Using the Entomological Surveillance Planning Tool (ESPT) to integrate human behavioral and entomological data towards identifying gaps in protection in Guna Yala, Panamá

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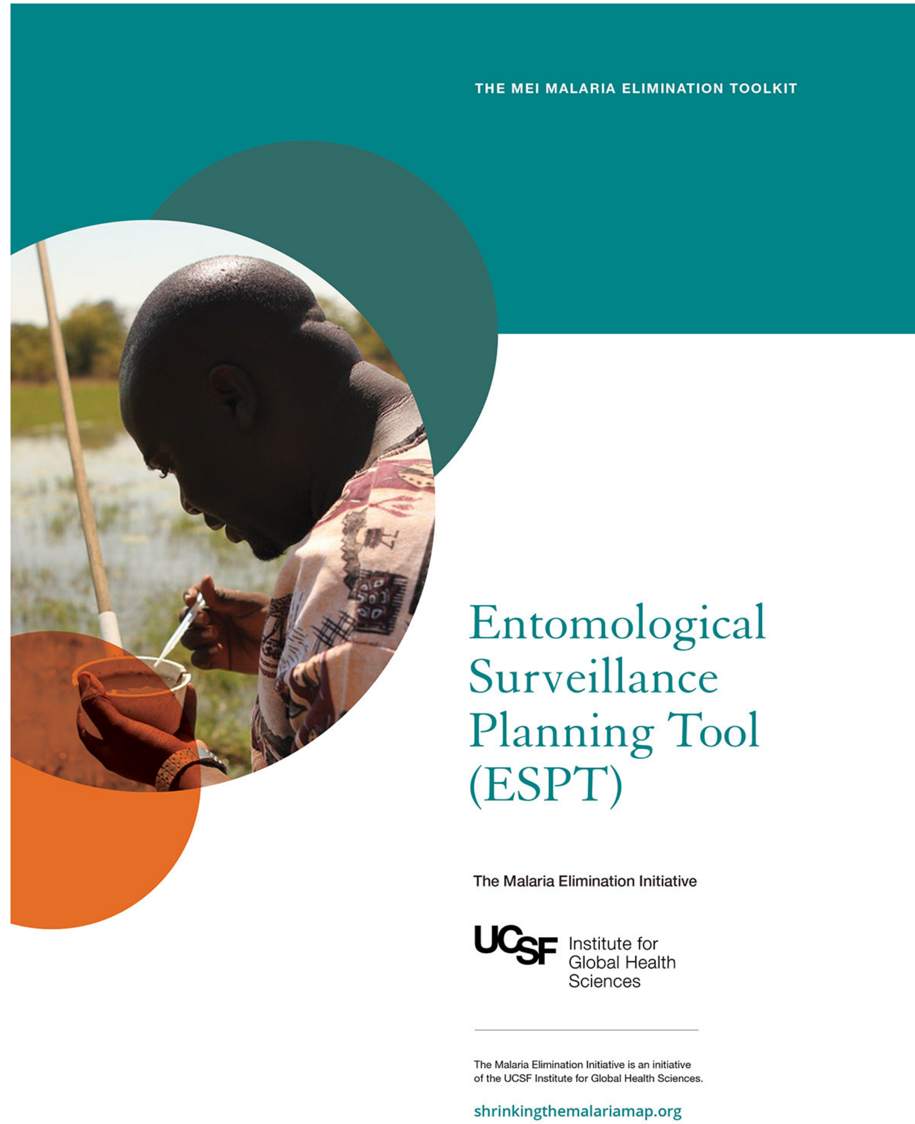
REPÚBLICA DE PANAMÁ
— GOBIERNO NACIONAL —
MINISTERIO DE SALUD

CLINTON HEALTH ACCESS INITIATIVE

The ESPT

- A **decision-support tool** for planning entomological surveillance activities, interpreting entomological data, and guiding programmatic vector control decisions.
- Supports **question-based programmatic entomological surveillance** that is cost-effective and tailored to local context and available resources.
- Provides guidance on how to integrate entomological data with key metadata, including human behavioral data to address **program priorities.**



Malaria in Guna Yala, Panamá

- Panamá is striving to eliminate malaria.
- But malaria transmission remains high in the country’s indigenous territories (*Comarcas*)
- Traditionally, heaviest burden of malaria is found in the Comarcas of Guna Yala
  - The Guna indigenous group comprises less than 3% of total population, but shoulder ~90% of Panama’s malaria burden.

