May 8, 2023

Using routine epidemiological, entomological, and/or programmatic data sources to monitor the impact of the distribution of new ITN types

Molly Robertson, Senior Technical Specialist, Malaria, The Global Fund

PATH

The New Nets Project

1 Overview of the New Nets Project

2 Epidemiological activities

3 Human and vector behavior activities

New Nets Project partners

Pilot evaluations

PATH

PNCM

rbc RWANDA BIOMEDICAL CENTER
A Healthy People. A Wealthy Nation

CNRFP

UNIVERSITY OF RWANDA

INSTITUTO NACIONAL DE SAÚDE MOÇAMBIQUE

NIMR

TROPICAL HEALTH

LSTM LIVERPOOL SCHOOL OF TROPICAL MEDICINE

Tulane University

IBOLDA HEALTH INTERNATIONAL LTD.

Operational pilots

psi
Healthy lives. Measurable results.

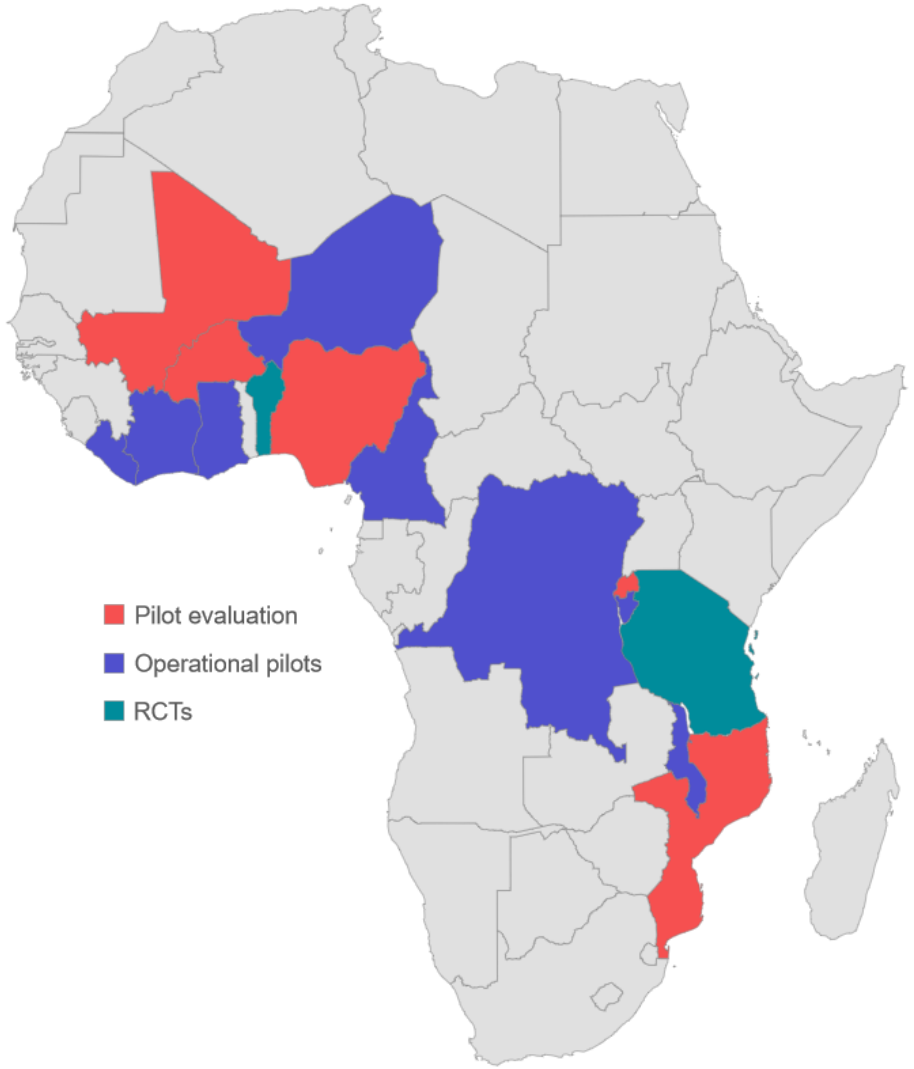
The Alliance for Malaria Prevention

Randomized control trials

LONDON SCHOOL of HYGIENE &TROPICAL MEDICINE

CREC

NATIONAL INSTITUTE FOR MEDICAL RESEARCH



PATH

Research and enhanced surveillance

The New Nets Project supported research and enhanced surveillance to evaluate the impact of different insecticide-treated bed nets (ITN) types in operational settings (2019–2022)

- Interceptor® G2 (IG2) ITN
- Royal Guard® (RG) 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

- Understand the transmission landscape in each setting
- 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.

