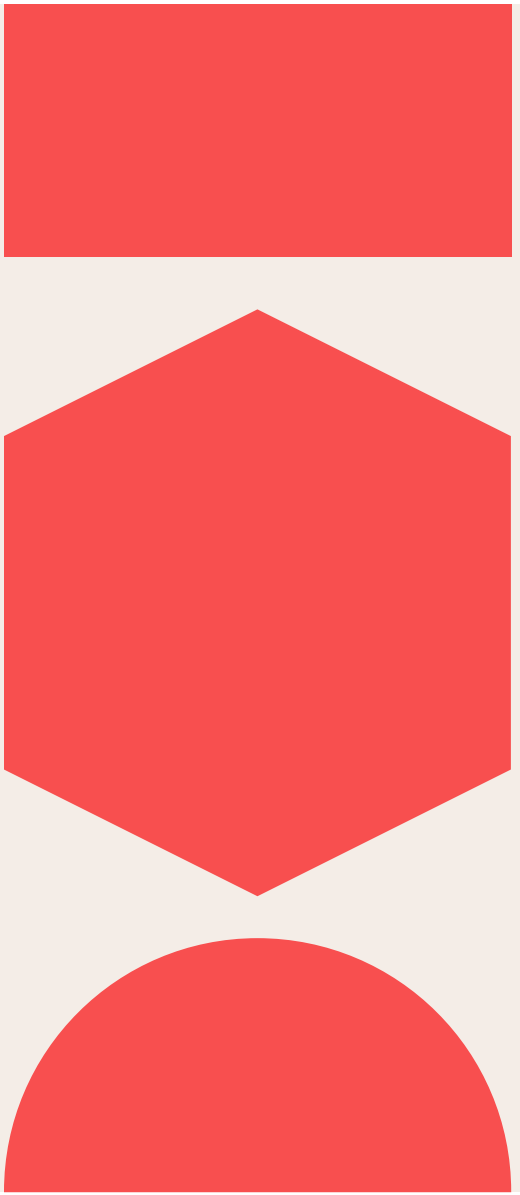
August 2022

New Nets Project interim results

Preliminary evidence from the pilot evaluations

PATH



1 Project background & overview

2 Interim results

3 Key lessons to date

Interim results – interpret with caution

New Nets Project partners

Unitaid Innovation in Global Health · The Global Fund To Fight AIDS, Tuberculosis and Malaria · USAID FROM THE AMERICAN PEOPLE · Bill & Melinda Gates foundation

IVCC

- Lead and coordinator
- Liaison with industry partners
- Link to vector control product development pipeline

psi — Healthy lives. Measurable results.

- Compilation of cross-country lessons learned from pilot studies, funding for process evaluations

The Alliance for Malaria Prevention

- Technical assistance

Imperial College London

- Modelling of trials design and implementation impact

PATH · CNRFP · rbc Rwanda Biomedical Center — A Healthy People. A Wealthy Nation · University of Rwanda · PNCM · Instituto Nacional de Saúde Moçambique · Tropical Health · NIMR · Ibolda Health International Ltd.

- Cost-effectiveness determination from pilot implementations

LSTM Liverpool School of Tropical Medicine

- Entomological correlates of epidemiological impact

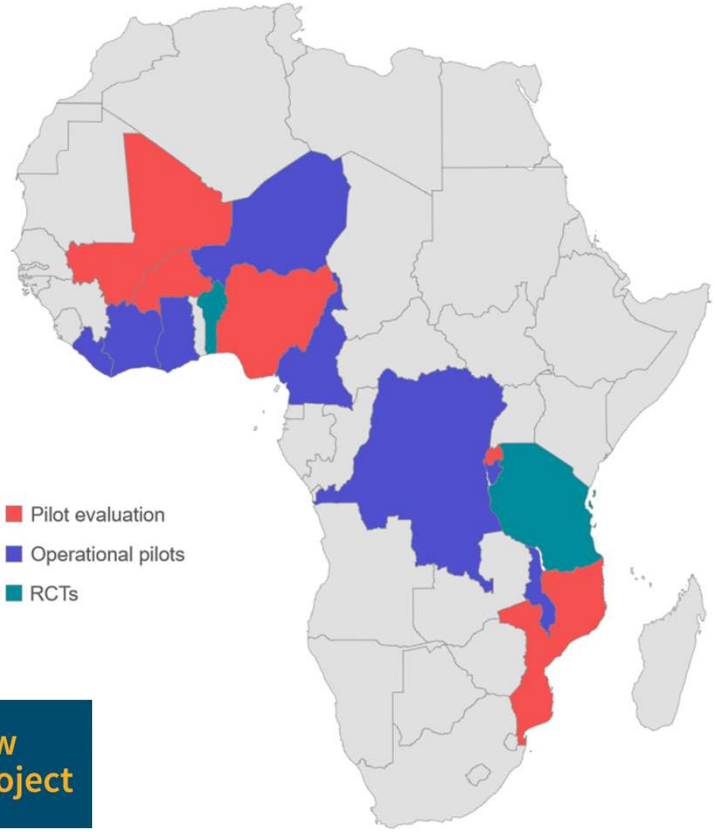
Tulane University

- Cost effectiveness study design and data collection

London School of Hygiene & Tropical Medicine

- Cluster-randomized trials of dual active-ingredient ITNs and entomological correlates in trials

The New Nets Project



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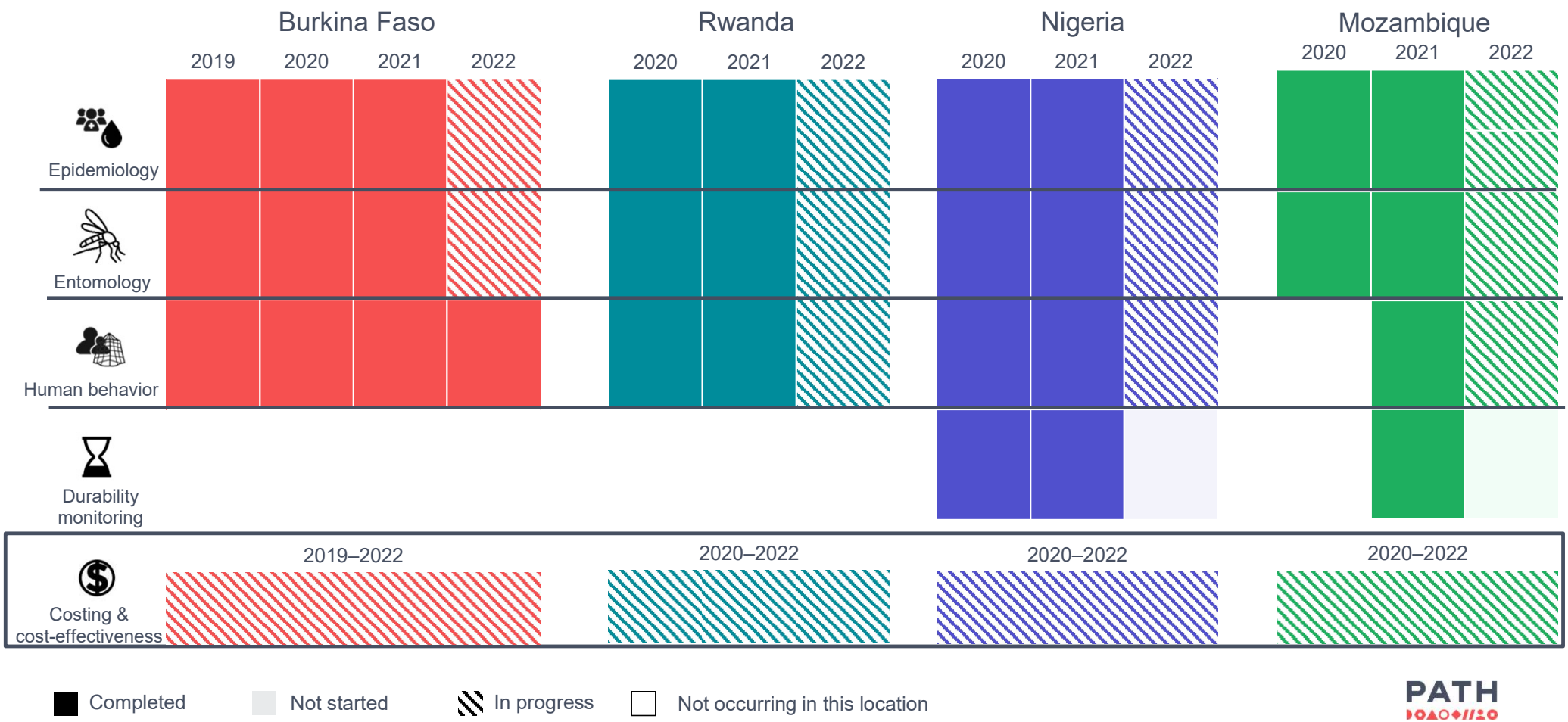
Interim results – interpret with caution