A boy from Guna Yala sleeping in his hammock net.
Photo courtesy of Clinton Health Access Initiative (CHAI)

ESPT pilot in Guna Yala (2018-2019)

ESPT piloted to address several **priority program questions** towards better understanding **drivers of transmission** in GY, including:

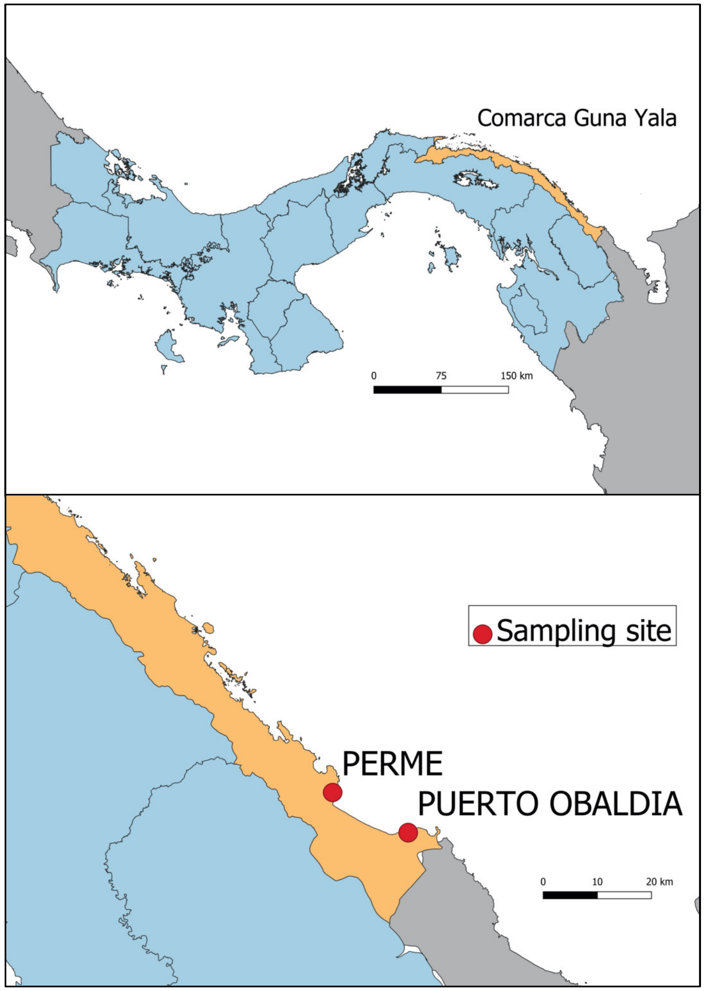
*Are **bed nets** an appropriate intervention in Guna Yala based on **human** and **vector behavior**?*

Bednet care in Guna Yala
Photo courtesy of Clinton Health Access Initiative (CHAI)

Pilot methods 1/3

- 2 neighboring sentinel sites: Perme, Puerto Obaldia (PO)
- 3 collection periods to include rainy and dry seasons
- 5-7 collection nights per collection period

- **Human Landing Catches** (HLC) inside/outside in 2 sentinel houses per site (17h00 – 06h00)
- **Human Behavior Observations** (HBOs) inside/outside in same 2 HLC houses (17h00 – 06h00)