Durability monitoring

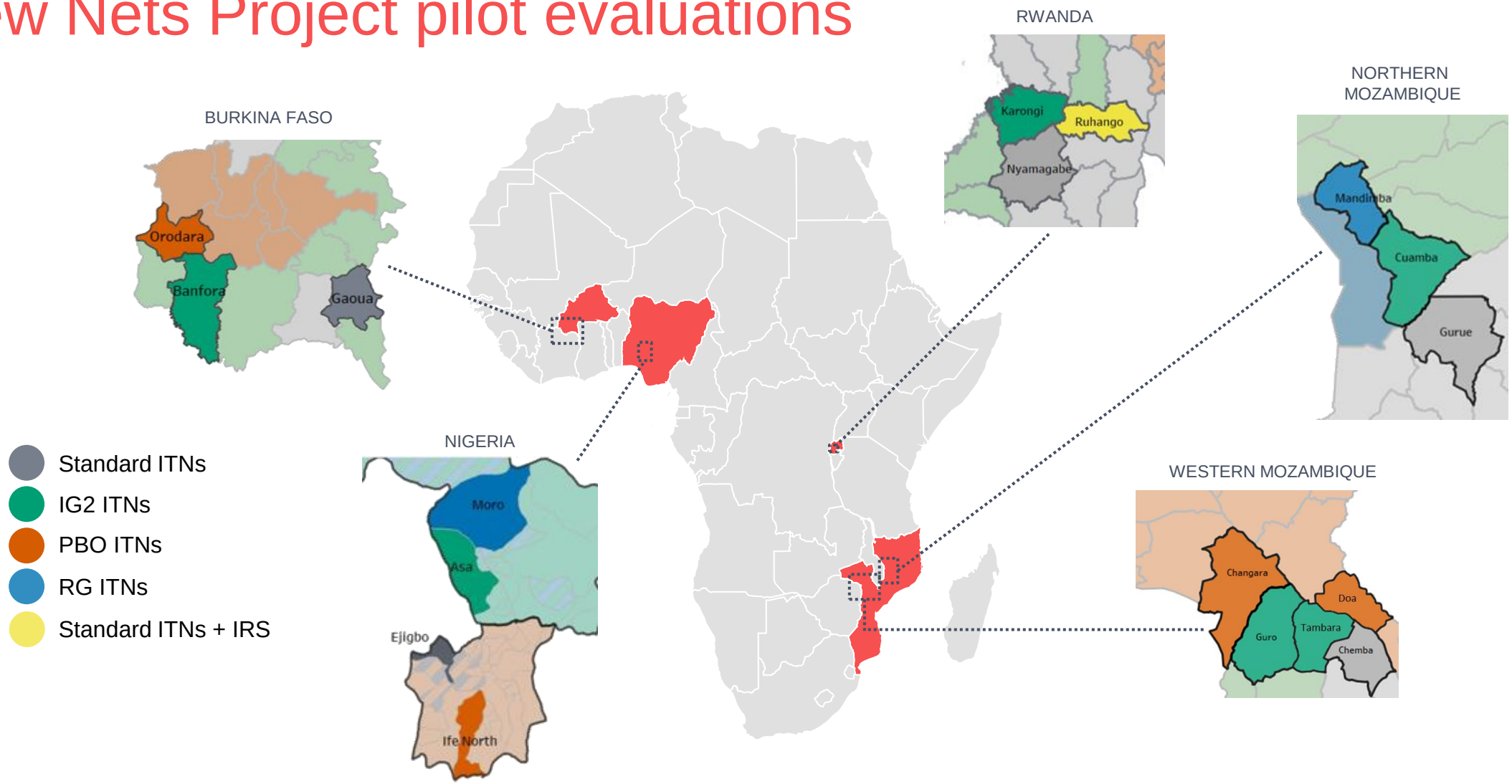
- Estimate survivorship, attrition, physical integrity, and insecticidal content throughout the study time period

