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Research Article

Estimation of Long-Lasting Insecticidal Bednets usage in 14 Cutaneous Leishmaniasis Endemic Areas in Morocco

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Abstract

One of the recommended control methods to reduce leishmaniasis transmission is the use of long lasting insecticide nets (LLINs). However, recent studies in Morocco show that their effect on cutaneous leishmaniasis (CL) incidence was minor.

Aim: This study was conducted to identify the factors that might explain this low impact; mainly ownership and use after distribution.

Subject and methods: The study involved fourteen localities covered by LLINs and was based on a households (HH) survey, which utilized a simple random sampling design. Interviews were done during May-June 2012, with each head of randomly selected HH using a questionnaire. Data were analyzed by using the normal test for the comparison of proportions and the student test for comparison of means.

Results: In the fourteen localities, LLINs ownership was good: 94.4 % (62-100). On average, each household received 3.2 LLINs. The proportions of individuals sleeping under LLINs was very low (34.3%) with no significant difference between both sexes. Results of the study support the conclusion that the low impact of LLINs intervention is due to their low usage by the population.

Conclusion: There is a need to strengthen the communication with community to improve the use of nets and assure an effective impact on leishmaniasis transmission.

ABBREVIATIONS

LLINs: Long Lasting Insecticide Nets; CL: Cutaneous Leishmaniasis; HH: Household

INTRODUCTION

Cutaneous Leishmaniases (CL) remainas a major health issue in Morocco [1,2]. Two forms are described; anthroponotic and zoonotic leishmaniasis. The zoonotic forms are caused by *Leishmania major* and *L. infantum* [3]. *Leishmania major* is endemic in the south and the east of the country where its vector, *Phlebotomus papatasi* and its reservoir host, *Meriones shawi*, are prevalent [4,5]. CL caused by *L. infantum* has been described mainly in the north of the country [6-9]. The anthroponotic CL, prevalent in the center and the north of the country [3,10], is due to *L. tropica* and transmitted by *Ph. Sergenti* [11,12]. Major epidemics of CL have occurred in Morocco recently, with 8000 cases nationwide in 2010 [10]. In 2011 and 2012, the Moroccan Ministry of Health reported respectively 4319 and 2990 cases caused by both *L. major* and *L. tropica*. Control measures against leishmaniasis rely on case management, rodent reservoir control in zoonotic foci, and vector control in anthroponotic foci. Vector control methods have historically relied mainly on environmental management. In addition, focal indoor residual spraying with DDT or synthetic pyrethroids and use of bednets has been conducted in some transmission foci.

Between 2010-2015, a nationwide study was conducted in 42 localities belonging to eight leishmaniasis endemic provinces to compare the effectiveness of long lasting insecticide treated bednets and indoor residual spraying for the control of cutaneous leishmaniasis in Morocco [13]. Results of this study revealed that the impact of LLINs on leishmaniasis transmission was weak with a non-significant reduction in CL incidence.

Hence, the current study was conducted to identify the factors that might explain this low impact. It is about a household survey conducted in fourteen localities where long lasting insecticide nets (LLIN) were distributed to determine their availability and use after distribution. This paper describes the methodology and results of this survey.

MATERIALS AND METHODS

The study was a cross-sectional household survey using a simple random sampling design. The sampling involved fourteen localities covered by LLINs. These localities are belonging to five provinces: Azilal, Tinghir, Essaouira, Moulay Yacoub, and Chichaoua (Figure 1). Characteristics of these localities are summarized in (Table 1). The nets were distributed door to door to the target localities to cover all sleeping areas. In these localities, kids are used to sleep near each other's. Therefore, two people bed net could cover up to four kids.

Data collection

The study was based on a households (HH) survey conducted in the14 localities during May-June of year 2012. Interviews were done with each head of HH using a questionnaire, which was pre-tested and adapted to the local characteristics of each locality.

The questionnaire was divided into four sections including HH demographic characteristics, knowledge on CL and attitudes adopted to prevent disease transmission, knowledge on bed nets, nets owned by the HH and their use. The questionnaire was used by trained healthcare professionals.

