



Training isolated populations in  
the Amazon to self-diagnose and  
self-treat for malaria

MALAKIT research study

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French Guiana

*Senegal, Sept 2023*

CONTEXT

# Guiana Shield





# Access to care

300 000 inhabitants

Median age 25 years

**Multiculturality**  
(> 25 languages)

**Littoral**

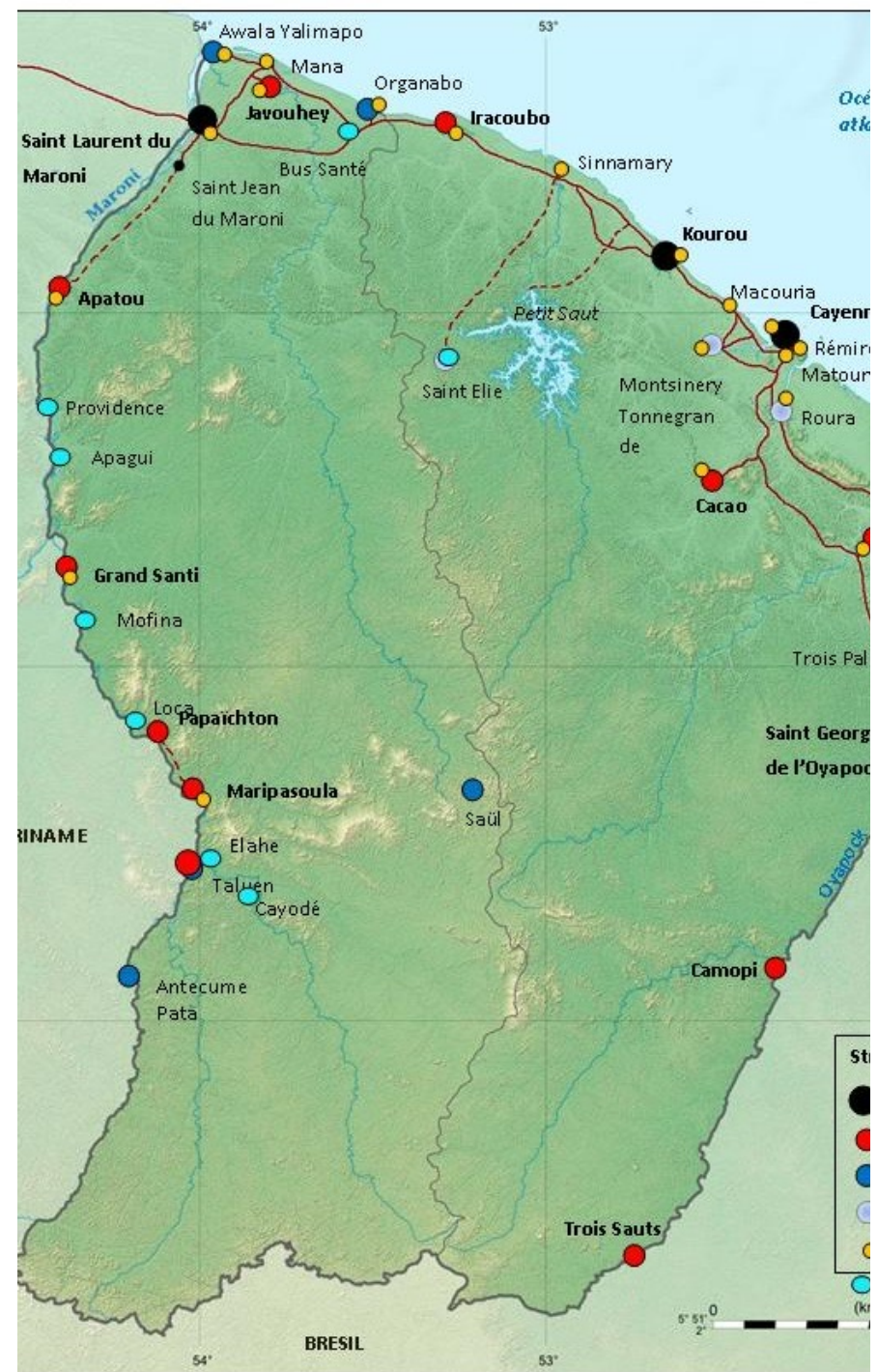
**80% population**

3 Hospitals

**Interior villages**

**20% population**

Health centers







# Centre Hospitalier de Cayenne



**Département de recherche, innovation et santé publique (DRISP)**

Centre d'Investigation Clinique  