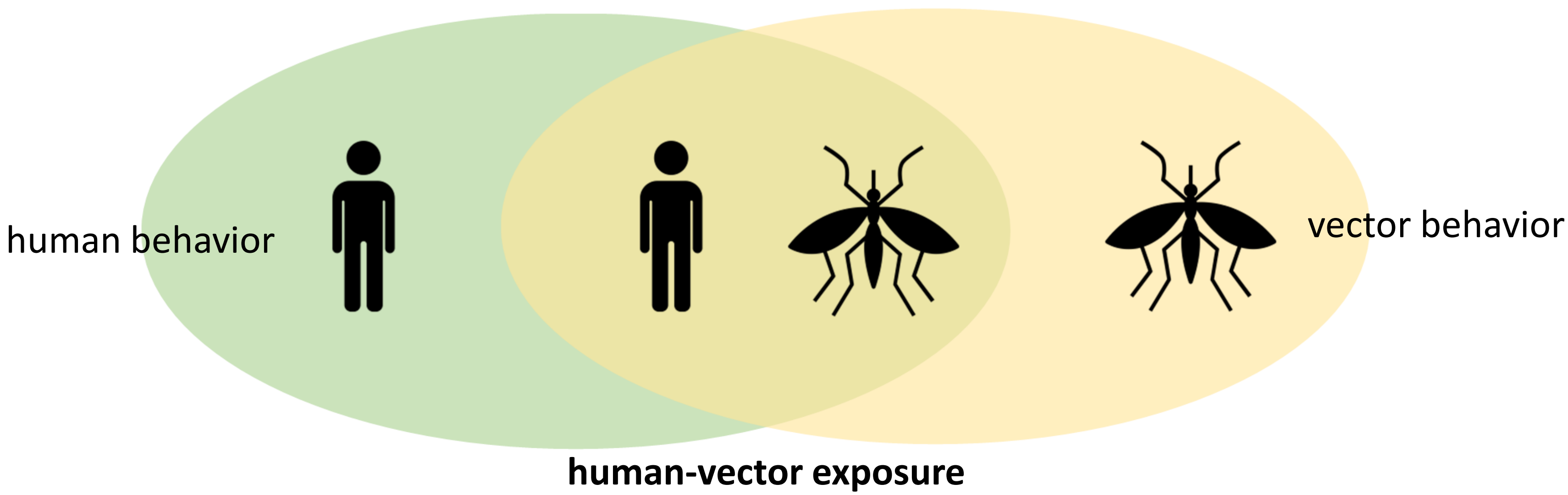
Pilot methods 2/3: HBOs + HLCs

- In HLC houses, HLC collectors also conduct hourly counting and recording of **HBO indicators** to look at bed net use sleeping patterns:
  - Number of people awake, outside
  - Number of people awake, *not under a bed net*, inside
  - Number of people asleep, *not under a bed net*, inside
  - Number of people asleep (or resting/awake), *under a bed net*, inside

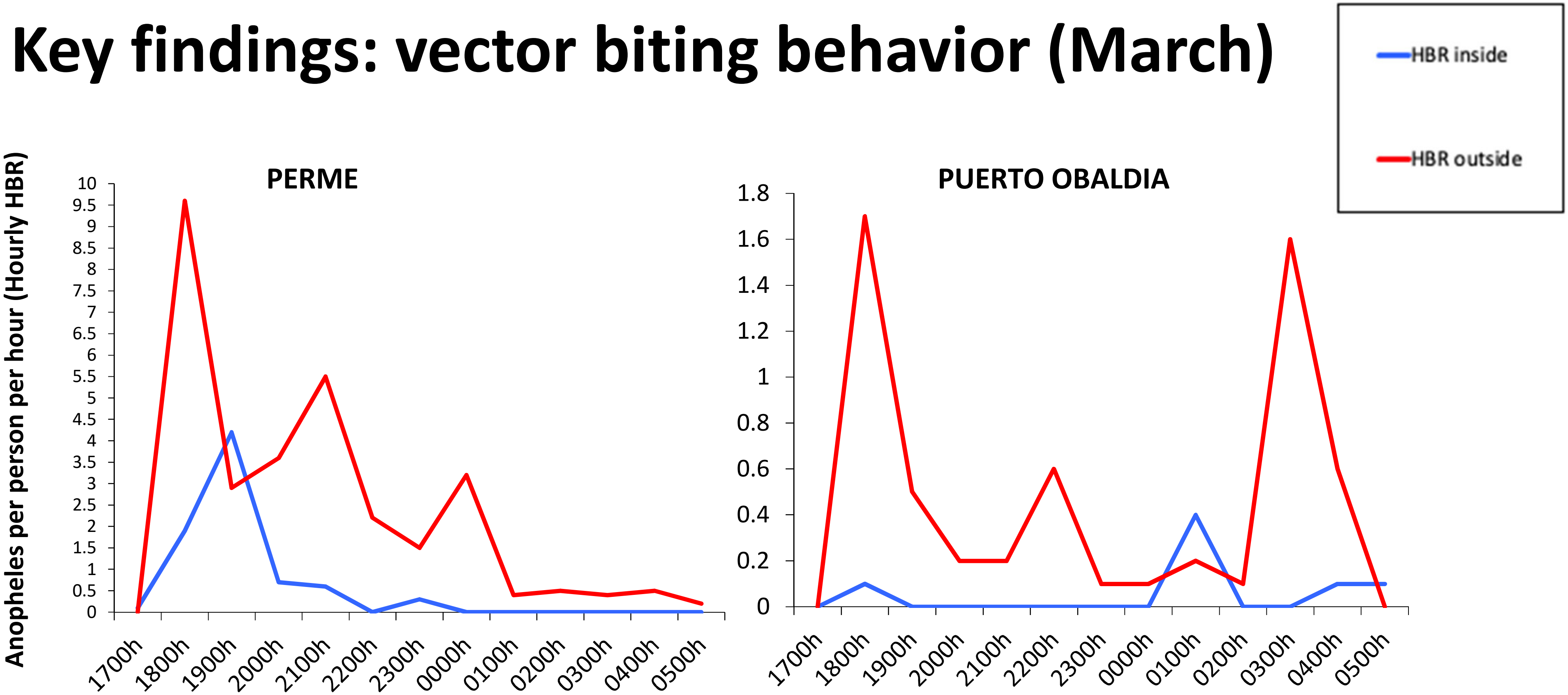
- **Cost-effective** field method: no added expense; data is recorded by the HLC collector!