In each locality, an alphabetical list of HH was established. 10 % of them were randomly selected to answer the questionnaire. The choice of the HH was made by using a simple random sampling with interval. The first HH to keep for the survey was randomly selected from the HH list. Next HH were selected after every 10 HH count. Each selected HH was visited at home and the head of HH or an adult person acting on behalf of him was interviewed.

Data processing and analysis

The information collected from the survey forms was entered by creating a data entry form under the Census and Survey Processing System (CSPro), a public domain software package developed and supported by the U.S. Census Bureau and used for entering, editing, tabulating, and disseminating census and survey data.

All the information is then centralized in an Excel file. Frequencies and means of responses were computed to describe the basic characteristics of HH in each locality. We used the normal test for the comparison of proportions and the student test for comparison of means. The tests are significant if $p < 0.05$ [14].

Main indicators used for data analysis are:

- Net coverage: the total number of nets relative to the total number of sleeping units.

- Net usage: proportion of family members who slept under LLINs the previous night.

RESULTS AND DISCUSSION

(Table 1) showed that 6714 LLINs has been distributed to the population living in the localities involved in this study.

The coverage rate was 100% for eight localities. The lowest rates are in the province of Azilal in the localities Iaatarne (62%) and Ait Ouariane (71%). These low coverage rates are mainly explained by the absence of heads of HH and their families at the time of the distribution and during the catch-up sessions.

A random sample of 299 HH from the 14 localities involved in the study was selected to determine the availability and usage rate of nets.

100% of the 299 households surveyed, received LLINs. The average number of LLINs received is 3.2 LLINs per household (Table 2).

The use rate was very low in almost all the localities of the study, except in two localities; Ait Ouariane and Timolite in Azilal province where the rates of usage were satisfactory; respectively

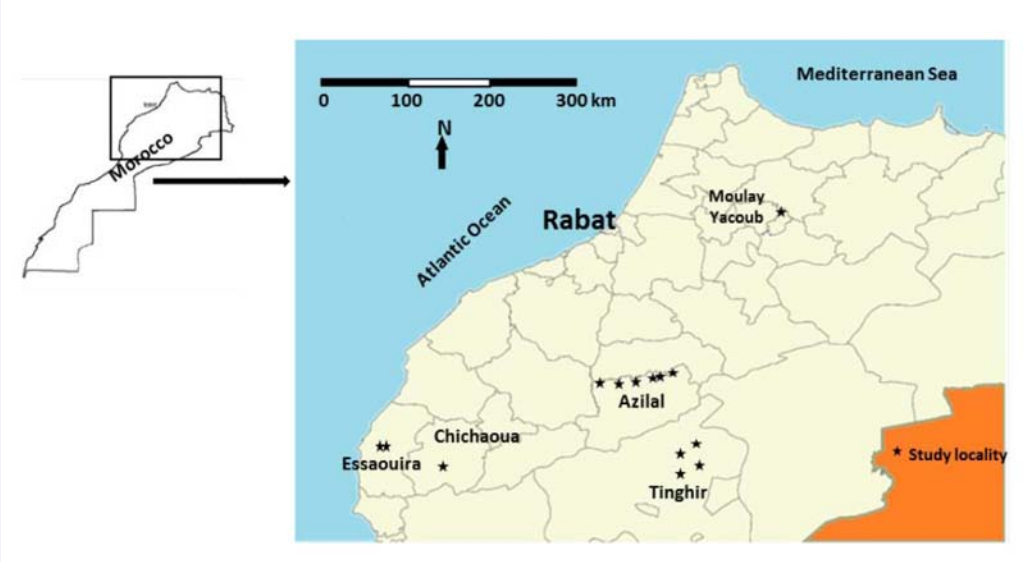

Figure 1 Map of study locations.

Table 1: Characteristics of localities involved in the study.