Antilles – Guyane  
Inserm 1424



**Equipe  
Malakit/Curema**  
Recherche  
opérationnelle  
transnationale –  
populations vulnérables  
Pr Maylis Douine





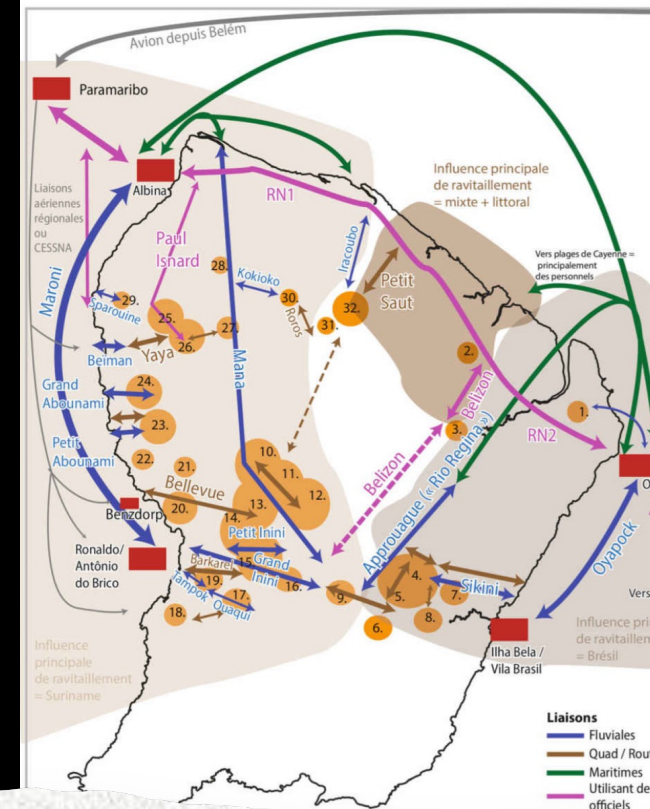






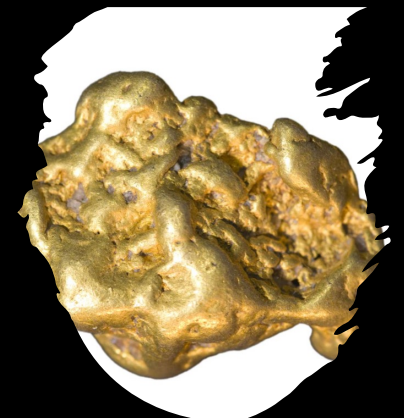
Rain forest





Le Tourneau, CNRS, 2021

A soil rich in gold,  
attracting *garimpeiros*







## Informal artisanal and small-scale gold mining

- 10,000 persons
- Mainly from Brazil
- > 700 informal sites
- located deep in the rain forest (several days of travel between sites and the nearest town)