Progress on pilot study activities



Interim results – interpret with caution

Pilot Studies: The NNP is supporting research and enhanced surveillance to evaluate the impact of different ITN types in operational settings (2020–2022)

- Interceptor® G2 ITN
- Royal Guard® ITN
- PBO ITN
- Standard ITN

Epidemiology

- Measure impact of new nets and standard ITNs, and if feasible PBO ITNs, through observational studies comparing trends in:
  - Malaria prevalence in community surveys
  - Malaria prevalence in antenatal care
  - Malaria case incidence

Entomology

- Evaluate the impact of new nets and standard ITNs, and if feasible PBO ITNs, on vector population density, behavior, infection and resistance status

Anthropology

- Examine barriers, facilitators, and patterns of ITN access and use.
- Measure time spent under an ITN and correlate use patterns with vector behaviors to explore transmission risks and understand the limitations of ITN interventions.

Cost-effectiveness

- Estimate the cost and cost-effectiveness through data on product price, delivery and deployment costs and effectiveness based on incidence rates

Durability monitoring

- Estimating survivorship, attrition, physical integrity and insecticidal content throughout the study time period

PATH

Updated pilot study interim results

Rwanda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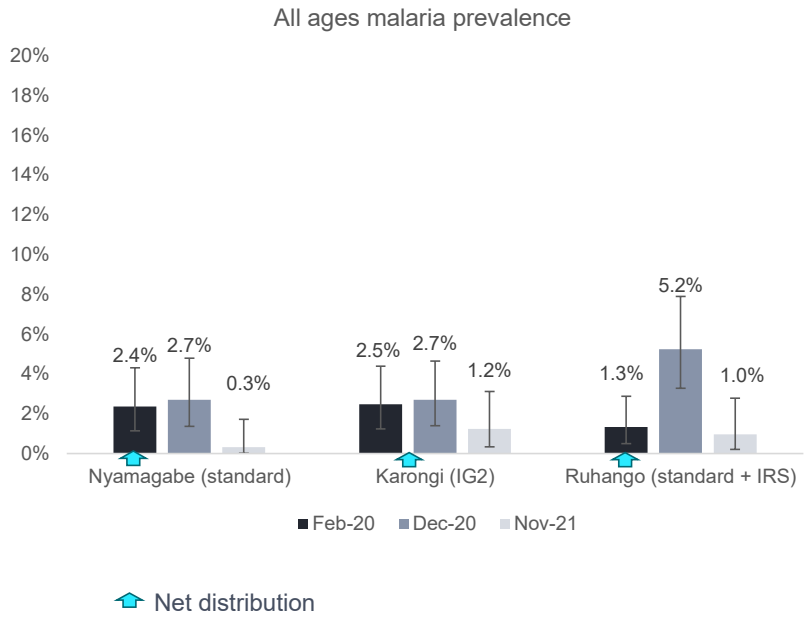
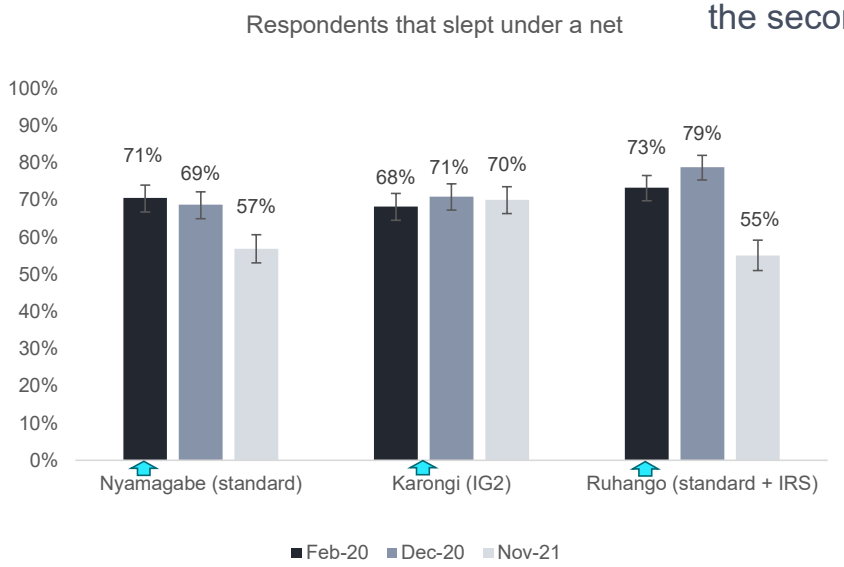
UNIVERSITY OF
RWANDA

Malaria prevalence and ITN coverage

Cross-sectional surveys Feb. 2020, Dec. 2020, Nov. 2021

- Malaria prevalence declined across all study districts
- ITN access and use were relatively consistent, but waned somewhat during the second year

