Is Bioko getting the hang of it? Evaluation of a universal long-lasting insecticidal net (LLIN) door-to-door distribution and hang-up campaign in Equatorial Guinea

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INTRODUCTION

Despite the known effectiveness of long-lasting insecticidal nets (LLINs) in providing protection against malaria, maintaining universal coverage and use continues to be a challenge, with ownership and use dropping precipitously immediately after distribution campaigns.

In order to maintain universal coverage, the Bioko Island Malaria Control Project (BIMCP) has applied a combination of mass free distributions and continuous distributions through multiple channels. Strategies such as door-to-door visits and hang-up activities are being integrated into mass distribution campaigns to encourage higher LLIN use and prolong ownership.

This study explored community, household, and individual level associations between parasitemia and factors related to LLIN survivorship and use among households in which LLINs were hung and those in which LLINs were not hung. The results will add to the evidence base for decision-making on future distribution strategies that seek to incorporate novel approaches to encourage higher LLIN use and prolong ownership.

METHODS

From February to July 2018, the BIMCP distributed 155,972 LLINs to 60,291 households during a mass LLIN distribution campaign on Bioko Island with the goal of achieving universal coverage. The campaign included pre-registration of persons and sleeping spaces, nets owned, door-to-door distribution of LLINs delivered with ‘hang-up’ activities by volunteers, and ‘keep-up’ behavior change communication activities.

The annual Malaria Indicator Survey (MIS) was carried out over an average 4 months after mass distribution and collected information on net ownership and net use, as well as individual parasitemia. We examined factors associated with household ITN possession and use with logistic regression models.

RESULTS

Table 1: Comparison of 2015 and 2018 mass LLIN distribution campaigns with population access and ownership from subsequent MIS (2015 – 2018).

<table>
<thead>
<tr>
<th>Distribution</th>
<th>Net received ≥ 1 LLIN</th>
<th>% HH receiving ≥ 1 LLIN</th>
<th>% HH receiving ≥ 1 LLIN/2 people</th>
<th>LLINs delivered</th>
<th>% HH with access to LLIN in %</th>
<th>% decrease in reported net ownership –6 months after distribution (MIS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015 Distribution</td>
<td>63,991</td>
<td>61,088</td>
<td>87%</td>
<td>148,307</td>
<td>69%</td>
<td>36%</td>
</tr>
<tr>
<td>2015 MIS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2016 MIS</td>
<td></td>
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<td></td>
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<tr>
<td>2017 MIS</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2018 Distribution</td>
<td>70,513</td>
<td>60,291</td>
<td>74%</td>
<td>155,972</td>
<td>75%</td>
<td>10%</td>
</tr>
</tbody>
</table>

In 2018, about 12% of households surveyed did not receive an LLIN in previous campaign; however, many households reported an increase in net ownership. There was a 23% decrease in ownership among households that did not report an increase in ownership. Despite achieving goals of universal coverage during mass distributions while attempting to maintain universal coverage through an array of distribution channels, the BIMCP has been challenged with precipitous drops in population access to LLINs occurring soon after distribution. Similarly, net use as recorded in annual MIS tends to decrease over time, especially among households lacking universal coverage.

In an effort to increase sustained use and ownership, the BIMCP has implemented rigorous distribution campaigns monitored through a tablet-based Campaign Information Management System to track door-to-door hang-up visits.

Figure 1: What happened to net?

- HH did not like this net
- Net was destroyed accidentally
- Net was thrown away
- Don’t know
- Net was lost
- Net was stolen
- Net was cleaned
- HH were hanging LLIN
- HH not curfew
- HH was sprayed

Why not keep net?

- HH in which <50% LLINs were hung reported a 63% decrease in ownership, and lost on average 2 LLINs
- HH in which >50% LLINs were hung reported a 33% decrease in ownership, and lost on average 1.7 LLINs
- HH in which <50% LLINs were hung reported a 54% decrease in ownership, and lost on average 1.7 LLINs
- HH in which >50% LLINs were hung reported a 65% decrease in ownership, and lost on average 2 LLINs

Among HH that reported owning fewer nets than were received during mass distribution:

- HH traveling to mainland in past 8 weeks lost on average 1.9 nets whereas households not traveling lost 1.7 LLINs.
- HH in which >30% LLINs were hung reported a 54% decrease in ownership, and lost on average 1.7 LLINs.
- HH in which <30% LLINs were hung reported a 65% decrease in ownership, and lost on average 2 LLINs.

Figure 3: Households reporting universal coverage were more likely to sleep under net the night before, regardless of whether half the nets were hung during distribution.

Table 2: Factors associated with sleeping under bednet the night before MIS in children under 14

<table>
<thead>
<tr>
<th>Factor</th>
<th>OR</th>
<th>P Value</th>
<th>Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 50% LLINs hung</td>
<td>2.08</td>
<td>0.00005</td>
<td>(1.80 – 2.40)</td>
</tr>
<tr>
<td>Age years ≥ 5</td>
<td>0.90</td>
<td>0.05</td>
<td>(0.48 – 1.00)</td>
</tr>
<tr>
<td>Households targeted for IRS</td>
<td>0.72</td>
<td>0.00005</td>
<td>(0.56 – 0.90)</td>
</tr>
</tbody>
</table>

Table 3: Factors associated with parasitemia in children under 14

<table>
<thead>
<tr>
<th>Factor</th>
<th>OR</th>
<th>P Value</th>
<th>Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 50% LLINs hung</td>
<td>0.87</td>
<td>0.00005</td>
<td>(0.70 – 1.12)</td>
</tr>
<tr>
<td>Age years ≥ 5</td>
<td>0.81</td>
<td>0.00005</td>
<td>(0.48 – 1.00)</td>
</tr>
<tr>
<td>Travelled to mainland</td>
<td>0.72</td>
<td>0.00005</td>
<td>(0.56 – 0.90)</td>
</tr>
</tbody>
</table>

ACKNOWLEDGEMENTS

- Ministry of Health and Social Welfare, Equatorial Guinea,
- Bioko Island Malaria Control Project Team and MCDI
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Despite the known effectiveness of long-lasting insecticidal nets (LLINs) in providing protection against malaria, maintaining universal coverage and use continues to be a challenge. To maintain universal coverage, the Bioko Island Malaria Control Project (BIMCP) has applied a combination of mass free distributions and continuous distributions through multiple channels. Strategies such as door-to-door visits and hang-up activities are being integrated into mass distribution campaigns to encourage higher LLIN usage. Mass door-to-door distribution campaigns include a pre-registration of persons and sleeping spaces, sensitization, and hanging of LLIN by community volunteers to encourage high and sustained use. From February to July 2018, the BIMCP is leading a mass LLIN distribution campaign on Bioko Island with the goal of achieving universal coverage. Data on the number of sleeping spaces, LLINs previously owned, LLINs received, and LLINs hung are recorded in an Open Data Kit (ODK) based Campaign Information Management System (CIMS) that facilitates longitudinal analyses of household-level interventions. A cross-sectional malaria indicator survey (MIS) will be conducted two to five months after the mass distribution campaign to collect information on individual parasitemia, LLIN survivorship, and use. This study will explore community, household, and individual level associations between parasitemia and factors related to LLIN survivorship and use among households in which LLINs were hung and those in which LLINs were not hung. The results will add to the evidence base for decision-making on future distribution strategies that seek to incorporate novel approaches to encourage higher LLIN usage.