Cost-effectiveness

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

PATH

New Nets Project pilot evaluations



Epidemiology

ANC-based surveillance

- Testing incorporated into first ANC visits
- Continuous data collection
- Monthly, RDT-confirmed prevalence

Cross-sectional surveys

- Household survey - *Could build on existing household surveys (e.g., DHS, MIS, durability monitoring)*
- Annual data collection
- RDT-confirmed prevalence

Passive case detection

- Uses existing data collected at health facilities
- Continuous data collection
- RDT and blood smear-confirmed case incidence reported at health facilities

PATH

Epidemiology

ANC-based surveillance

- **Advantages:**
  - Integrated into routine systems
  - Asymptomatic and symptomatic infection prevalence
  - Continuous
- **Disadvantages:**
  - Additional time for ANC attendees, depending on number of questions

Cross-sectional surveys

- **Advantages:**
  - Asymptomatic and symptomatic infection prevalence
- **Disadvantages:**
  - Expensive
  - Infrequent
  - Insufficiently powered for sub-district differences

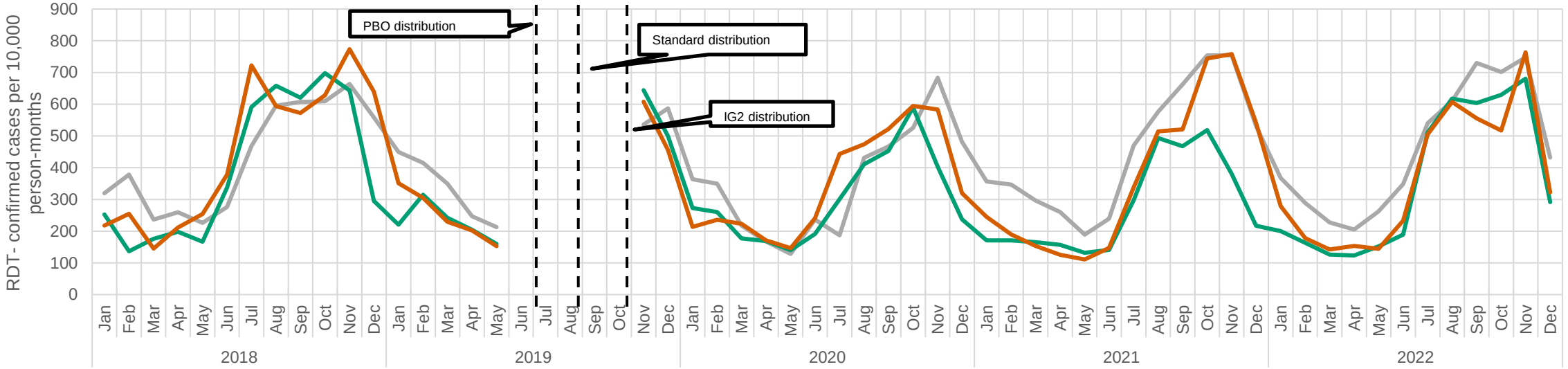
Passive case detection

- **Advantages:**
  - Routine system
  - Health facility level
- **Disadvantages:**
  - Timeliness and quality challenges
  - Accurate population estimates not always available
  - Does not capture all cases

PATH

Epidemiology and ANC surveillance in Burkina Faso

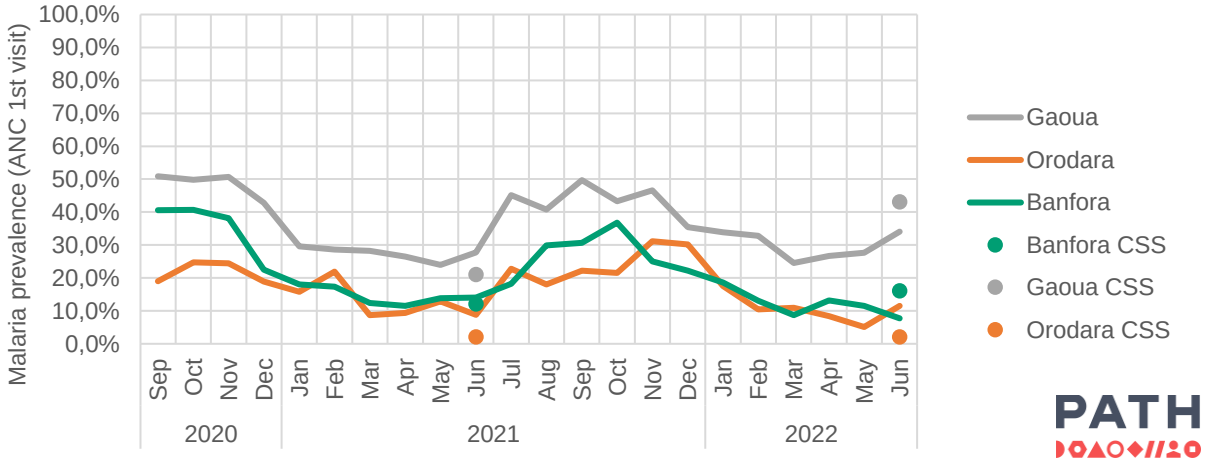
Average all ages monthly malaria incidence rate (confirmed cases per 10,000 person-months at risk) by district, 2018–2022