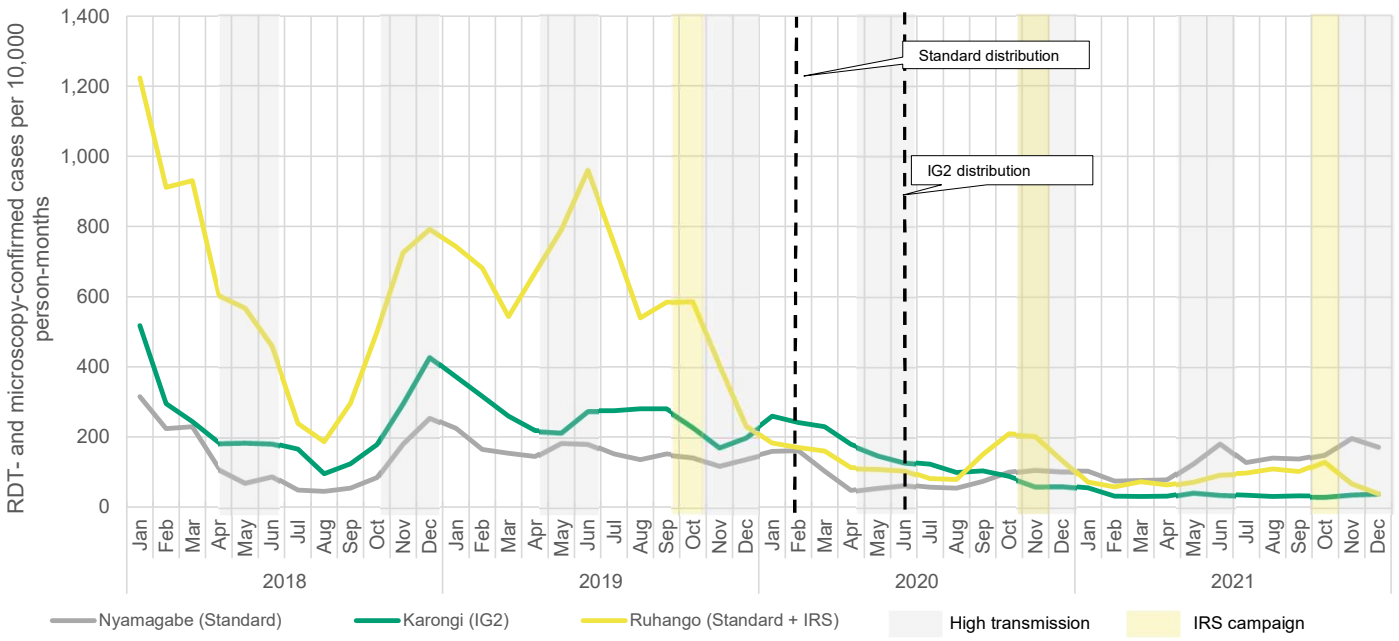




Interim results – interpret with caution

Malaria case incidence

through December 2021



13.4%

greater reduction in the IG2 district

28.7%

greater reduction in the standard + IRS district

compared to the standard district in Year 1
(April 2020 to March 2021)

Interim results – interpret with caution

Entomological landscape

Year 1

	Nyamagabe (standard ITNs)	Karongi (IG2 ITNs)	Ruhango (standard ITNs + IRS)
	Year 1	**Year 1**	**Year 1**
Most abundant vector (% of likely vector species collected)	*An. funestus* s.l. (78.30%)	*An. gambiae* s.l. (89.5%)	*An. gambiae* s.l. (69.54%)
Second most abundant vector (% of likely vector species collected)	*An. gambiae* s.l. (21.28%)	*An. funestus* s.l. (7.31%)	*An. funestus* s.l. (30.46%)
Third most abundant vector (% of likely vector species collected)	*An. coustani* (0.43%)	*An. coustani* (3.19%)	–
***An. gambiae* molecular IDs**			
An. gambiae s.s.	91.3%	81.6%	80.0%
An. arabiensis	8.7%	18.4%	20.0%
HLC nightly landing rates			
Indoor:outdoor ratio (*An. gambiae s.l.)*	0.48	1.10	0.58
Indoor:outdoor ratio (*An. funestus* s.l.)	0.27	1.05	1.09
Pyrethroid-resistance profile	**LOW to MODERATE: Mitigated by PBO**		
WHO tube test mortality	97%–100%	86%–99%	93-95%

- Mix of *An. gambiae* s.s., *An. funestus* s.l., *An. arabiensis,* and *An. coustani*
- Low to moderate levels of pyrethroid resistance—mitigated by PBO
- Variable ratios of indoor to outdoor biting

Interim results – interpret with caution

Human behavior findings

In-depth interviews, focus group discussions 2020–2021

- Five rounds of data collected from 2020–2022
- Coding and analyzing the data to explore:
    - Behaviors that impact malaria risk
    - Malaria prevention methods
    - Bed nets
        - Use
        - Access
        - Benefits
        - Preferences
        - Maintenance
        - Challenges and solutions

Interim results – interpret with caution

Human behavior findings

Bed net access

- **Mass campaigns are the primary method** for acquiring bed nets.
- **EPI and ANC visits are also a common** method of acquiring a net.
- Respondents were **split on whether they received enough bed nets**:
  - Each family is supposed to receive one bed net for each bed in the household.
  - Many respondents reported receiving one or two fewer bed nets than needed.
  - People are not able to collect their nets while away from home during registration or distribution, including children at boarding school.
  - Other respondents report receiving enough nets, and some received an extra net for visitors.
- Many respondents were **not aware of any store or market** that sells bed nets.

"I was given two bed nets, corresponding with two beds we have. But there are some homes that were given less bed nets than the number of beds they have.
-FGD, Nyamagabe

Interim results – interpret with caution

Human behavior findings

Bed net use

- Bed nets were cited as the most common malaria prevention method. Respondents in all 3 districts report **using nets at night throughout the year.**
- Awareness of the importance of nets for **reduction of malaria transmission** was cited as key motivating factors for use.
- Due to vulnerability to malaria, **special attention to pregnant women, the elderly, and young children was reported** when there are few nets compared to sleeping spaces.

"As the education on the use of bed nets increased and malaria cases increased; we realized the importance of bed nets and started using them properly. As per now I can't dare go to sleep without a bed net."
-FGD, Nyamagabe

Interim results – interpret with caution

Human behavior findings

Bed net barriers to use

Common barriers to use in all three districts:

- Seasonal differences
    - Participants reported **higher net use in rainy/cold season compared to dry/hot season** due to increased heat and community perception that malaria is more common in the rainy season.
- Irritation from chemicals
    - **Difficulty breathing and skin rashes or irritation were commonly reported** by participants, sometimes as a challenge experienced firsthand and other times as a possible reason others may not use a bed net.
    - Almost all respondents who mention this **note that this challenge is temporary or easily remedied**, by washing or airing out a new net before using and ensuring the net doesn't touch their skin.
    - Many participants report that this **does not affect their own use** of bed nets.
- Access
    - Including **delays in distribution campaigns**, old **nets wearing out** before receiving new nets, **not receiving enough** nets per household or for visitors, nets **not being available in markets to purchase**.