Pilot methods 3/3: HBOs + HLCs

HBO indicators are integrated with **HLC indicators** (Human Biting Rate (HBR) inside, HBR outside) to pinpoint **human-vector exposure: gaps in protection**



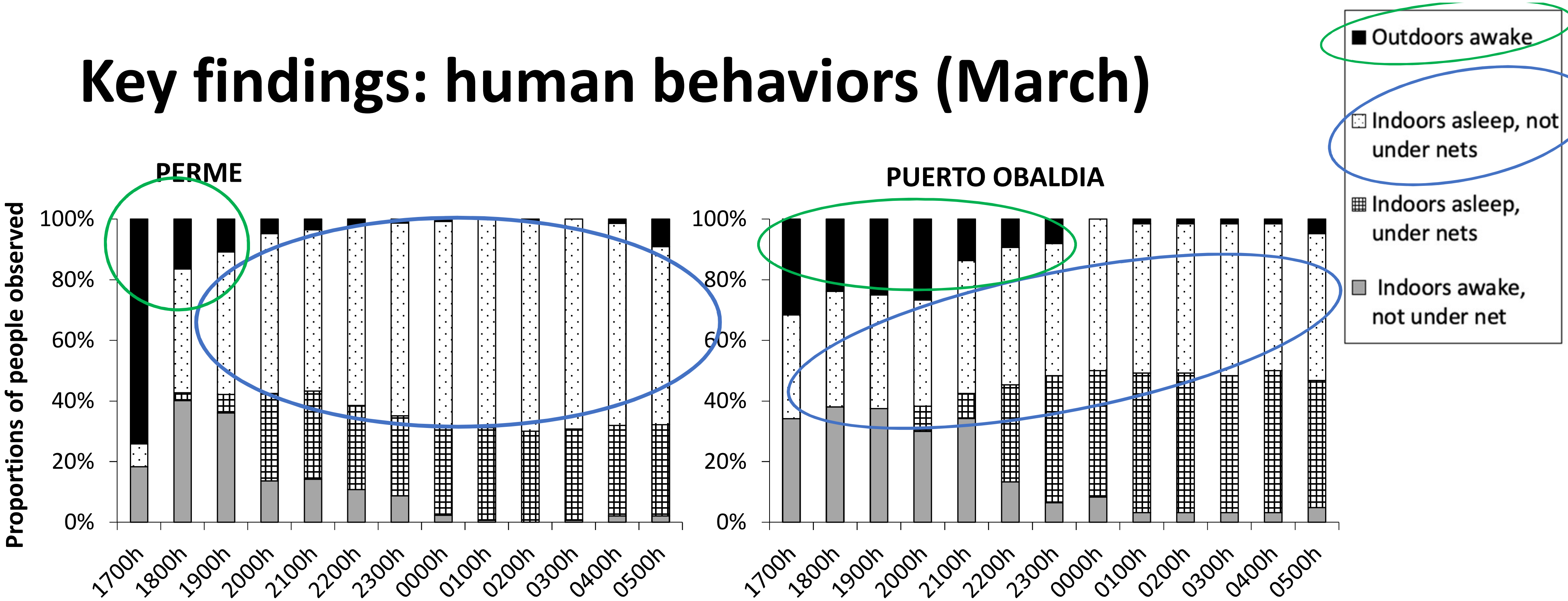
Key findings: vector biting behavior (March)