Malaria prevalence from cross-sectional surveys and ANC-based surveillance

		CSS	ANC (3-month average)
Gaoua (standard ITNs)	June 2021	21.1%	32.3%
	June 2022	42.6%	30.8%
Banfora (IG2 ITNs)	June 2021	11.6%	15.3%
	June 2022	16.3%	9.6%
Orodara (PBO ITNs)	June 2021	2.1%	14.8%
	June 2022	1.6%	8.3%

Malaria prevalence of women attending first ANC visit



PATH

Human-vector interaction

Entomological surveillance

- Routine entomological surveillance activities
- CDC light traps, paired indoor/outdoor human landing trap collections (HLCs), annual larval collections
- Vector species composition, species-specific population densities, biting rates, EIR, insecticide resistance

HLC-based observations

- Incorporated into routine entomological surveillance activities
- Entomological data collectors count people in/out of ITNs each hour
- Characterize time at risk of mosquito bites

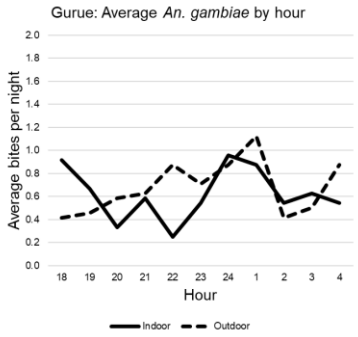
Indirect monitoring of ITN use

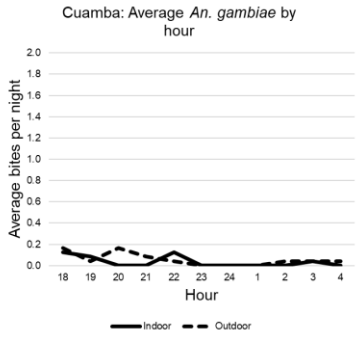
- Biannual study activity
- Participants use two stopwatches to capture the time they spend under an ITN each night
- Characterize time at risk of mosquito bites

