia [6-11], Tanzania [12], Sudan [13], Swaziland [14,15], Nigeria [16-20], Burkina Faso [21], Cameroon [22-26], Ghana [27] etc before and after large scale LLIN distribution. It was often noticed that availability could not necessarily imply acceptability and use everywhere even in the same country [19,24].

The “review of data from household surveys, including demographic and health surveys in sub-Saharan African countries” [28] showed that “not all mosquito nets owned by African households are being used for young children”... “use was lower than possession because:

- nets were scarce (mean 1.8 per possessing household);
- nets were not always used for children;
- use was lower during hot, dry months than during cool rainy months, and many surveys had been conducted in the dry season”.

Analysis of data from “a total of 28 countries in sub-Saharan Africa” showed that “ownership of ITNs was consistently higher than population access and population use” [29] but access to LLIN

increases their use and adapted IEC campaigns must be elaborated and launched accordingly [30,31].

This first Knowledge, Attitudes, Practices (KAP) survey was implemented in Lobito in 2011, after a first large scale distribution of LLIN by the National Malaria Control Programme (NMCP) targeting “at risk” groups and before the next step targeting a universal coverage. It was therefore important to precise the actual current behavior of inhabitants towards mosquitoes, their perception of mosquito problems, mosquito control methods implemented at household level with their cost, as reported by interviewees and reason for use/not use of nets, in order to further elaborate, evaluate and improve the next large scale LLIN distribution scheduled in Angola.

## Material and Methods

### Location of study

The survey took place in Lobito, (Benguela Province) (12°22' S; 13°32'E) 500 km south of Luanda, and where malaria is considered as mesoendemic. Lobito is a town of 150 000 inhabitants located on the Atlantic coast, it is the principal port of the province. This city has two different facies: “high part” without permanent water collections, and “low part” with large pools of salt water suitable for of *Anopheles listeri* and dirty stagnant water swarming with *Culex* larvae. Entomological situation of Lobito in both low and high parts was already studied [32] showing the presence of both *Anopheles gambiae* and *Anopheles coluzzii* the main vectors of malaria with proportion changing according to place and seasons. In Lobito, parasitological surveys done in 2006-2007 (Foumane et al., unpub. obs.) showed plasmodic index of 7% and gametocytic index of 1.1% in children 2- 9 years old.

### Targeted populations and Sampling

The sampling unit was a household randomly selected by classical cluster sampling (30 clusters of 14 households) with an assumption that 50% of people are implementing some mosquito control at household level. The survey was done in 2 steps for operational reasons: from 24 May to 28 June 2011, then 26 to 30 August 2011. The field work was done by four agents of the Malaria Control Programme (MCP) of the Sonamet Angolese private society after training in the use of the pre-printed standardized questionnaire developed from the one already used in Cameroon [22,23].

### Information Collected

The questionnaire was filled in by the head of the family or an adult representative of the home. The information gathered were direct observations on housing and environment then interview of head on house about their behavior in term of mosquito control, its rationale and the costs of mosquito control and malaria disease crisis as they estimated.

### Data processing and statistical analysis

Data were processed using Epi Info Version 6.04c. Confidence intervals were calculated using the exact binomial method, with a risk of error of 5%. The statistical tests used were the Chi<sup>2</sup> test or Fisher for proportions, analysis of variance or test Kruskal-Wallis for the mean or median, depending on the requirement for statistical validity of comparisons. The level of significance was set at  $p \leq 0.05$ .

## Results

### Status of the questioned people and household composition

Of the 420 households surveyed, 68.9% of respondents were parents (51.8% of mothers and 17.1% fathers), 27.8% “old” children and 3.3% “other”. The whole population of homes surveyed was estimated at 2,384 people with an average of 5.6 persons per household with 0.4 children less than 1 year; 2.1 child of 1-15 years and 3.1 adults over 15 years. 36.1% of households had no children less than 1 year.

### Ecological and demographic information

People surveyed lived in a detached house in 53.7% of cases, a terraced house in 26.8%, a modern villa in 12.6% and 6.9% in a room. Houses made of cement walls accounted for 77.1%, other materials (adobe etc) for 22.6% and unspecified materials (0.2%). The average number of beds per household was 2.4 (SD 0.88) with extremes ranging from 1 to 6. Domestic water collections were present near houses in 48.3 % of houses surveyed (203/420) and among these 50.7% (103/203) were opened. Within a 20 meters radius outside the house, it was noticed the existence of vegetation in 81.4 % of houses (342/420). This vegetation was “sparse” in 74.6% (255/342), “medium” in 20.5% and “abundant” in 5%. The existence of water tanks potential breeding site for mosquitoes (old boxes, can, old tires, etc) around the houses were noticed in 79.5% of cases (334/420).

