

# 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

Jordan M. Smith<sup>1</sup>, José Osá Osá Nfumu<sup>1</sup>, Jeremías Nzamio Mba Eyono<sup>1</sup>, Liberato Motobe<sup>1</sup>, Lucas Ondo<sup>1</sup>, Teresa Ayingono Ondó Mifumu<sup>1</sup>, Megan Perry<sup>2</sup>, Olivier Tresor .D<sup>1</sup>, Carlos Cortes<sup>1</sup>, Wonder Philip<sup>1</sup>, Luis Tam<sup>2</sup>, Christopher Schwabe<sup>3</sup>, Guillermo Garcia<sup>2</sup>

<sup>1</sup>Medical Care Development International Field Office, <sup>2</sup>Medical Care Development International Home Office, <sup>3</sup>Medical Care Development

CONTACT: Jordan M. Smith, jsmith@mcdi.org



## 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 on 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.

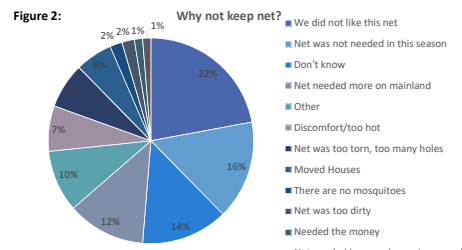
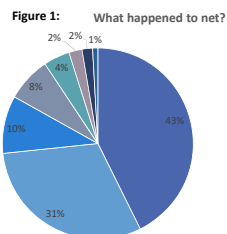


## RESULTS

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

	Estimated N inhabited HH	HH receiving ≥ 1 LLIN	% HH receiving ≥ 1 LLIN/2 people	LLINs delivered	% hung	% population with access to LLIN in HH	% decrease in reported net ownership ~4-5 months after distribution (MIS)
2015 Distribution	69,961	61,000	87%	149,287	69%	95%	
2015 MIS							61%
2016 MIS							39%
2017 MIS							52%
2018 Distribution	70,513	60,291	74%	155,972	75%	92%	49%
2018 MIS							78%
							8%*

\* 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.



Figures 1 and 2: Responses of what happened to net and why they did not keep the net among households that reported previously owning a net, but no longer owning it. Among those that reported transferring their net, most reported transferring it within the island (72%). Similarly, analysis of household identifiers written on observed nets suggested minimal (2%) redistribution within the island.

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

- HH travelling to mainland in past 8 weeks lost on average 1.9 nets whereas households not traveling lost 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 63% decrease in ownership, and lost on average 2 LLINs

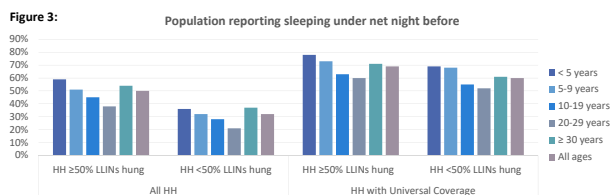


Figure 3: Households reporting universal coverage were more likely to sleep under net the night before, regardless of whether half the nets were hung during distribution.

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

Factor	OR	P-value	Confidence Interval
≥ 50% LLINs hung	2.20	< 0.0001	(1.92 – 2.52)
Age years	0.94	< 0.0001	(0.93 – 0.95)
≥ 1 LLIN / 2 people	2.58	< 0.0001	(2.30 – 2.89)
In neighborhood targeted for IRS	0.75	< 0.0001	(0.67 – 0.84)

Table 3: Factors associated with parasitemia in children under 14

Factor	OR	P-value	Confidence Interval
≥ 50% LLINs hung	0.97	0.809	(0.79 – 1.21)
HH sprayed	0.81	0.192	(0.59 – 1.11)
Slept under net	0.7	<0.0001	(0.59 – 0.84)
≥ 1 LLIN / 2 people	0.67	<0.0001	(0.56 – 0.81)
Age years	1.13	<0.0001	(1.11 – 1.16)
In neighborhood targeted for IRS	1.46	0.01	(1.08 – 1.97)
Travelled to mainland	11.5	<0.0001	(8.51 – 15.67)

## DISCUSSION

The BIMCP's vector control strategy has been predicated primarily on island-wide IRS up to 2014. Beginning in 2015, a targeted approach for IRS was implemented, focusing on neighborhoods with high prevalence of malaria.

In 2015, the BIMCP transitioned to universal coverage of LLINs as its primary vector control strategy. The first mass distribution was carried out in 2008, then again in 2015, and most recently in 2018. Continuous 'keep-up' channels have been implemented through ANC clinics, while distribution also occurs annually through primary schools. Targeted 'keep-up' campaign in high risk communities have also taken place in 2012 and later in 2017.

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.

Rigorous hang-up campaigns have shown to be associated with prolonged ownership and use, particularly among children, but were not statistically significantly associated with decreased odds of infection. As found in every MIS, travelling to mainland appears to be one of the biggest risk factors and may suggest an importation of cases. More studies should attempt to investigate whether people are taking their nets to the mainland, and later bringing back parasites to the island.

## ACKNOWLEDGEMENTS

- Ministry of Health and Social Welfare, Equatorial Guinea,
- Bioko Island Malaria Control Project Team and MCDI
- The Funders: Marathon Oil Noble Energy, Atlantic Methanol, GEPetrol, Sonagas and the Government of Equatorial Guinea.

## **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**

**Jordan Smith**<sup>1</sup>, Jose Osa Osa Nfumu<sup>1</sup>, Jeremias Nzamio<sup>1</sup>, Lucas Ondo Nze<sup>1</sup>, Liberato Motobe<sup>1</sup>, Olivier Tresor Donfack<sup>1</sup>, Wonder Philip Phiri<sup>1</sup>, Carlos Cortes Falla<sup>1</sup>, Luis Tam<sup>2</sup>, Christopher Schwabe<sup>2</sup>, Guillermo Garcia<sup>2</sup>

<sup>1</sup>*Medical Care Development International, Malabo, Equatorial Guinea*, <sup>2</sup>*Medical Care Development International, Silver Spring, MD, United States*

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.