At both sites:

Vector biting inside and outside, but primarily outside and during early evening hours

Key findings: human behaviors (March)



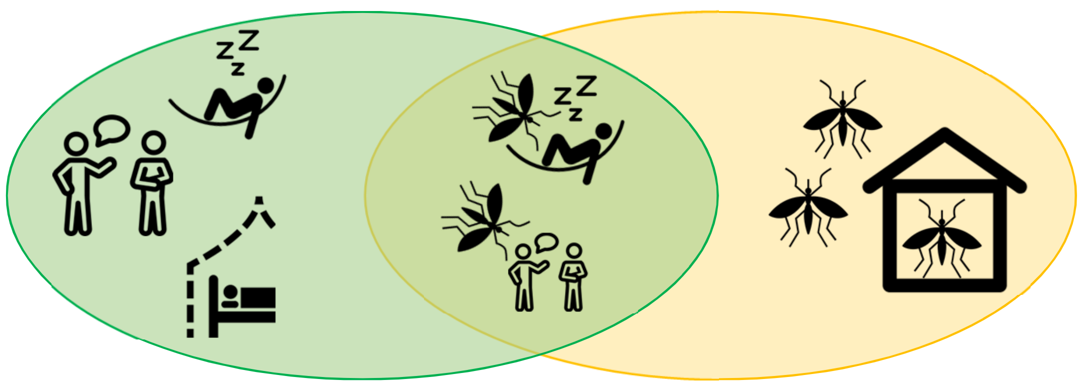
PERME	PUERTO OBALDIA
People go to sleep early and spend less time outside in the evening	People go to sleep late and spend more time outside in the evening socializing
Lower bed net use at night	Higher bed net use at night

Integrating vector and human behavior data

- Next, we integrated the vector biting behavior data (HBR) with the human behavior data, allowing us to obtain the **adjusted HBR**.
- The adjusted HBR is the <u>human biting rate for each activity</u>:
    - It is the product of **HBR** and the **proportion of people observed doing specific activities**.
    - *For example:* you can compute the adjusted HBR for people sleeping without a bed net:

      Proportion of people not sleeping under a net, inside x **HBR** = **adjusted HBR**

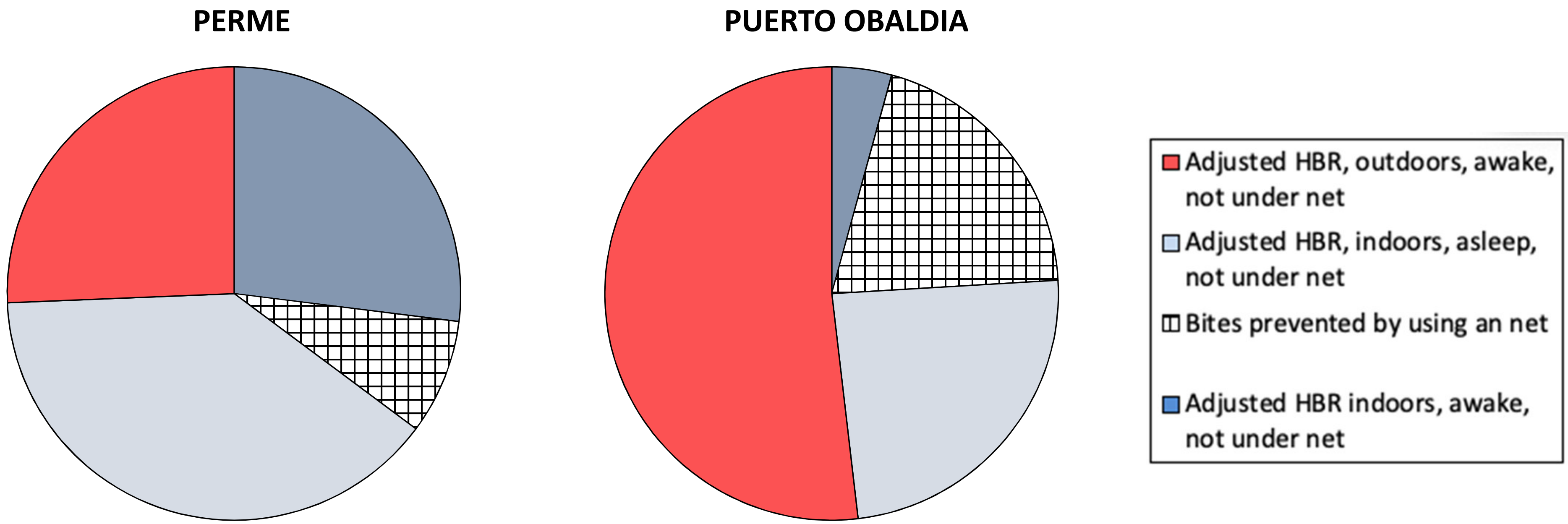
Proportions of people doing specific activities