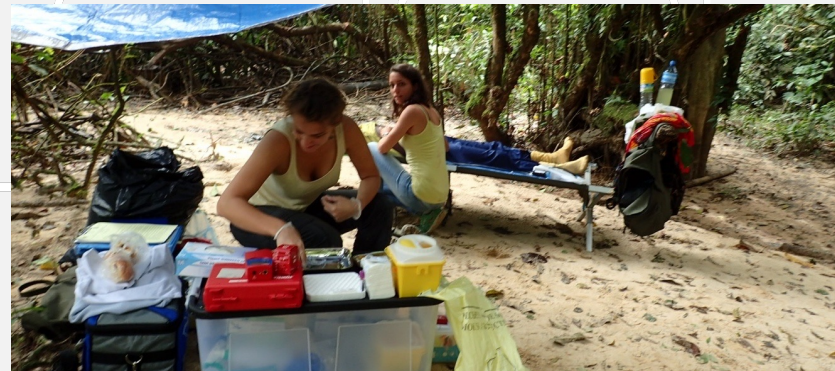
# In 2015: a descriptive study among 421 gold miners

*Plasmodium*-PCR prevalence 22.3%  
84% asymptomatic carriers  
60% *P. falciparum*

52% of self-medication

High mobility

- Risk of *Pf* artemisinin-resistant emergence
- Risk of malaria propagation in the Region

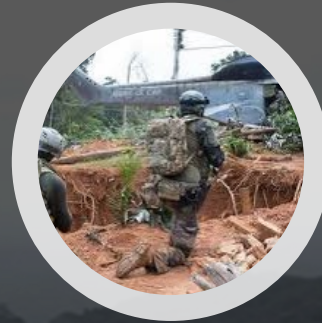




# Need of an innovative strategy

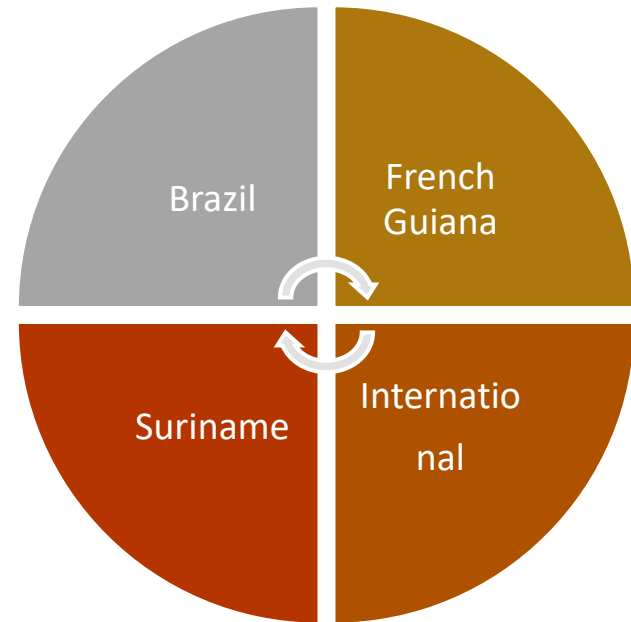
- **Barriers to appropriate case management implementation in this vulnerable population**