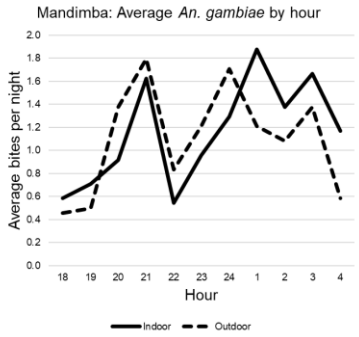
PATH

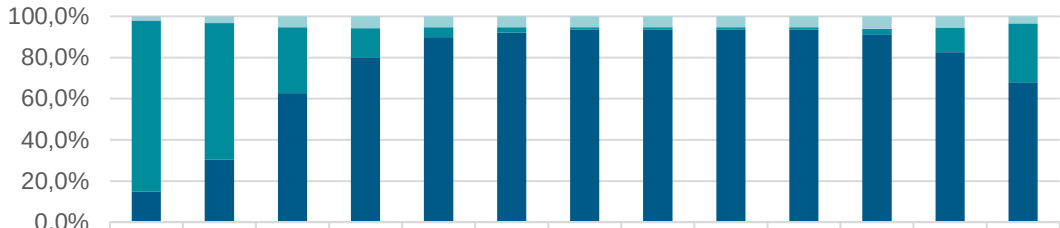
Vector and human behavior in Mozambique

Northern Mozambique



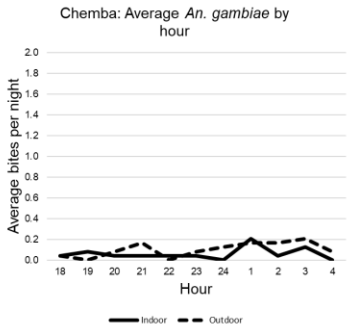


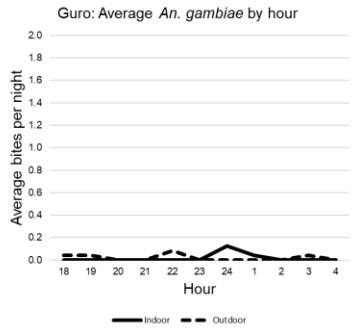


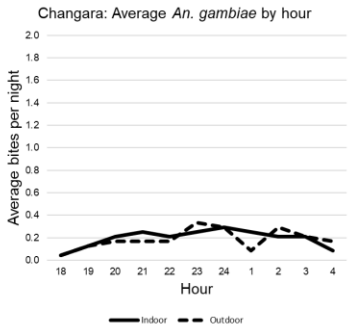


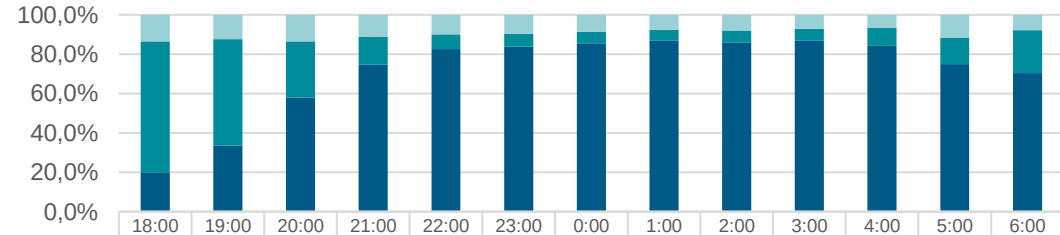
	18:00	19:00	20:00	21:00	22:00	23:00	0:00	1:00	2:00	3:00	4:00	5:00	6:00
Percent of people asleep out of net	2,0%	3,2%	5,2%	5,8%	5,2%	5,2%	5,3%	5,3%	5,3%	5,3%	6,0%	5,4%	3,4%
Percent of people awake out of net	83,2%	66,5%	32,1%	14,1%	4,8%	2,6%	1,1%	1,1%	1,1%	1,1%	2,6%	12,0%	28,5%
Percent of people under net	14,8%	30,3%	62,6%	80,1%	90,0%	92,2%	93,6%	93,6%	93,6%	93,6%	91,4%	82,5%	68,0%

