A Preliminary Evaluation of Insecticide-Impregnated Ceiling Nets in Western Kenya

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Materials and Methods

- Olyset (2% permethrin) roll, cut and sewn into sheets
- Untreated Olyset netting - same mesh size etc
- 3 houses in Nyandago village, Mbita western Kenya.
- Primary malaria vectors: *Anopheles gambiae s.s.*, *An. arabiensis*, *An. funestus*
- 3 houses selected: NYAND 6, 8 (intervention) and NYAND 11 (control)
- 10.5 × 5 m of netting was installed in each home
- Bed nets were in use before and during these trials
Timeline

• May 26, 2010 Olyset ceiling nets installed in two intervention houses – left for 9 months & removed February 11, 2011.

• 1 week later untreated nets installed (February 18, 2011).

• New Olyset ceiling nets were reinstalled in the 2 intervention houses February 25, 2011.
Mosquito collection

- 3 times before intervention
- 6 times after installation of Olyset ceiling net
- 5 times after removal of the Olyset ceiling net
- 5 times after intervention with untreated ceiling nets;
- 4 times after re intervention with new Olyset ceiling nets
Nets stapled into wall by eaves
Changes in the number of mosquitoes collected in the intervention houses (NYAND 8 and NYAND 11) and the control house (NYAND 6). The red arrow indicates the day of intervention (May 26, 2010).
Mean no. mosquitoes collected before and after intervention with permethrin-impregnated ceiling nets and after removal and after intervention with permethrin-untreated ceiling nets, and after re-intervention with new permethrin-impregnated ceiling nets. Bars indicate 95% confidence limits.
## Total Mosquitoes collected

<table>
<thead>
<tr>
<th>Total mosquitoes collected</th>
<th>An. gambiae s.l.</th>
<th>An. funestus s.l.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention house #8</td>
<td>18</td>
<td>151</td>
</tr>
<tr>
<td>Intervention house #11</td>
<td>18</td>
<td>188</td>
</tr>
<tr>
<td>Control House #6</td>
<td>96</td>
<td>1590</td>
</tr>
</tbody>
</table>
Preliminary Evaluation of Insecticide-Impregnated Ceiling Nets with Coarse Mesh Size as a Barrier against the Invasion of Malaria Vectors

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\(\text{Received October 14, 2011. Accepted February 13, 2012}\)

SUMMARY: We evaluated the effectiveness of installing the Olyset\textsuperscript{\textregistered} Net on the ceiling in preventing the invasion of malaria vectors. This study was conducted in homes in western Kenya. The number of resting mosquitoes inside the houses reduced when the ceiling and even the houses were covered with the net. The mosquito densities remained low for 9 months, until the nets were removed.

Olyset\textsuperscript{\textregistered} Net, which is made of polyethylene netting material mesh size 30 holes/cm\(^2\), with permethrin (2%) incorporated into the polymer before monofilament yarn formation, is one of the most successful long-lasting insecticide-treated net (LLITN) products recommended by the World Health Organization. In this present study, we evaluated the effectiveness of Olyset\textsuperscript{\textregistered} Net as a barrier against the invasion of malaria vectors. We propose that the use of Olyset\textsuperscript{\textregistered} Net with a coarse mesh size to cover the ceiling and the screen is a novel, economical, and environment-friendly protective measure against the entry of mosquitoes.

Two net materials were used: Olyset\textsuperscript{\textregistered} Net. The net material was impregnated with 2% permethrin, the other material was untreated. Each net material was cut and sewn into sheets measuring 7 m x 2 m. The nets were installed under the ceiling, and ring hangers were attached to the diagonal positions of the net. The study was performed in 3 houses in Nyangondo Village, Gembe East, Mbita Division, Saba district of Nyanza Province, western Kenya. The Gembe East area has a population of ca. 13,000 with 3,700 households and an area of 46.2 km\(^2\). The mosquito vectors present in the area are Anopheles gambiae complex, An. funestus, and An. arabiensis. Among Anopheles gambiae complex, An. gambiae sensu stricto, and An. arabiensis are the main breeding areas of the malaria mosquito. Two houses (NYAND 1 and 11) were used as the intervention houses, while the third (NYAND 6) constituted a control house. NYAND 8 and 11 have 1 bedroom and 1 living room divided by a partition, and NYAND 6 has 2 bedrooms and 1 living room divided by partitions. The residents were informed about the study and their written consent was obtained before the intervention. Data on the residents' sleeping conditions and their movement were recorded and maintained during the intervention. NYAND 8 and 11 received intervention with permethrin-impregnated ceiling nets on May 31, 2010. One and a half ceiling nets (7 m x 5 m plus 5 m x 5 m) were installed to cover the ceiling of each house. The bottom edges of the ceiling nets were stapled to the edge of the eaves or mud walls to close the openings of the roof (Fig. 1). The ceiling nets were kept hanging for ca. 3 months and were then removed on February 11, 2011. To compare the effect of the ceiling nets with or without permethrin treatment, untreated nets were placed on the ceilings 1 week after the removal of the permethrin-impregnated nets (February 18, 2011), in the same manner as described above. Finally, new permethrin-impregnated ceiling nets were reinstalled in the 2 intervention houses on February 25, 2011.

Mosquito collection was performed in each of the 3 houses in the morning (07:00-09:00). Anopheles mosquito resting on the walls, under the furniture, etc., were collected by 3 different persons for ca. 30 min per house using a battery-powered aspirator (CEM-30).
Thank You!