### Perception of Culicidae nuisance

94.3% of questioned people said that mosquitoes are “boring”, “annoying” etc, the two main causes of such nuisance were the bite (83.3%) and the noise (62.8%) quite often both nuisances are equally reported. “Disease” transmission was cited by 22.1% of respondents.

### Knowledge and means of protection against mosquito

Questioned people were asked about their usual mode of protection against mosquitoes implemented at family level. 93.6% (393/420) reported actually implementing protection against bites (Table 1), and 50.7% (213/420) used more than one means of protection but 6.4% do nothing. It has to be noticed that more than 50% of people said they have bed nets.

Method of protection	Sample size (n=420)	Percentage	SD 95%*
Domestic canister (Shelltox)	239	56.9%	49.9-63.6
Bed net	222	52.8%	45.9-59.7
Coils	150	35.7%	29.3-42.6
Window screen	28	6.7%	3.8-11.2
Skin Repelents	3	0.7%	0.08-3.4
Traditional package	1	0.2%	0-2.6
Nothing	27	6.4%	3.6-10.9

**Table 1:** Main methods of protection against mosquitoes in Lobito town (May-June – August 2011).

### Monthly Cost of protection

For the 306 subjects who answered, the estimated average monthly cost of protection against mosquito nuisances was # 10 \$ US ( ± # 7 \$ US) with a median of 8 \$ US, (extremes 0.4-32 \$ US).

### Morbid episodes associated with mosquitoes and cost within 15 days prior to the survey

During the 15 days preceding the interview, illness episodes associated with mosquito bites and the costs incurred (as estimated by people) are as summarized in Table II.

Variables	Adults (>15 years)	children (<14 years)	p
No of sickness	86/1319 (6.5%)	120/1065 (11.3%)	<0.05
Household with at least one sick people	75/420 (17.9%)	104/420 (24.8%)	<0.05
Household notifying the cost of the disease	20/75 (26.7%)	44/104 (42.3%)	NS
Sick people notifying the cost of the disease	24/86 (27.9%)	52/120 (43.3%)	<0.05
Average cost of a malaria crisis	# 21 \$ US	# 22 \$ US	NS

**Table 2:** Episodes morbid and cost within 15 days preceding the interview in some homes in Lobito, Angola, May-June and August 2011.

Significantly more child than adults were “sick due to mosquitoes”, respectively 11.3% and 6.5%, (p <0.05). The same trend was observed in households with at least one sick people, 24.8% of child against 17.9% in adults, as well as in notifying the cost of the disease (43.3 % for child *versus* 27.9% for adults (p <0.05).

Curiously the cost of the disease, as reported by questioned, was almost the same for adult or children malaria crisis; while it has to be kept in mind that drugs of the National Malaria Control Programme recommendations for malaria crisis are Artemisin Combined Therapy which are actually officially given free of charge!!!

### Availability and use of mosquito nets

222 of the 420 households surveyed had at least one bed net (52.8%) and the total number of nets for these homes was estimated at 438, i.e. # 1.04 net per household. These nets protected a population estimated at 795 people (89 babies, 318 children and 388 adults), i.e. 33.3% (Table 3) of the surveyed population. Protected population was significantly higher in babies (53%) than children and adults (# 30%).

This is worth noticing because it demonstrates that the first LLIN distributions get part of its goal in prioritization of babies for malaria vector protection through regular use of impregnated mosquito nets.

In both groups of homes, "equipped" as well as "not equipped" in bed nets, advantages and disadvantages of nets were discussed to identify the reasons for using or not using them [33]. The “uncomfortable” and “heat” are the 2 main reasons advocated for the non-use of mosquito nets (Table IV) and are also reported by users of bed nets even in much less percentage (#10% instead of # 30%).

The “not easy to use” issue is also reported by non-users (12%) and by “users” but in much lower percentages (# 3%). The cost doesn't seem to be a great issue in the no purchase and use of nets. The average purchase cost of a LLIN as estimated by 169 households, was # 3 \$ US ( ± 2 \$ US).

Age	Sleeping under bednet	%	SD 95%*
Babies <1 year (n=167)	89	53.3%	42.1-64.2
Children 1-15 years (n=898)	318	35.4%	31.0-40.1
Adults >16 years (n=1319)	388	29.4%	25.9-33.1
Total (n=2384)	795	33.3%	30.7-36.1

**Table 3:** Percentage, by age group, of subjects sleeping under mosquito net in a random sample in Lobito, Angola, May-June and August 2011 group.