Interim results – interpret with caution

Nigeria

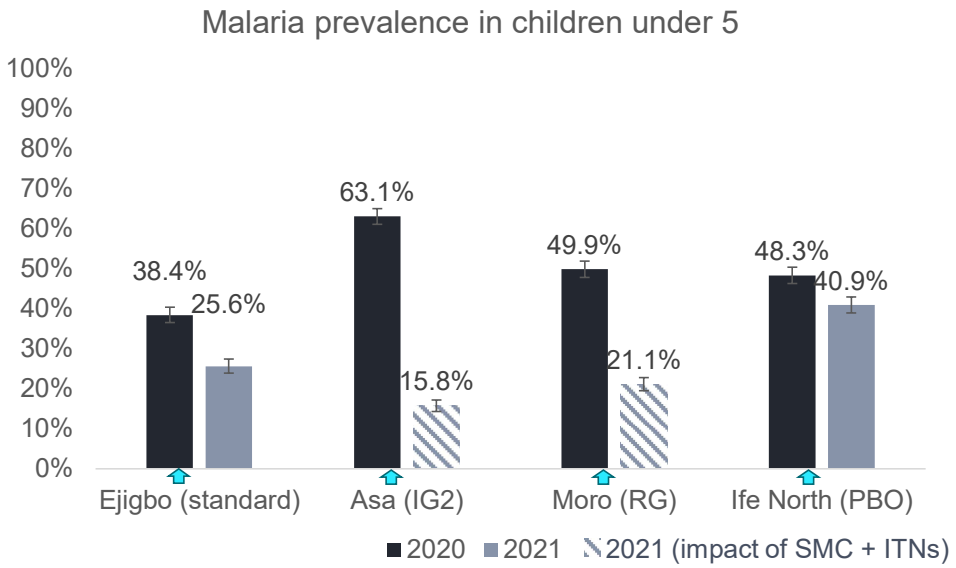

FEDERAL MINISTRY OF
HEALTH

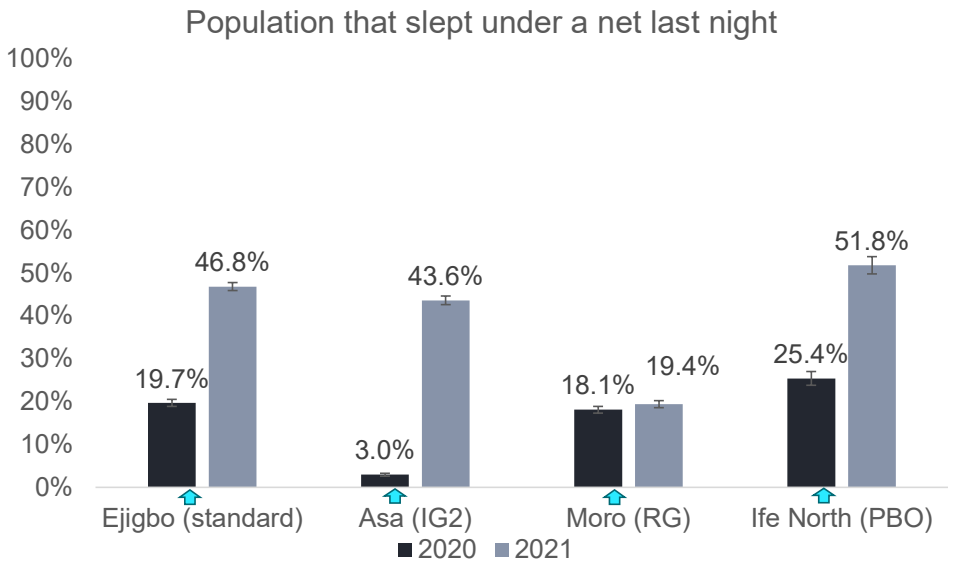

NIGERIAN INSTITUTE OF MEDICAL RESEARCH
NIMR
Research for National Health
IBOLDA HEALTH
INTERNATIONAL LTD.


TROPICAL
HEALTH

Malaria prevalence and ITN coverage

Cross-sectional surveys 2020, 2021





*Asa and Moro LGAs received SMC in 2021. Modeled estimates of ITN impact without SMC are pending.

Net distribution

Interim results – interpret with caution

Entomological landscape

Year 1

	Ejigbo (standard ITNs)	Asa (IG2 ITNs)	Moro (RG ITNs)	Ife North (PBO ITNs)
	Year 1	**Year 1**	**Year 1**	**Year 1**
Most abundant vector (% of likely vector species collected)	*An. gambiae* s.l. (88%)	*An. gambiae* s.l. (100%)	*An. gambiae* s.l. (100%)	*An. funestus* s.l. (82%)
Second most abundant vector (% of all anophelines collected)	*An. funestus* s.l. (6%)	–	–	*An. gambiae* s.l. (14%)
***An. gambiae* molecular IDs**				
An. gambiae s.s.	73.3%	66.7%	73.4%	66.7%
An. coluzzii	26.7%	26.7%	21.5%	33.3%
An. arabiensis	–	2.5%	5.1%	–
Monthly CDC LT densities				
HLC nightly landing rates (*An. gambiae* s.l.)				
Indoor:outdoor ratio	0.92	9.75	2.50	10.00
Pyrethroid resistance profile	**MODERATE to HIGH: Partially mitigated by PBO**			
WHO tube test mortality	73%–94%	12%–38%	41%–57%	20%–71%

- Mix of *An. gambiae* s.s., *An. funestus, An. coluzzii, An. arabiensis*
- Moderate to high levels of pyrethroid resistance—partially mitigated by PBO
- Tendency for higher indoor than outdoor biting rates

Interim results – interpret with caution

Human behavior findings

In-depth interviews, focus group discussions 2020–2021

- Two rounds of data collected in 2020 and 2021
- Round 3 data collection planned for July and August 2022
- Coding and analyzing the data to explore:
    - Behaviors that impact malaria risk
    - Malaria prevention methods
    - Bed nets
        - Use
        - Access
        - Benefits
        - Preferences
        - Maintenance
        - Challenges and solutions

Interim results – interpret with caution

Human behavior findings

Bed net access

- Most participants received their nets through door-to-door or centralized distributions, ANC, and immunization visits.
    - Many **participants found the door-to-door method of distributing nets to be easy** and noted that they received an appropriate number of nets for their family.
    - Others reported receiving an **inadequate number of nets and requested more frequent distributions**. Requests ranged from having nets consistently available at health facilities to yearly distributions.
    - People noted that **families that lived in remote areas may have a harder time collecting nets**, and that if people were not at home at the time of distribution there was no way to collect their nets.
- Most people reported getting their nets for free and described being dependent on the government distributions to get nets. Many were not confident they would be able to replace nets that were damaged before the next distribution.

"It is very difficult to replace the old net because campaign distribution is done only after three years."
-IDI, Osun

Interim results – interpret with caution

Human behavior findings

Bed net use

- Most participants in all districts stressed the importance of always using a bed net.
- Awareness of the effectiveness of nets at preventing malaria transmission is a key motivating factor.
- Several participants reported that their net use increased after they themselves or someone they know got seriously ill with malaria.
- Some report that prevalence of malaria has been reduced due to use, either broadly in the community or within their own household.

"In this community I don't know anybody that doesn't make use of bed net. We always use bed net. So I don't think there is any household that doesn't use it."
-IDI, Kwara

Interim results – interpret with caution

Human behavior findings

Bed net barriers to use

- Seasonal differences are the biggest factor that affects people's decision to not use a net.
    - Even among participants who state the importance of always using a net, many of them also **report higher bed net usage during the rainy season**.
    - **Heat is the main challenge to using a bed net during dry season,** with many participants saying it's too uncomfortable to sleep under the net.
    - Participants also report **seeing a decrease in the number of mosquitos during dry season**, which also impacts their decision not to use a net during dry season.

- Travel and having visitors also impact net use.
    - Some participants reported that the only reason they don't use is **if they're away from home and don't have a net available.**
    - Others mention **offering their own nets to guests** when they have visitors, leaving them without a net for themselves.