HBR: vector biting behavior

Adjusted HBR

Key findings: human-vector exposure

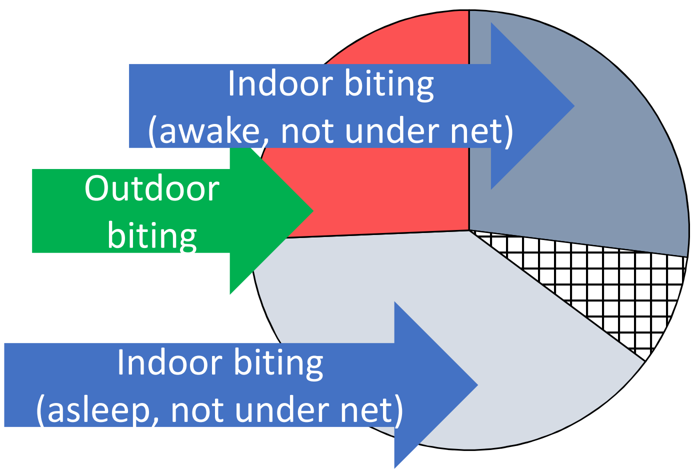


PERME	PUERTO OBALDIA
Primary exposure to vectors is **indoors, asleep, not under net**	Primary exposure to vectors is **outdoors, awake, not under net**
Lower bed net use	Higher bed net use
Outdoor biting accounts for ¼ of exposure to vector biting	**Outdoor biting** accounts for **more than ½** of exposure to vector biting

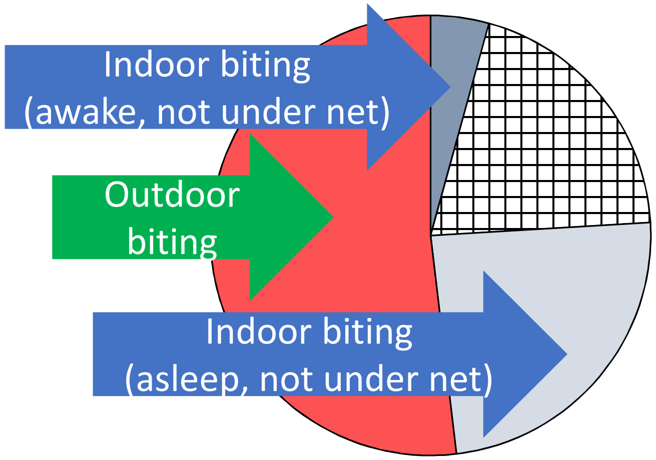
Identified gaps in protection in Guna Yala

By integrating mosquito and human behavior data, we identified key **gaps in protection**:

PERME



PUERTO OBALDIA



Perme and PO are neighboring communities, yet their **human-vector exposure profiles differed**, due to differences in human behavior rooted in cultural differences:

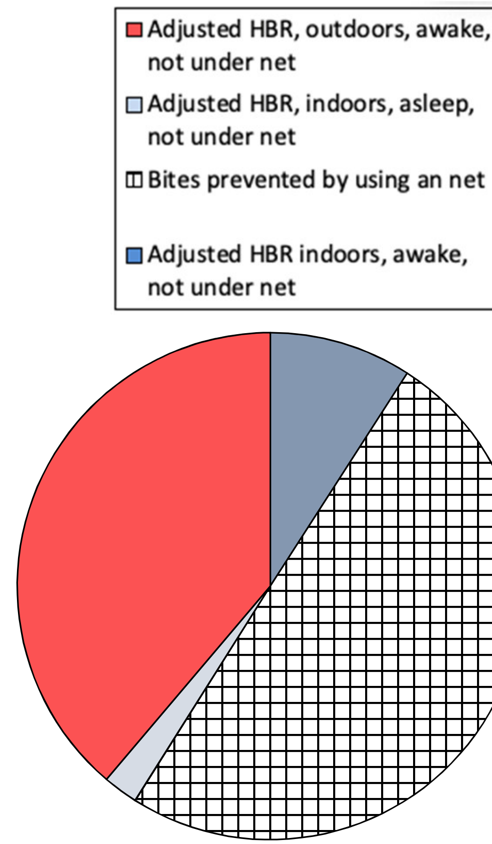
- **PO** community members spent more time outside during the evening, went to sleep later, and used bed nets more than in Perme.
- **Perme** community members spent less time outside in the evening, went to sleep earlier, and used bed nets less than in PO.