- Regulatory
- Political
- Geographical
- Logistical
- Security-related



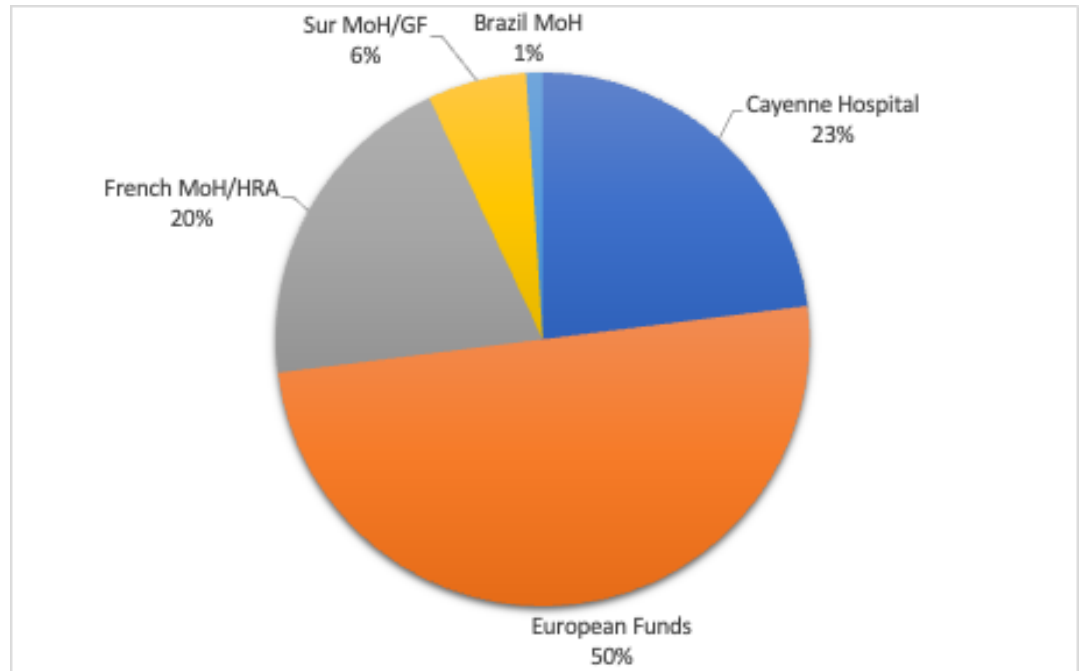
# MALAKIT STRATEGY

# Collaboration between many partners





Funding  
1,5 M€



# Malakit strategy



*French Guiana border*  
**DISTRIBUTION SITE**

*French Guiana forest*  
**MINING SITES**

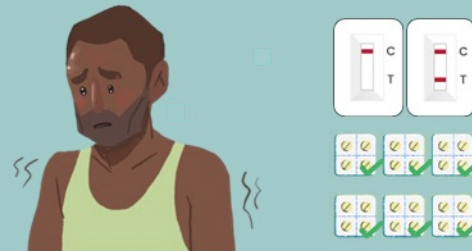
*French Guiana border*  
**DISTRIBUTION SITE**

FIRST VISIT



Inclusion, training and kit handing over

WORKING



Symptoms and/or Kit use

FOLLOW-UP VISIT

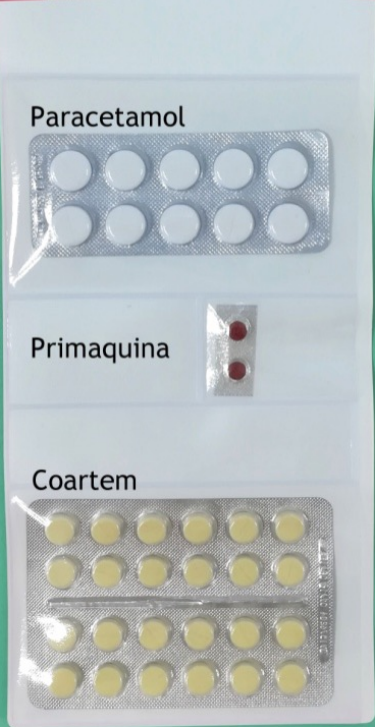


Kit refill or replacement



# The kit:

- 3 RDTs Carestart® PanLDH
- 1 treatment with artemether-lumefantrine
- + 1 primaquine single-dose (15 mg)
- paracetamol



Saco amarelo (resíduos)