Interim results – interpret with caution

Estimates of ITN durability

12-month

Estimates for the survival of campaign nets in serviceable condition after 12 months:

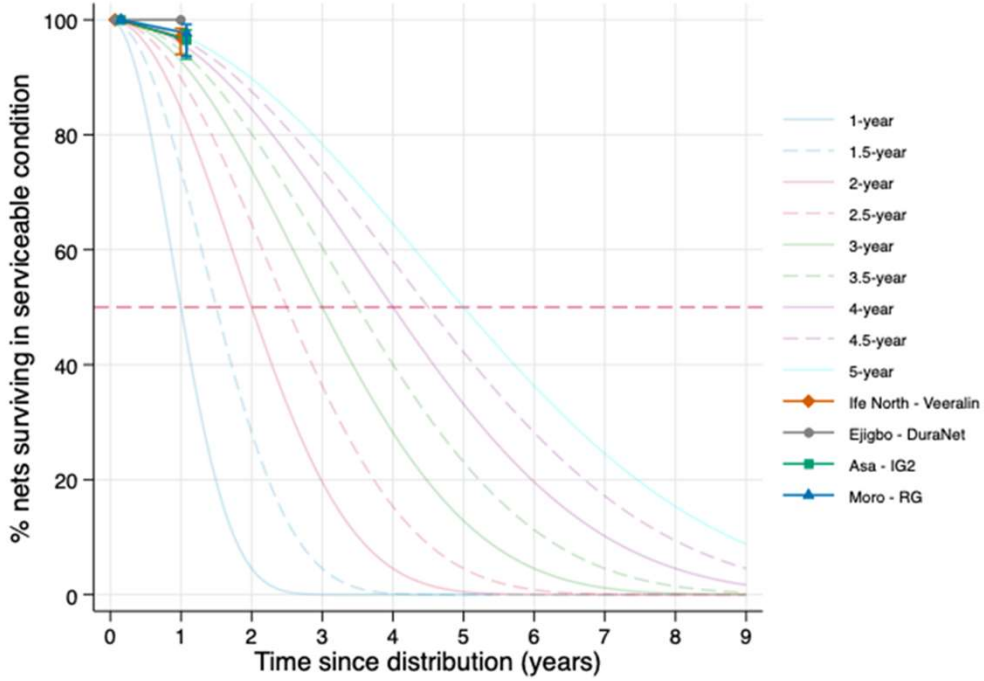
100% in Ejigbo

96.5% in Asa

97.7% in Moro

97.0% in Ife North

Estimated net survival in serviceable condition with 95% error bars plotted against hypothetical survival curves with defined median survival



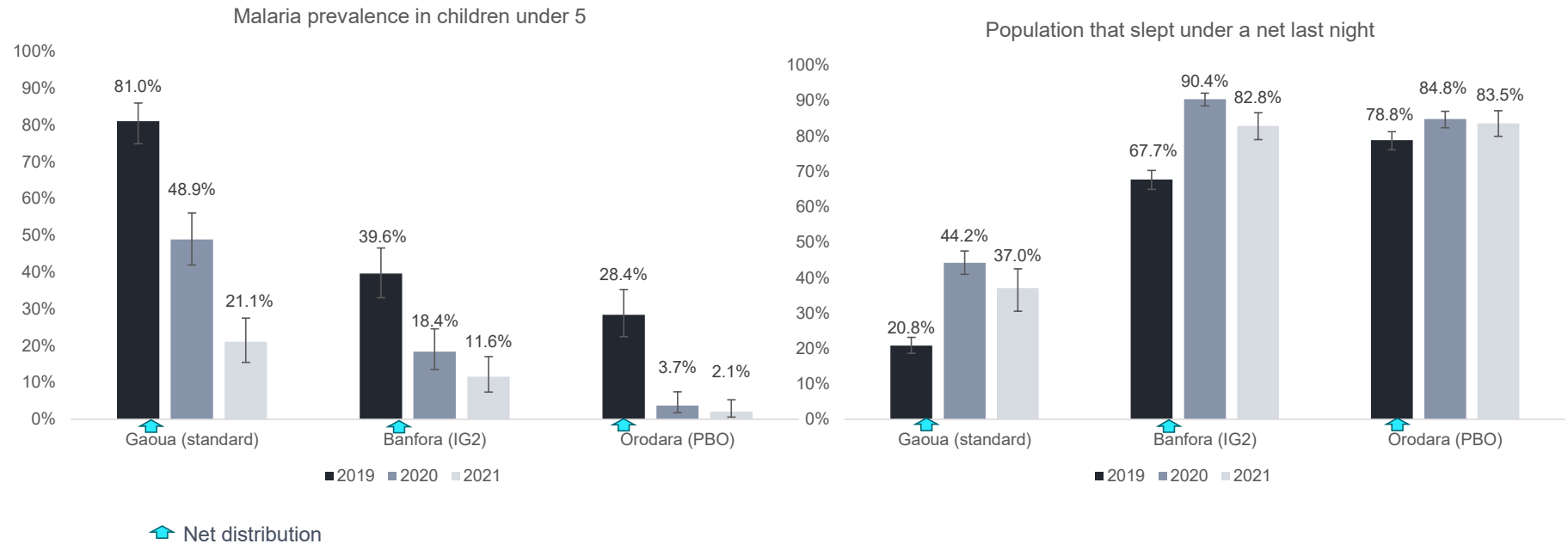
Interim results – interpret with caution

Burkina Faso

Malaria prevalence and ITN coverage

Cross-sectional surveys 2019–2021

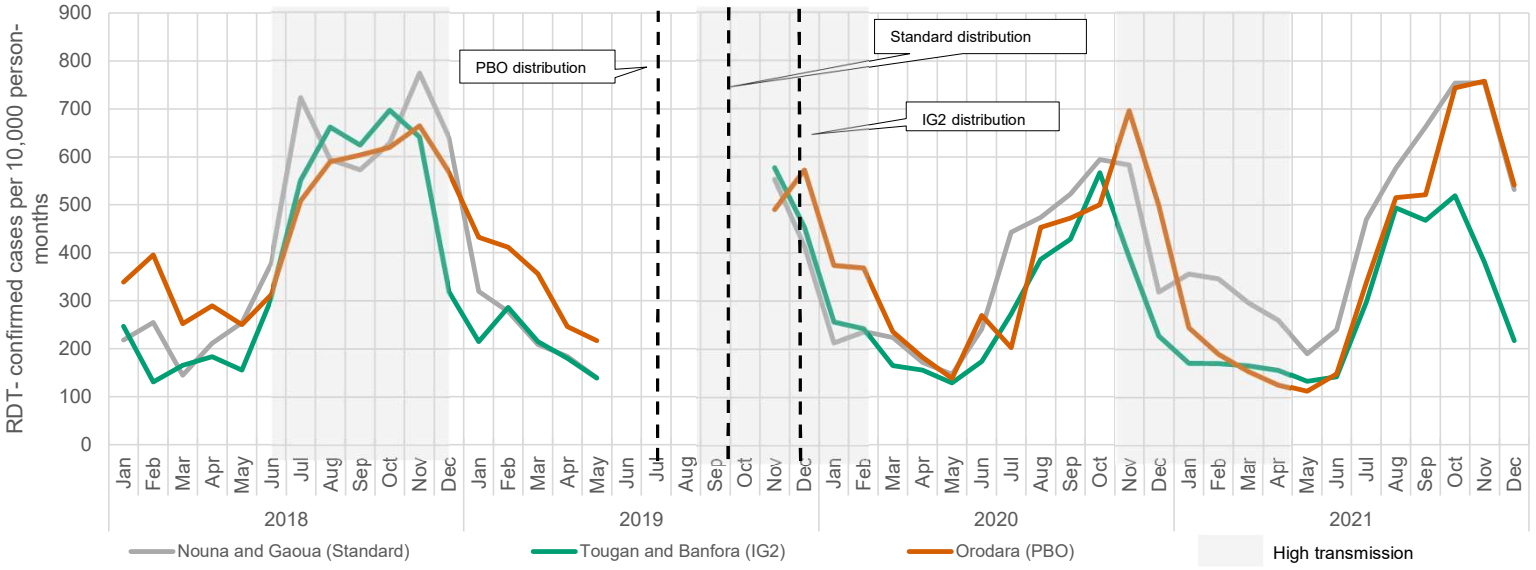
- ITN access and use increased after the 2019 campaign, but waned somewhat during the second year
- Malaria prevalence declined across all study districts: gains were sustained through 2 years



Interim results – interpret with caution

Malaria case incidence

through December 2021



Compared to standard ITN districts:

