Screening mosquito entry points into houses with novel long-lasting insecticidal netting to reduce indoor vector densities and mitigate pyrethroid resistance

Mercy Opiyo¹,², Francisco Saute¹, Mara Maquina¹, Lauren Cator⁴, Neil Lobo⁵ and Krijn Paaijmans¹,²

¹Centro de Investigación em Saúde de Manhiça (CISM), Fundação Manhiça, Mozambique; ²Barcelona Institute for Global Health (ISGlobal), Barcelona, Spain; ³Arizona State University, Tempe, USA, ⁴Imperial College, London, UK, ⁵University of Notre Dame, USA

Corresponding author: mercy.opiyo@isglobal.org

Background

Objective and Methodology

Connerstone tools for control and elimination of malaria

- Contributed to about 78 % of the gains
- Malaria elimination in southern Mozambique

Challenges resulting from wide use of bed nets and IRS

- Do not target vectors biting outdoors
- Vectors enter houses to bite and immediately leave without coming into contact with bed nets and walls treated with insecticides
- Vectors don’t rest on the walls inside the houses

Addressing the protective gaps through housing improvements

- Enormous contribution in fight against malaria 20th century, and can do so well in this era.
- Sustainable tool for malaria control
- Impact of screening mosquito entry points with insecticide treated meshes.

Objectives and Methodology

1. Assess preferential points of entry of different mosquito species into experimental huts reflecting local house construction

(i) Experimental huts: 3 and will be equipped with mosquito entry traps.
(ii) Eave openings: front and back each receives entry trap
(iii) Windows: entry traps on each window and one to cover the open 5 cm below the door when closed.
(iv) Sampling duration: 1 week/month for seven months
(v) Study volunteers: Rotated between huts daily

The 3 experimental huts:

(i). Treatment 1: unscreened windows and eaves
(ii). Treatment 2: windows and eaves screened with untreated mesh
(iii). Treatment 3: windows and eaves screened with chlorfenapyr-treated mesh

Each hut will be coupled to the same volunteer and trap
Treatments rotating between huts

Sampling duration: 3 weeks/month for seven months
Study design: 3x3 Latin Square

2. a) Determine if experimental huts with untreated window and eave screens reduce indoor mosquito densities, compared to unscreened experimental huts
b) Determine if experimental huts with chlorfenapyr-treated window and eave screens reduce indoor mosquito densities, compared to experimental huts with untreated screens

3. Determine if (delayed) mosquito mortality increases in experimental huts with chlorfenapyr-treated window and eave screens, compared to experimental huts with untreated screens

Live mosquitoes (from the huts with untreated mesh and huts with treated mesh) will be transferred to insectaries to monitor delayed mortality (24, 48, 72, 96 and 120 hours post-collection)

Current status

Funding agreements finalized
Next step is building the huts in April
Study commences in early June during dry season in Mozambique

Email: mercy.opiyo@isglobal.org