## 3 testes rápidos (TDR)



## Material do teste rápido



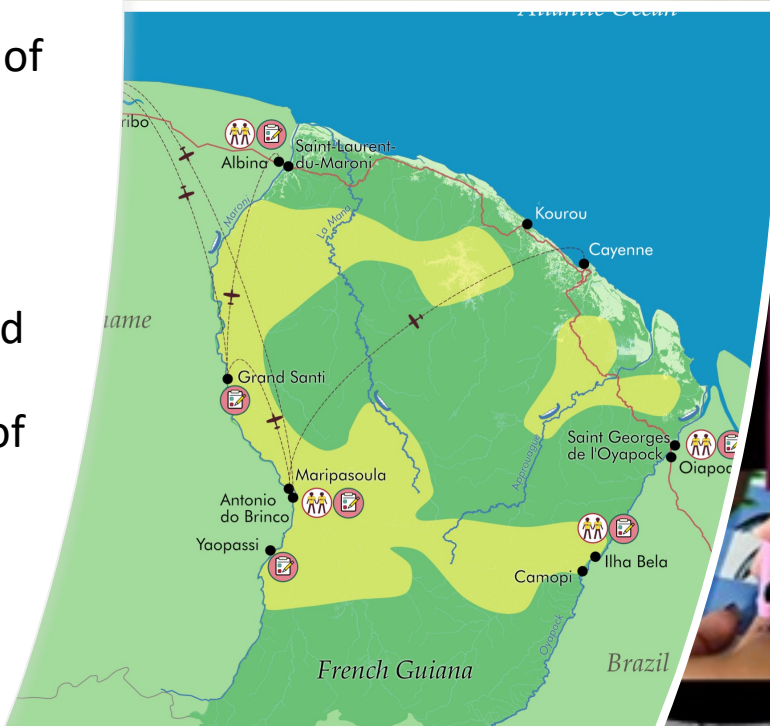


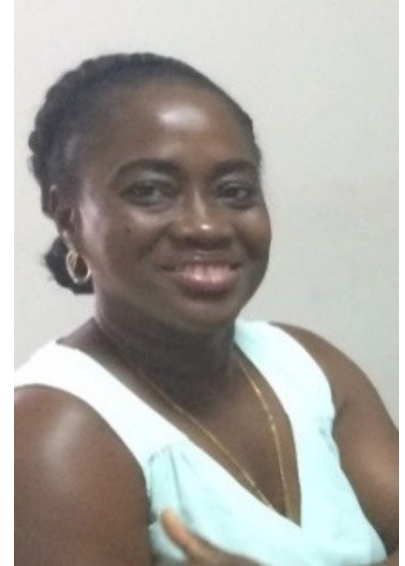
# Malakit distribution sites

Crossing points  
Logistical bases

## Facilitators:

- Good knowledge of the study population
- Same language
- specifically trained for appropriate implementation of the intervention



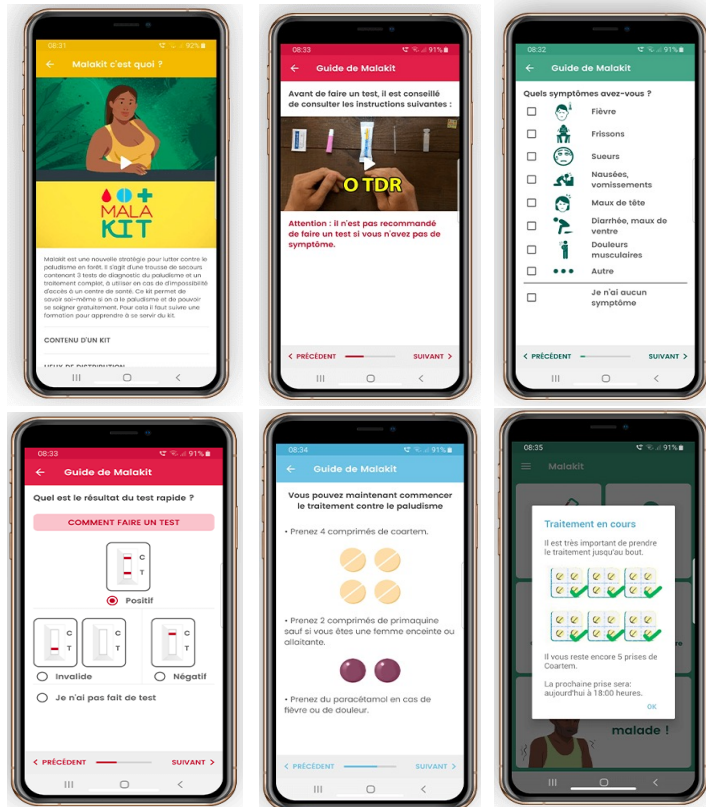
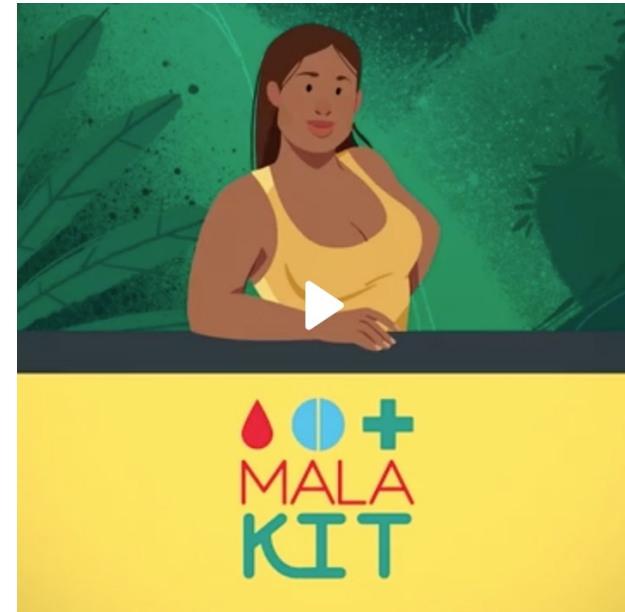