6.8% greater reduction in the IG2 district

4.2% greater reduction in the PBO district

Through 1 year

25.6% greater reduction in the IG2 district

16.2% greater reduction in the PBO district

Through 2 years

Interim results – interpret with caution

Entomological landscape

Year 1 and Year 2

	Gaoua (standard ITNs)		Banfora (IG2 ITNs)		Orodara (PBO ITNs)	
	Year 1	**Year 2**	**Year 1**	**Year 2**	**Year 1**	**Year 2**
Most abundant vector (% of likely vector species collected)	*An. gambiae* s.l. (67.9%)	*An. gambiae* s.l. (83.7%)	*An. gambiae* s.l. (97.7%)	*An. gambiae* s.l. (99.7%)	*An. gambiae* s.l. (92.9%)	*An. gambiae* s.l. (99.6%)
Second most abundant vector (% of likely vector species collected)	*An. funestus* s.l. (23.4%)	*An. funestus* s.l. (15.6%)	*An. coustani* (0.5%)	*An. funestus* s.l. (0.3%)	*An. funestus* s.l. (0.5%)	*An. funestus* s.l. (0.4%)
***An. gambiae* molecular IDs**						
An. gambiae s.s.	93.30%	Pending	35.10%	Pending	81.10%	Pending
An. coluzzii	5.20%	Pending	64.70%	Pending	18.90%	Pending
An. arabiensis	1.50%	Pending	0.20%	Pending	0.00%	Pending
HLC nightly landing rates (*An. gambiae* s.l.)						
Indoor:outdoor ratio	0.86	1.22	0.75	0.99	0.64*	0.83
Pyrethroid-resistance profile	**HIGH resistance: Partially mitigated by PBO**					
WHO tube test morality	Less than 50%					

Interim results – interpret with caution

Estimates of ITN durability

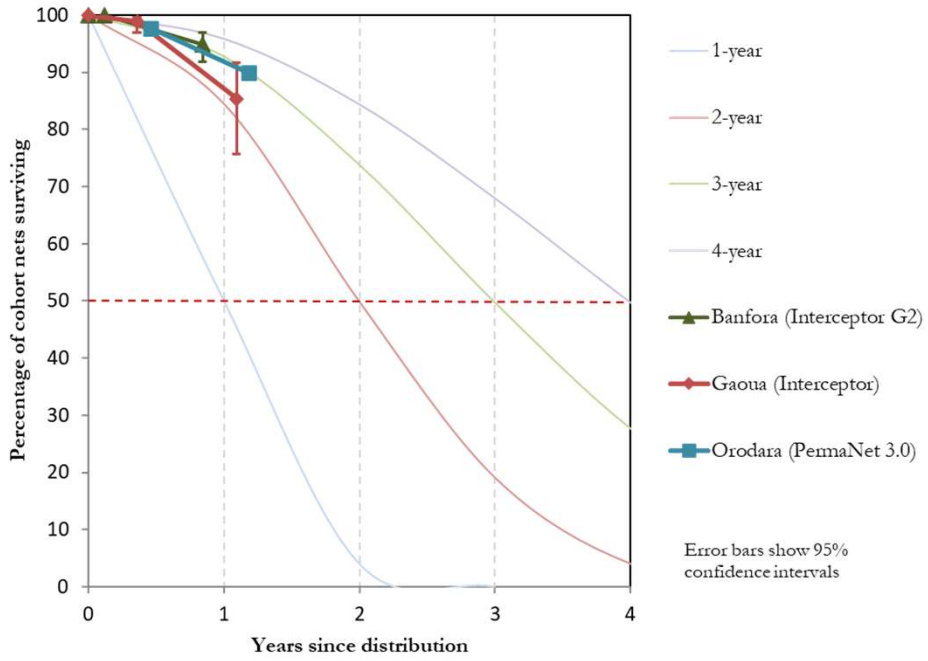
Year 1

Estimates for the survival of campaign nets in serviceable condition after 12 months:

95% in Banfora

85% in Gaoua

89% in Orodara



Interim results – interpret with caution

Northern Mozambique

Malaria prevalence and ITN coverage

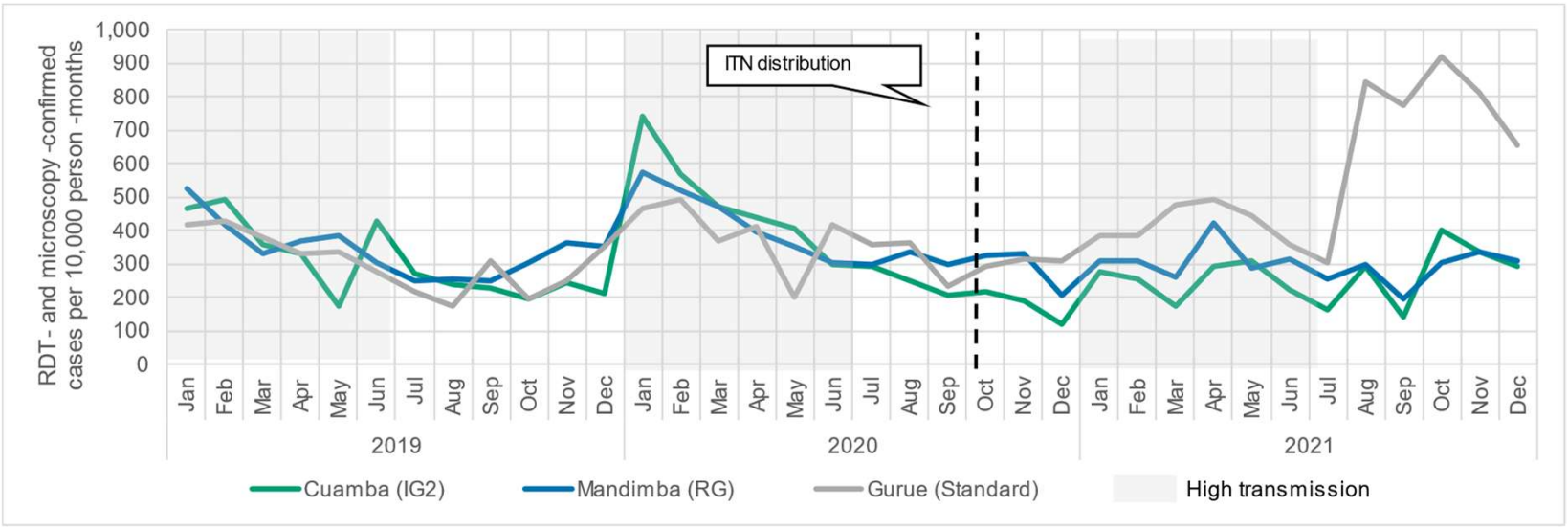
Cross-sectional surveys 2020, 2021

- ITN access and use increased substantially after the 2020 campaign
- Malaria prevalence declined across all study districts, but by a larger magnitude in the IG2 and RG districts