Issues	Household without bednet	Household with bednets	p
	n=192	n=228	
Uncomfortable (« Incomoda »)	67 (34.9%)	23 (10.1%)	<0.005
Hot (« Calor »)	59 (30.7%)	29 (12.7%)	<0.005
Not easy to use (« Manutenção »)	23 (12.0%)	8 (3.5%)	<0.005
Cost (« Custo »)	4 (2.1%)	1 (0.4%)	NS
useless (« Nao é eficaz »)	0 (0%)	1 (0.4%)	NS

**Table 4:** Issues mentioned for the use or not of nets in a sample of households in Lobito, Angola, May-June and August 2011.

### Knowledge on ITN

357 of households questioned (85%) are aware of ITNs/LLINs and 281 answered to be “ready to use”. After providing to questioned families some more information about ITNs/LLINs which can kill mosquitoes and avoid diseases, 354 households (84.3%) would be willing to get some but at an average price of # 1.2 \$ US the unit ( ± 1.2 \$ US). This is interesting to keep in mind as the NMCP scheduled large scale distribution of LLINs free of charge!

### Conclusion

This cluster sampling survey showed that in Lobito, as well as other surveyed towns in Africa South of Sahara such as in Douala, Yaoundé etc [22,23], the nuisance is the main cause of mosquito control at household level and more than 90% of surveyed people regularly implement some methods (at least one if not two) for mosquito protection. The most popular is the domestic can which have often some efficacy and their “spectacular” knock down effect induce people to regularly use them but they are short lasting and space spraying of house has to be done every evening inducing some costs. More than 50% of surveyed people reported a regular use of bed nets for mosquito protection and a special attention is devoted to babies who are the most susceptible to malaria disease, this behavior could be linked to the previous LLIN distribution which sensitized communities and targeted babies. 85% of surveyed people knew LLIN and 67% said they

were even willing to pay for them if they actually protect against mosquitoes and diseases.

Discomfort, hot, and issue to use were the main drawbacks of nets reported from both household “with” and “without net” but more frequently in houses without nets. According to answer mosquito control operations at household level cost around # 10 \$ US ( ± # 7 \$ US \$)/month and for interviewees a mosquito net costs # 3 US \$ (market price). These are very positive information for National Malaria Control Programme which already distributed LLIN free of charge to “at risk” people (children <5 and pregnant women) and schedule scaling-up of LLIN still free of charge for universal coverage. On the other hand the nuisance is mainly due to *Culex quinquefasciatus*, the “urban mosquito” which is resistant to several insecticides [34], including pyrethroids used for impregnation of LLIN, and even if local *Anopheles* malaria vectors are still susceptible to pyrethroids such resistance of *Culex* could hampered the regular use of LLIN if they don't obviously reduce the nuisance. This entomological and cultural situation has to be taken into due consideration and an Integrated Vector Management (IVM) must be developed for vector control in the framework of the National Malaria Control Programme (NMCP) which planified implementation of Inside House Spraying (IRS) and larval control with *Bacillus thuringiensis* moreover large scale distribution of insecticide treated nets. 22% of questioned people advocated their mosquito control operations at familial level as part of disease prevention, the main one being “malaria” and this is very important as the etiology of fever is generally reported of great variety; if “malaria fever due to mosquitoes” is usually advocated by nurses, people quite often link “fever” also to food, sun, weariness etc [35].

According to answer, during the two weeks before the studies a “disease due to mosquitoes” occurred in # 25% of households surveyed and more than 10% of children were “sick of malaria” underlining the importance attributed to malaria in the health of babies and the needs for their protection for disease prevention. The treatment of “malaria” was estimated by people, at a cost of # 22 US \$ for children as well as for adults. It is interesting to notice that Artemisin Combined Therapy (ACT) treatment is in fact given free of charge in National Health Center but the behavior of buying “drugs” in the market is still common (VF unpub obs.) with the well-known risks of false drug. Information gained during this cluster sampling survey in Lobito showed some actual impact of the first step of LLIN distribution which targeted babies, in term of knowledge of LLIN by communities, “malaria” as a mosquito borne disease, improved protection of babies against mosquitoes and malaria etc as it was observed a regular use of net in some 50% of household surveyed with already # 1 net/house. But the National Malaria Control Programme scheduled other step of Long Lasting Insecticide treated Nets (LLINs) distribution to gain the universal coverage required and Information, Education, Communication (IEC) campaign will have to be developed according to these social information to obtain better participation of communities, a clues for the efficiency of the vector control programme part of the Malaria Elimination targeted.

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