Provinces	Localities	Number of households	Bednets distributed			Protected population	Total population	Coverage rate (%)
			Total	1P	2P			
Azilal	Ait Chribou	131	426	00	426	738	773	95.47
	Ait Ouariane	92	315	00	315	529	745	71.00
	Bouaziar	120	462	00	462	755	864	87.38
	Iaatarne	105	322	00	322	423	679	62.30
	Ouaourinte	75	265	00	265	543	625	86.88
	Timolite	325	500	00	500	1716	1727	99.36
Tinghir	Ait Ali	176	702	00	702	1358	1358	100.00
	Ait Boulemane	93	353	00	353	638	638	100.00
	Ait Brahim	199	819	00	819	1498	1498	100.00
	Jida	101	429	00	429	645	645	100.00
Essaouira	Soualeh	48	262	50	212	375	375	100.00
	Tabia	375	1128	400	728	1544	1544	100.00
Chichaoua	Aderdor	136	432	170	262	696	696	100.00
MlyYacoub	OuledAyed	115	299	00	299	670	670	100.00
Total	**14**	**2091**	**6714**	**620**	**6094**	**12128**	**12846**	**94.41**

Abbreviations: [1P: bednet for one person; 2P: bednet for two people]

Table 2: LLIN ownership and usage by locality.

Provinces	Localities	Number HH surveyed	Numbersurveyed			Average LLIN per HH	Use rate (%)		
			total	women	men		total	women	men
Azilal	Ait Chribou	13	85	42	43	3.3	25.9	12.9	12.9
	Ait Ouariane	10	60	26	34	3.4	98.3	43.3	55
	Bouaziar	12	80	45	35	3.9	32.5	15.0	17.5
	Iaatarne	11	68	34	34	3.1	33.8	16.2	17.6
	Ouaourinte	8	35	16	19	3.5	37.1	20.0	17.1
	Timolite PAM	33	169	81	88	1.5	84.0	40.2	43.8
Tinghir	Ait Ali	41	354	190	164	4.0	20.6	11.0	9.6
	Ait Boulemane	25	218	103	115	3.8	18.3	9.2	9.2
	Ait Brahim	35	257	127	130	4.1	28.4	15.6	12.8
	Jida	21	140	72	68	4.2	33.6	17.8	15.7
Essaouira	Soualeh	9	53	24	29	5.5	37.7	18.9	18.9
	Tabia	42	209	105	104	3.0	28.7	15.8	12.9
Chichaoua	Aderdor	26	159	70	89	3.2	29.6	15.7	13.8
MlyYacoub	OuledAyed	11	65	29	36	2.6	36.9	16.9	20.0
Total	Total	299	1964	968	996	**3.2**	34.3	17.3	16.9

Abbreviations: HH: Household; LLINs: Long Lasting Insecticide Nets

98 and 84 %. Overall, only 34% of the study population reported using a net at the time of the survey, with an equal usage by both sexes. The normal test-U showed that there is no-significant difference between both sexes (p=0.57).

The present household survey is particularly interesting because it is the first report describing bednets ownership and usage in CL-endemic areas in Morocco in particular and in the old world in general. To our knowledge there is no publication related to the LLINs coverage and utilization for CL prevention. Studies on this subject are so far mainly performed on bednets use for malaria in Africa [15-19] and visceral leishmaniasis in the Indian subcontinent [20].

These survey findings show that even if the average coverage was up to 94 %, the proportion of individuals sleeping under LLINs was low (34%), possibly, because the perceived risk of CL is small and because of *L. tropica* CL is a non-invalidating disease.

This low uses of LLINs could be also explained by the low knowledge on the importance of bednets use, in spite of the effort

made to heighten the awareness of the population by Health officers. Therefore, it is possible that the low levels of LLIN use compromised the efficacy of the LLIN intervention.

To achieve a high proportion of people using the nets during the CL transmission season, a behavior change is needed. More investigations to determine factors inducing low LLIN use in endemics areas are very important before any new introduction of the LLINs in CCL endemics areas in Morocco.

CONCLUSION

Results of the study support the conclusion that the low impact of LLINs intervention on CL incidence is due to their low usage rates by the population.

Our results indicate that LLINs interventions need to be strengthening by communication with community using LLIN to improve their use and assure an effective impact of the intervention on CL incidence. A communication strategy should be developed taking into account the factors that motivate a family to appropriately use bednets and should accompany the net distribution.

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