Interim results – interpret with caution

Malaria case incidence

through December 2021



75.1% greater reduction in the IG2 district

64.4% greater reduction in the RG district

compared to standard districts in Year 1

Interim results – interpret with caution

Entomological landscape

Year 1

	Gurue (standard ITNs)	Cuamba (IG2 ITNs)	Mandimba (RG ITNs)
	Year 1	**Year 1**	**Year 1**
Most abundant vector (% of likely vector species collected)	*An. funestus* s.l. (54.6%)	*An. gambiae* s.l. (100%)	*An. gambiae* s.l. (53.9%)
Second most abundant vector (% of all likely vectors collected)	*An. gambiae* s.l. (44.5%)	–	*An. funestus* s.l. (45.1%)
***An. gambiae* molecular IDs**			
	Pending	Pending	Pending
HLC nightly landing rates (*An. gambiae* s.l.)			
Indoor:outdoor ratio	0.84	0.5	1.1
HLC nightly landing rates (*An. funestus* s.l.)			
Indoor:outdoor ratio	1.8	–	1.2
Pyrethroid-resistance profile	**MODERATE to HIGH: Mitigated by PBO**		
WHO tube test mortality (*An. gambiae)*	15%-89%	54%-83%	54%-83%
WHO tube test mortality (*An. funestus)*	60%–100% (*An. funestus*)*		

Interim results – interpret with caution

Estimates of ITN durability

12-month

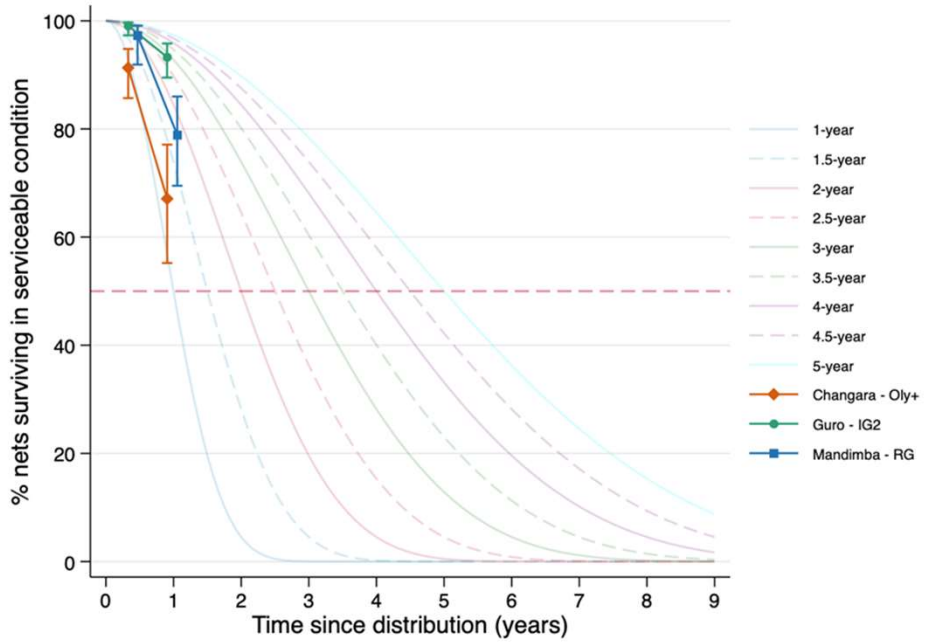
Estimates for the survival of campaign nets in serviceable condition after 12 months:

67% in Changara

93% in Guro

79% in Mandimba

Estimated net survival in serviceable condition with 95% error bars plotted against hypothetical survival curves with defined median survival



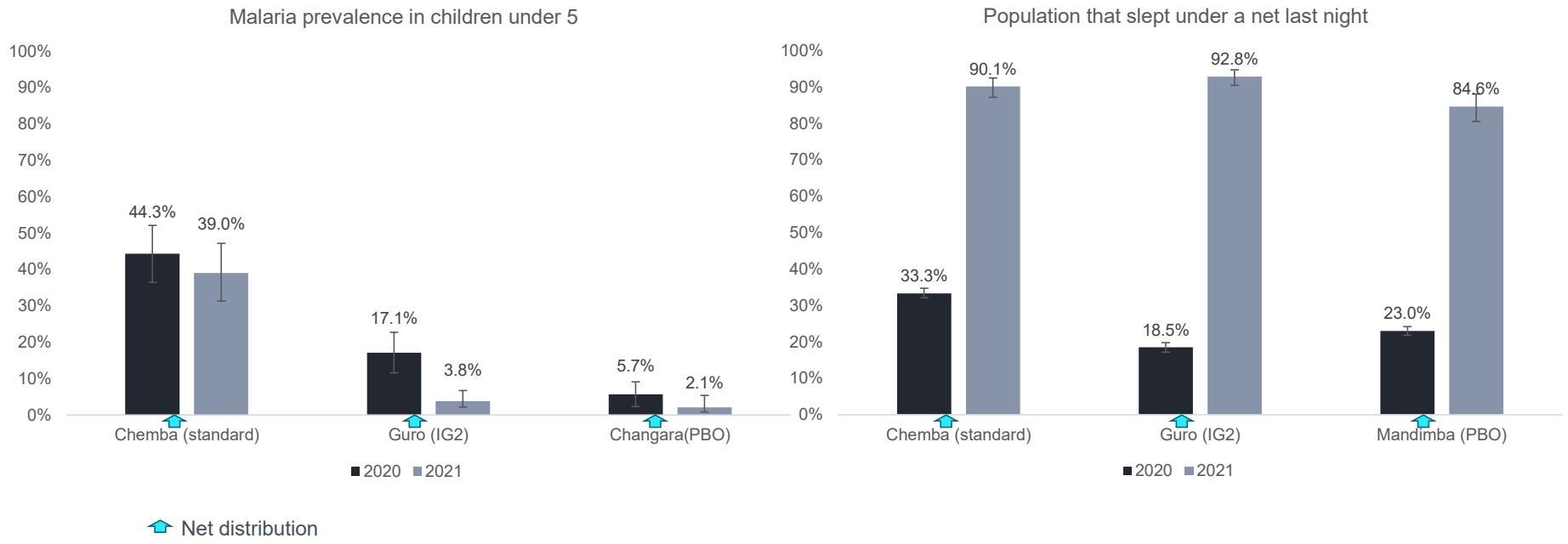
Interim results – interpret with caution

Western Mozambique

Malaria prevalence and ITN coverage

Cross-sectional surveys 2020, 2021

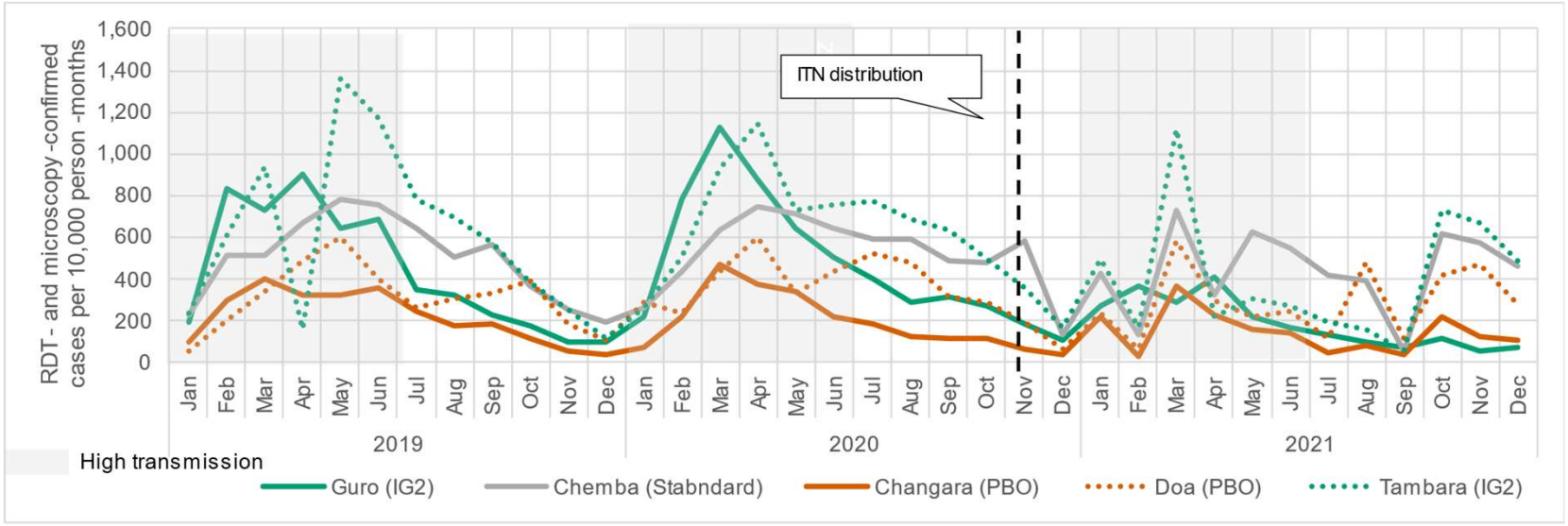
- ITN access and use increased substantially after the 2020 campaign
- Malaria prevalence declined across all study districts, but by a larger magnitude in the IG2 and PBO districts