Western Mozambique





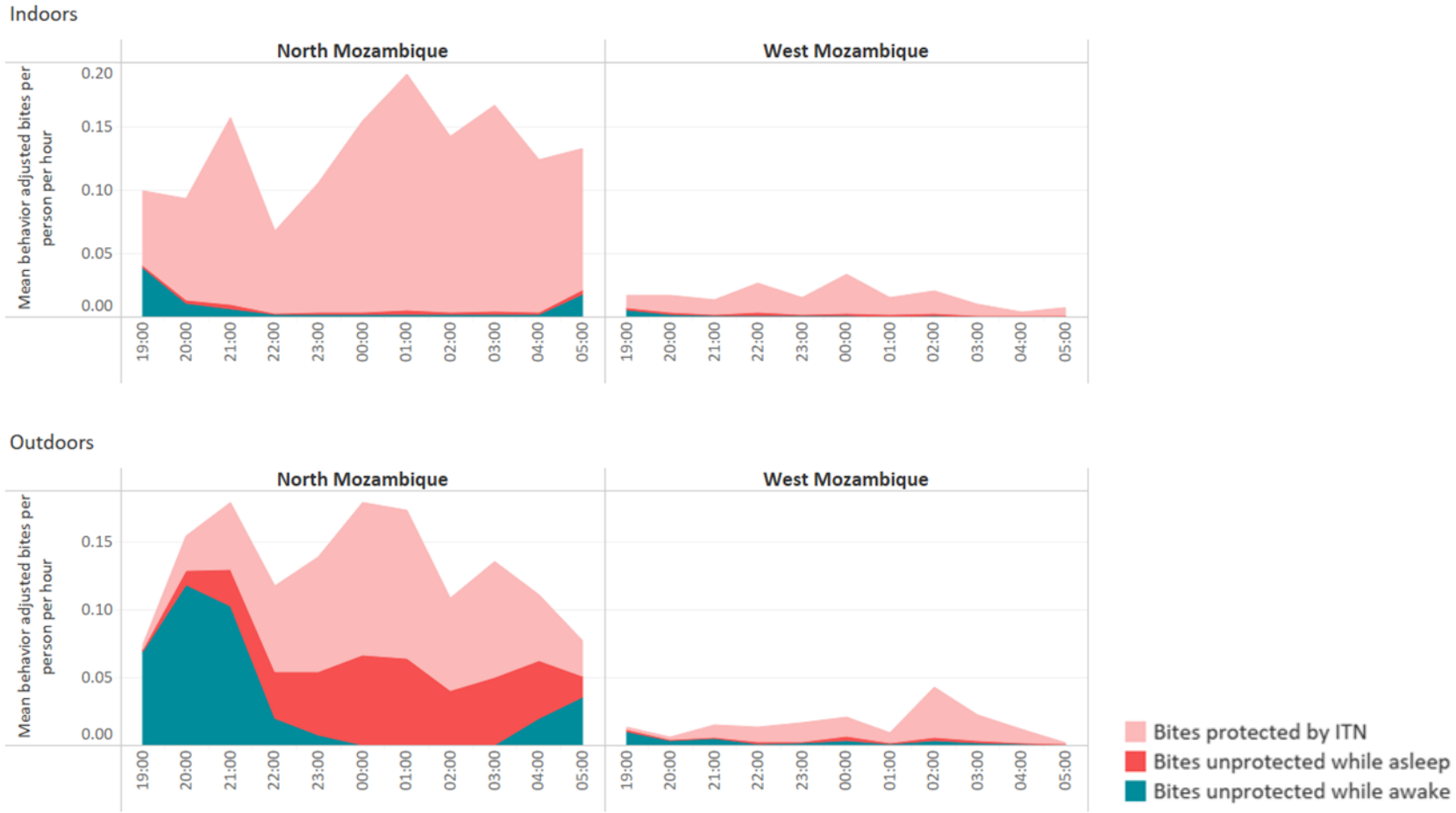




	18:00	19:00	20:00	21:00	22:00	23:00	0:00	1:00	2:00	3:00	4:00	5:00	6:00
Percent of people asleep out of net	13,4%	12,4%	13,4%	11,0%	9,9%	9,6%	8,6%	7,7%	7,9%	7,2%	6,6%	11,6%	7,8%
Percent of people awake out of net	66,8%	54,0%	28,7%	14,2%	7,5%	6,4%	5,8%	5,5%	6,1%	6,0%	9,1%	13,5%	21,9%
Percent of people under net	19,8%	33,6%	57,9%	74,8%	82,6%	83,9%	85,6%	86,8%	86,0%	86,8%	84,3%	74,9%	70,3%

PATH

Intersection of vector and human behavior in Mozambique



Human behavior

Focus group discussions

- Biannual data collection
- Semi-structured discussion with 6 to 8 participants
- Patterns of ITN use behavior

In-depth interviews

- Biannual data collection
- Semi-structured interview with 1 participant
- Patterns of ITN use behavior

Participant/direct observations

- Biannual data collection
- Observations of daily activities related to ITN use
- Refinement of topics for interviews and focus group discussions

PATH

Human behavior findings in Mozambique

Access

Net use and motivation

Barriers to use

Acknowledgments

NNP consortium members

IVCC Building Partnerships Creating Solutions Saving Lives

- 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

PATH

- Lead pilot evaluations in partnership with NMCPs and research institutes

The Alliance for Malaria Prevention

- Technical assistance

Imperial College London

- Modelling of trials design and implementation impact

Funders

Primary

Unitaid Innovation in Global Health

The Global Fund To Fight AIDS, Tuberculosis and Malaria

Supporting

MedAccess

Bill & Melinda Gates foundation

USAID FROM THE AMERICAN PEOPLE

PATH

Vector Control Epidemiological Impact Evaluation Staff and Technical Assistance Guide

This is a guide for national malaria programs to inform requests for staff and/or technical assistance for evaluations of the impact of vector control interventions on malaria burden or transmission.

It includes:

- An overview of two common types of evaluations—using existing routine data sources and conducting cross-sectional or cohort studies.
- Examples of when and how national malaria programs have used these interventions and how they went about setting them up
- It also provides a description of the staff/technical assistance roles and the expected level of effort for these roles.

