Outdoor sleeping and other night-time activities in northern Ghana: implications for malaria prevention

Presented by April Monroe

January 29, 2015
Background

- Persistently high malaria prevalence\(^1\), despite multi-year LLIN distribution and targeted IRS
- Night-time biting (18.00-06.00; peak biting 23.00-04.00)\(^2\)
- Presence of endophagic and exophagic vectors\(^2\)

1-Ghana MICS 2011
2-PMI Africa IRS (AIRS) Project: Entomological Monitoring of the Africa IRS (AIRS) Program in Northern Ghana Annual Report
Methods

- February-March 2014 (late dry season)
- Continuous household observations (18.00-06.00)
- In-depth interviews
## Results

### Household Observations

<table>
<thead>
<tr>
<th>Region</th>
<th>Upper West Region</th>
<th>Northern Region</th>
<th>Total Households (members)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 (n=94)</td>
<td>12 (n=88)</td>
<td></td>
<td>24 (n=182)</td>
</tr>
</tbody>
</table>

### In-depth Interviews

<table>
<thead>
<tr>
<th>Role</th>
<th>Upper West Region</th>
<th>Northern Region</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Member</td>
<td>16</td>
<td>12</td>
<td>28</td>
</tr>
<tr>
<td>Health Worker</td>
<td>6</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>Community Health Volunteer</td>
<td>4</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

| Total                    | 26                | 22              | 48    |
Percentage of observed study population outdoors, throughout the night (n=182)
Results: Outdoor Activities

Early Night (18.00-23.00)
- Working
- Household chores
- Socializing
- Eating
- Bathing
- Studying
# Results: Outdoor Activities

<table>
<thead>
<tr>
<th>Time</th>
<th>Activities</th>
</tr>
</thead>
</table>
| **Late Night (23.00-04.00)** | - Funerals  
- Weddings  
- Festivals  
- Illness  
- Emergencies |
| **Morning (04.00-06.00)**    | - Household chores  
- Bathing  
- Eating |
Results: Outdoor Sleeping

• 42% of observation participants slept outdoors at some time during the night
• Most common reason cited was heat
Results: Net Use

- Among observation participants, 69% had access to a net at the household level.
- Among those with access, only 17% used a net at any time during the night.
Results: Barriers to Net Use

- Heat
- Fluidity of sleeping spaces
- Difficulty hanging net outside
Conclusions

Key findings
• Outdoor night-time activities make LLIN use infeasible in some settings
• Funerals represent a common activity during peak biting time
• Under-utilization of LLIN for indoor and outdoor sleeping was identified

Limitations
• One time of year (late dry season)
• Observations limited to one village in Upper West Region and one in Northern Region
• Not designed to show causal link between night-time behavior and parasitemia rates
Recommendations

- Similar studies needed during other times of year
- Epidemiological and entomological research needed to quantify relative risk
- Research on acceptability and feasibility of outdoor net use
- Development and implementation of complementary outdoor prevention strategies
Acknowledgements

Co-Investigators
• Steven Harvey (PI)
• Obed Asamoah
• Yukyan Yam
• Hannah Koenker
• Emily Ricotta
• Matthew Lynch
• Paul Psychas
• Sureyya Hornston
• Amanda Berman

Contributors
• Study participants
• Local leaders
• Data collection team
• Ghana National Malaria Control Program

Funding Support

President’s Malaria Initiative
Thank you

For more information on this study:


http://www.malariajournal.com/content/14/1/35
Supplemental: Intra-household Access

*Koenker 2014- Recalculating the Net Use Gap: A Multi-Country Comparison of ITN Use verses ITN Access*

“First, an intermediate variable of “potential ITN users” was created by multiplying the number of ITN in each household by a factor of 2.0. In order to adjust for households with more than one net for every two people, the potential ITN users were set equal to the de-facto population in that household if the potential users exceeded the number of people in the household. Second, the population access indicator was calculated by dividing the potential ITN users by the number of de-facto members for each household and determining the overall sample mean of that fraction.”

[http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0097496](http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0097496)
Supplemental: Children Under 5

Children Under 5

Over 5
Supplemental: Outdoor sleeping structure known as a “fiok”
Supplemental: Vector Species

• *An. gambiae s.l.*
• *An. funestus*
• *An. nili*
• *An. pharoeenis*
• *An. rufipes*