Interim results – interpret with caution

Malaria case incidence

through December 2021



25.6% greater reduction in the IG2 district

2.1% greater reduction in the PBO district

compared to standard districts in Year 1

Interim results – interpret with caution

Entomological landscape

Year 1

	Chemba (standard ITNs)	Guro (IG2 ITNs)	Changara (PBO ITNs)
	Year 1	**Year 1**	**Year 1**
Most abundant vector (% of all likely vectors collected)	*An. funestus* s.l. (79.7%)	*An. gambiae* s.l. (100%)	*An. gambiae* s.l. (100%)
Second most abundant vector (% of all likely vectors collected)	*An. gambiae* s.l. (20.31%)	–	–
***An. gambiae* molecular IDs**			
Pending	Pending	Pending	Pending
HLC nightly landing rates (*An. gambiae* s.l.)			
Indoor:outdoor ratio	0.4	0.6	0.94
HLC nightly landing rates (*An. funestus* s.l.)			
Indoor:outdoor ratio	1.1	–	–
Pyrethroid-resistance profile	**MODERATE to HIGH: Mitigated by PBO**		
WHO tube test mortality (*An. gambiae*)	17%-53%	88%	92%
WHO tube test mortality (*An. funestus*)	60%–100% (*An. funestus*)*		

Interim results – interpret with caution

Key takeaways – interim results

- Mass ITN distributions (universal coverage campaigns) are **strongly associated with increased ITN use and decreased malaria transmission regardless of ITN type**.
- In areas of moderate to high transmission with pyrethroid-resistant vectors:
    - Distribution of any of the new net types (**IG2, PBO, and RG ITNs) seem more effective at controlling malaria than standard, pyrethroid-only ITN campaigns**.
        - Emerging story supports the findings from the Tanzania CRT, though RG nets seem to have performed better in the Mozambique (RG) and Nigeria (RG + SMC) pilots than in Tanzania.
        - May be **less pronounced in West African settings** with complex resistance profiles.
- More complete and nuanced analyses will consider **access, impact, and durability of ITNs after more than one year, as well as ITN use patterns and climate patterns**.
    - Human behavior findings so far are illustrating several key barriers to use, but no differences among districts (i.e., ITN types) are evident – emphasizing some general limitations of ITNs in general.

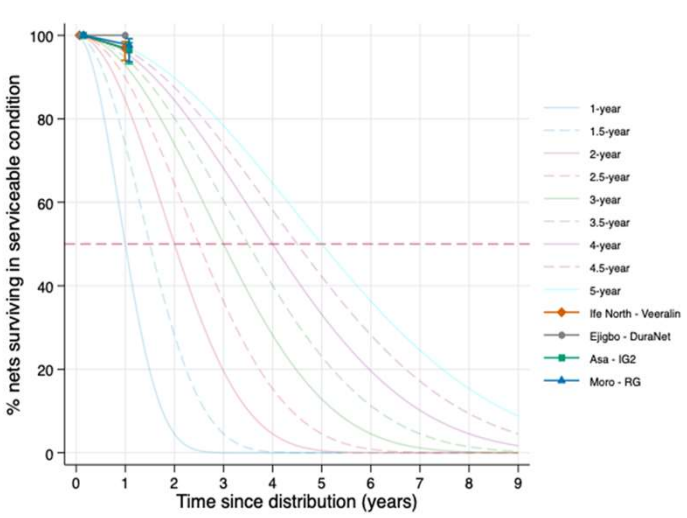
PATH

Interim results – interpret with caution

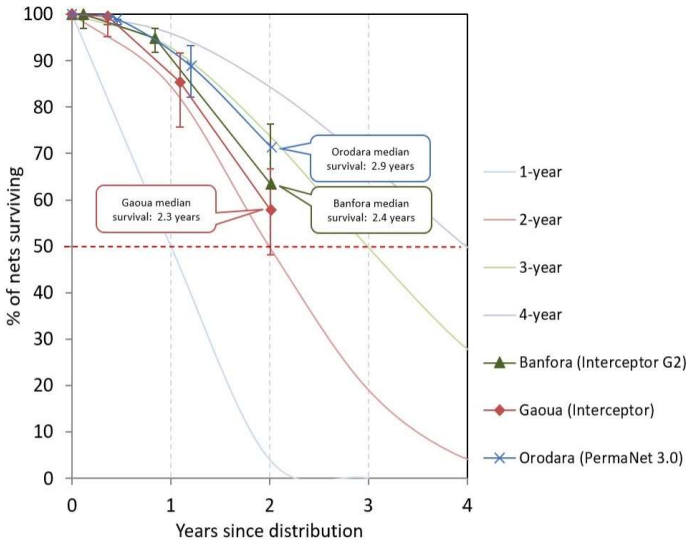
Key takeaways – interim results

12-month durability monitoring summaries indicate that **location** and **environment** are the biggest indicators of net survival.

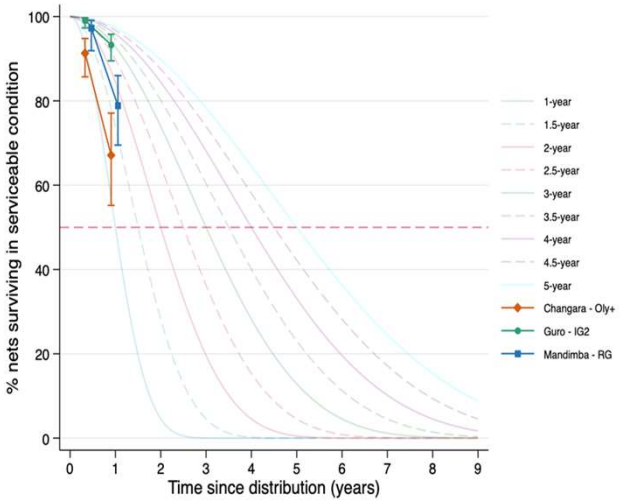
Estimated net survival in serviceable condition



Nigeria



Burkina Faso[1]



Mozambique

[1]The PMI VectorLink Project. November 2020. The PMI VectorLink Burkina Faso ITN Durability Monitoring 12-Month Study Report. Washington, DC. The PMI VectorLink Project, Population Services International (PSI).

Interim results – interpret with caution

Full interim report results are available online:

https://www.path.org/resources/new-nets-project-interim-results-output-3/


PATH