Research in progress (housing & malaria)

Professor Steve Lindsay, Durham University, UK
Overview:

1. WHO policy documents
2. Recent research on risk
3. Development of new interventions
Health policy on housing
1. Global Vector Control Response 2017-2030

- Insecticide-treated bed nets deployed on a mass scale
- Community-wide spraying of insecticides inside houses on surfaces where vectors rest
- Use of long clothing and topical repellents for personal protection
- Covering, emptying and cleaning of containers used for domestic water storage
- Elimination of old tyres and containers by good solid waste management/clean up campaigns by local communities
- House improvements by installing window screens, plastering walls or changing from thatch roofs
- Release of modified, transgenic or sterile vectors to suppress or replace wild populations
- Spatial repellents to stop vector entry into households and other areas
- Vector traps and targets with or without toxic baits for control/surveillance
- New insecticides with different modes of action
- Drainage or treatment of stagnant water with chemical or biological larvicides
- More effective combination of vector control with medicines and vaccines
2. WHO Policy document from Department of Public Health, Environmental and Social Determinants of Health

KEEPING THE VECTOR OUT

Housing improvements for vector control and sustainable development
Research on risk
3. Malaria and house design in rural Uganda

Rapid improvements to rural Ugandan housing and their association with malaria from intense to reduced transmission: a cohort study

John C Rek*, Victor Alegana*, Emmanuel Arinaitwe, Ewan Cameron, Moses R Kamya, Agaba Katureebe, Steve W Lindsay, Maxwell Kilama, Sarah G Staedke, Jim Todd, Grant Dorsey, Lucy S Tusting
Malaria and house design in rural Uganda

- Rapid improvements in house design were observed in a cohort of households in rural eastern Uganda from 2013-2016

- After malaria transmission was reduced by a mass IRS campaign, ‘modern’ housing was associated with additional reductions in mosquito density (73% lower) and parasite prevalence (57% lower), compared to ‘traditional’ homes.

- Conclusion: housing improvements may add benefit alongside primary interventions.

Out on February 9th 2018 in *The Lancet Planetary Health*

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4. New house designs

THE LANCET
Planetary Health

Affordable house designs to improve health in rural Africa: a field study from northeastern Tanzania

Lorenz von Seidlein, Konstantin Ikonomidis, Salum Mshamu, Theresia E Nkya, Mavuto Mukaka, Christopher Pell, Steven W Lindsay, Jacqueline L Deen, William N Kisinza, Jakob B Knudsen
4. New house designs


4. New house designs

Reductions in malaria vectors

- 96% (95% CIs = 92-98%) in double-storey buildings
- 77% (95% CIs = 72-82%) in single-storey buildings
- 23% (95% CIs = 18-29%) in control buildings
5. Relative attractiveness of African houses – Ebrima Jatta
80-100% malaria transmission in sub-Saharan Africa occurs indoors

Experimental houses on village edge
Experimental houses

Experimental houses, Wellingara
# Latin Square design

<table>
<thead>
<tr>
<th>Week</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Metal roof</td>
<td>Thatched, closed eaves, screened doors</td>
<td>Thatched, open eaves</td>
<td>Thatched roof, closed eaves</td>
<td>Roo Pfs</td>
</tr>
</tbody>
</table>
Moving roofs
Small changes to rural houses can be protective against malaria vectors.
Changing temperatures

Night

Day

Night

Day
Indoor temperatures in different Gambian houses

Outdoor temperature

Temperature (°C)

Indoor temperatures in different Gambian houses

Outdoor temperature
Development of interventions
6. Development of new screened doors –

Intellectual Ventures, Global Good Fund, Bellvue, USA
Evolution of the door

Gambian  Francophone  RooPfs  Concertinaed
New screened, self-closing doors

Control

D1

D2

D3

D4

Designed by J. Knudsen & Global Good
Reduction in nuisance mosquitoes entering houses

![Graph showing reduction in nuisance mosquitoes entering houses. The x-axis represents weeks, ranging from 1 to 8. The y-axis represents the number of other mosquitoes s.l./house/night, ranging from 0 to 250. Two lines are shown: one for Control (N = 6) and one for All GG doors (N = 24). The Control line shows a decrease in mosquitoes after the first 3 weeks, while the All GG doors line shows a gradual increase starting from the fourth week.]
7. Eaves tubes

Marit Farenhorst reporting progress with the Eave tube trial later
Thank you, find out more visit rollbackmalaria.org
@RollBackMalaria