Bed net campaign in Guna Yala

March – July 2019:
bed net campaign in Guna Yala

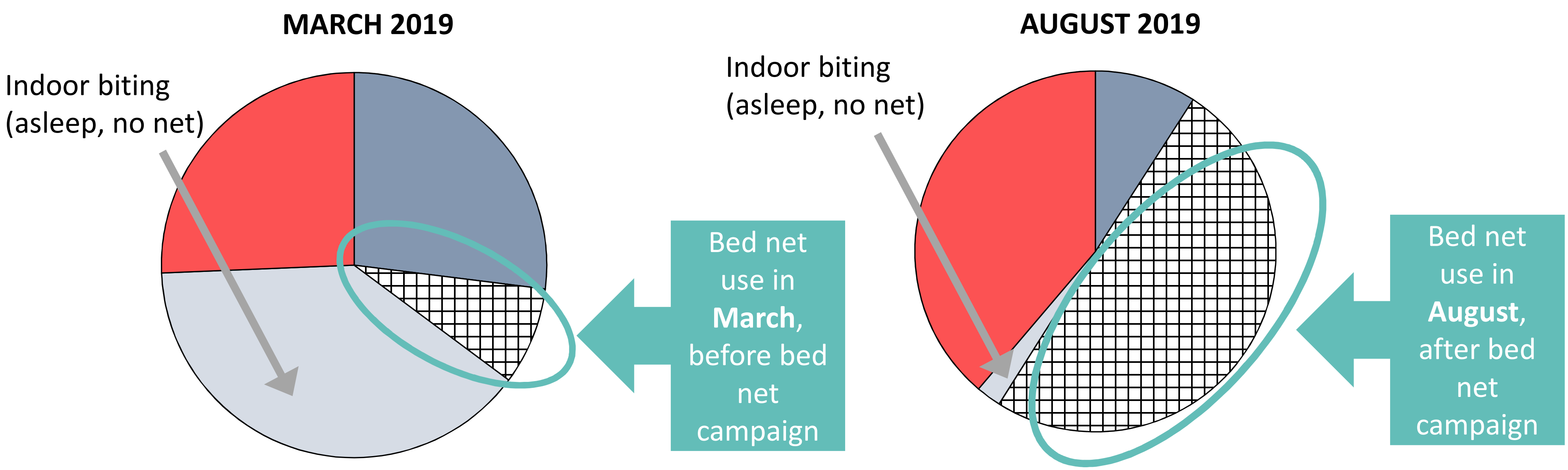
August 2019:
HLC and HBOs conducted in Perme

Data demonstrated reduced human-vector exposure during the night while asleep



PERME (August 2019)

After bed net campaign in Perme



- Bed net campaign changed the human-vector exposure profile in Perme: more people are now protected by bed nets, leading to fewer people sleeping without using nets.
- Bed net campaign also highlighted key remaining gaps in protection:
  - primary gap in protection in Perme is now outdoors, in the evening.

Bed net campaign posters supporting the bed net campaign.
Photo by Élodie Vajda

Answering MINSA's programmatic question

*Are **bed nets** an appropriate intervention in Guna Yala based on **human** and **vector behavior**?*

Answer:

- Bed nets are an appropriate and effective intervention, but are not sufficient as a sole intervention.
- Other interventions must also be included to address identified gaps in protection, such as outdoor biting.


Puerto Obaldia
Photo by Élodie Vajda

Key take-aways

1. Integrating human behavior data with vector data allows programs to identify where people are being bitten by mosquitoes (gaps in protection).

2. Understanding gaps in protection helps programs manage expectations and understand impact of interventions on malaria transmission.

3. Human-vector exposure profiles in neighboring communities such as in Perme and PO may differ.

Thank you
Gracias