Do topical repellents divert mosquitoes within a community?

Marta Maia¹²*, Peter Sangoro¹², Max Thele³, Elizabeth Turner⁴, Sarah Moore¹²

From Challenges in malaria research Basel, Switzerland. 10-12 October 2012

**Background**

Repellents are compounds which interfere with the mosquito’s olfactory system hindering them to identify their hosts and succeeding in taking a blood-meal [1]. However, repellents do not eliminate the host-seeking mosquitoes, they simply reduce human-vector contact. Consequently, there is a possibility that individuals, who do not use repellents, experience more bites than usual because mosquitoes are diverted from the repellent users. The objective of this study was to measure if diversion occurs from households that use repellents to those that don’t within a community with incomplete topical repellent coverage.

**Materials and methods**

An interventional study was performed in three villages of southern Tanzania using 15%-DEET (N,N-Diethyl-meta-toluamide) and a placebo lotion. Three coverage scenarios were investigated: complete repellent coverage (all households were given 15%-DEET), incomplete repellent coverage (80% of households were given DEET-15% and 20% were given a placebo lotion) and no repellent coverage (all households were given a placebo lotion). The coverage scenarios were rotated between villages. Mosquito densities were measured through aspiration of indoor and outdoor resting mosquitoes respective to each enrolled household. Data was analysed using mixed-effects models and the no coverage scenario was used as reference.

**Results**

Placebo users living in a village where 80% of the households used 15%-DEET were likely to have nearly three times more mosquitoes (p<0.001) resting in their dwellings in comparison to households in a village where nobody uses repellent (Table 1).

**Conclusions**

There is strong evidence that mosquitoes are diverted between households that use repellent to those that don’t. This study arises questions on health equity associated with repellent usage. Policy makers should take into consideration these results while devising vector control programs, as less privileged individuals are likely to suffer more mosquito bites and therewith be more exposed to vector-borne diseases if universal coverage is not reached.

| Treatment Group                          | IRR   | Mean¹ | 95% CI        | p-value |
|-----------------------------------------|-------|-------|---------------|---------|
| No coverage                             | 1.00  | 4.97  | [3.77 - 6.16] |         |
| Complete coverage                       | 0.50  | 2.49  | [1.76 - 3.22] | <0.001  |
| 80% Coverage (repellent users)          | 0.69  | 3.45  | [2.83 - 4.06] | 0.015   |
| 80% Coverage (non repellent users)      | 2.87  | 14.25 | [9.74 - 18.76]| <0.001  |

¹Department of Disease Control, London School of Hygiene & Tropical Medicine, London, WC1E 7HT, UK

Full list of author information is available at the end of the article.

© 2012 Maia et al; licensee BioMed Central Ltd. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/2.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.
Acknowledgments
We would like to thank the people of Sanje, Upper and Lower Matete for their support during the project.

Author details
1Department of Disease Control, London School of Hygiene & Tropical Medicine, London, WC1E 7HT, UK. 2Environmental Group, Ifakara Health Institute, Bagamoyo, United Republic of Tanzania. 3Institut Franco-Allemand de Recherche de Saint Louis, St. Louis, France. 4Departments of Biostatistics and Bioinformatics, Duke Global Health Institute, NC, USA.

Published: 15 October 2012

Reference
1. Davis EE: Insect repellents: concepts of their mode of action relative to potential sensory mechanisms in mosquitoes (Diptera: Culicidae). J Med Entomol 1985, 22:237-243.
doi:10.1186/1475-2875-11-S1-P120
Cite this article as: Maia et al: Do topical repellents divert mosquitoes within a community? Malaria Journal 2012 11(Suppl 1):P120.