PATH

Evaluations using Routine Data vs. Cohorts

- **Routine data sources** have the advantage of allowing impact evaluations to be conducted at a lower cost, at a more granular level, and with greater breadth across the country than through cross-sectional and cohort studies. Evaluations using routine data sources are typically used to inform national and sub-national vector control decisions.

- **Cross-sectional and cohort studies** are roughly 10 times the cost of evaluations conducted using routine data sources, including increased LOE and staff level, but provide higher quality data that accurately capture trends in community-based malaria prevalence or incidence with more precision. Cross-sectional and cohort studies are generally conducted to produce generalizable results to inform both national and global decision-making.

Routine and Existing Data Sources

1. Health Management Information Systems (HMISs), including confirmed malaria cases, malaria suspects, total suspects tested for malaria, total outpatient visits, confirmed malaria cases diagnosed by community health workers, pregnant women and infants receiving ITNs through health facilities, and population, by age and health facility.

2. **National Logistics Management Information Systems** (LMISs) for RDT and ACT stock and commodity data, to determine if stockouts are influencing trends in confirmed malaria cases.

3. **ITN distribution data** from program implementation, including ITN type and the number of ITNs distributed and population protected by location.

4. **Post-ITN campaign surveys**, such as end user or durability monitoring surveys.

5. IRS campaign data from program implementation, including structures sprayed and population protected.

6. **Entomological data** from routine entomological monitoring from the NMCP and research and implementing partners.

7. **Existing population survey data** from Malaria Indicator Surveys, Demographic and Health Surveys, Malaria Behavioral Surveys, or other population-based surveys that contain data on malaria-related indicators.

8. **Population estimates,** such as national censuses, WorldPop or GRID3 projections.

9. **Climate, weather, and ecology data** from either national or geospatial sources.

Why, When, and Where?

National malaria programs may want to prioritize vector control impact evaluations when

- new interventions, or
- new combinations of interventions are being introduced,
- when interventions are withdrawn, or
- when the program is actively considering a change in vector control strategy or policy and would like data to inform specific decisions.

- Burkina Faso, Rwanda, Mozambique, and Nigeria national malaria programs engaged the New Nets Project to conduct evaluations of new types of ITNs through a cross-sectional evaluation.

- In Cote d'Ivoire, the NMCP engaged PMI VectorLink to conduct an evaluation assessing the impact of IRS over the first two years of implementation using routine data sources.

- In Sierra Leone, the NMCP engaged PMI VectorLink to conduct an evaluation assessing the impact of co-deploying IRS and PBO ITNs compared to PBO ITNs alone using routine data sources.

Roles and Responsibilities + Links to Study Design Guides

Position	Responsibilities	Required experience
Epidemiologist	In addition to the responsibilities listed above: 1. Design data collection tools and plan epidemiological data collection. 2. Collaborate with study coordinator to design and lead training of field workers. 3. Collaborate with study coordinator to oversee data collection.	In addition to experience listed above: • Experience overseeing field-based data collection.
Entomologist	In addition to the responsibilities listed above: 1. Design data collection tools and plan entomological surveillance approaches, including insecticide susceptibility monitoring. 2. Collaborate with study coordinator to design and lead training of entomological field workers. 3. Collaborate with study coordinator to oversee data collection, analysis, and interpretation.	In addition to experience listed above: • Experience overseeing comprehensive entomological surveillance activities.
Data manager/ analyst	In addition to the responsibilities listed above: 1. Develop tools and processes to support data collection, such as configuration of data collection tools within digital platforms. 2. Rapidly review data from field teams and provide feedback. 3. Support field teams to troubleshoot any challenges with data collection tools.	In addition to experience listed above: • Experience in programming and using digital tools for data collection.
Study coordinator	1. Help draft, lead implementation of, and ensure compliance with protocols and standard operating procedures. 2. Establish and maintain positive working relationships with partners.	• Experience conducting health research activities. • Familiarity with malaria programs.

PATH

Acknowledgments

RBM Partnership To End Malaria | Vector Control Working Group
amp | The Alliance for Malaria Prevention
PATH
RBM Partnership To End Malaria | Surveillance, Monitoring and Evaluation Reference Group (SMERG)
IVCC
TROPICAL HEALTH

PATH


PATH