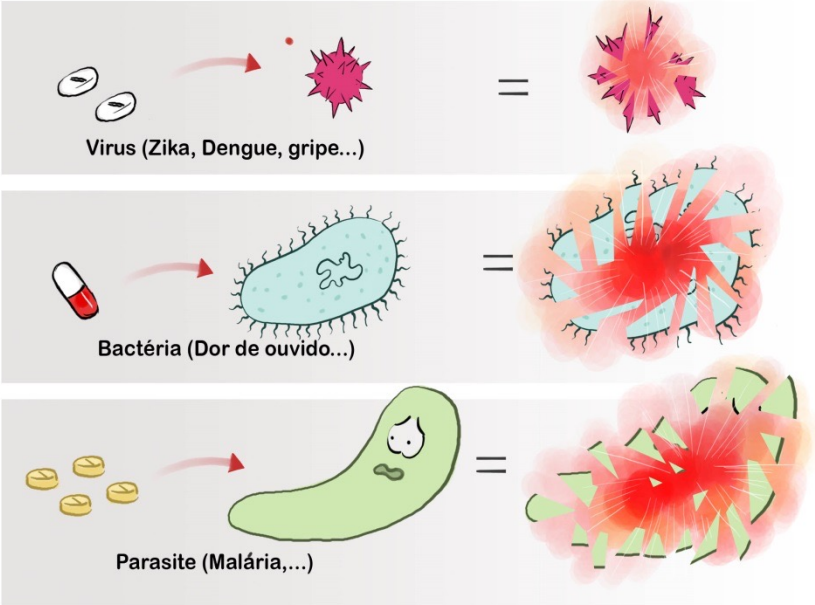




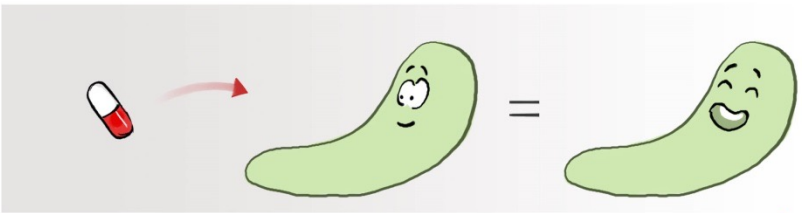
# Community-based training tools



# Uma infecção - um remédio adaptado

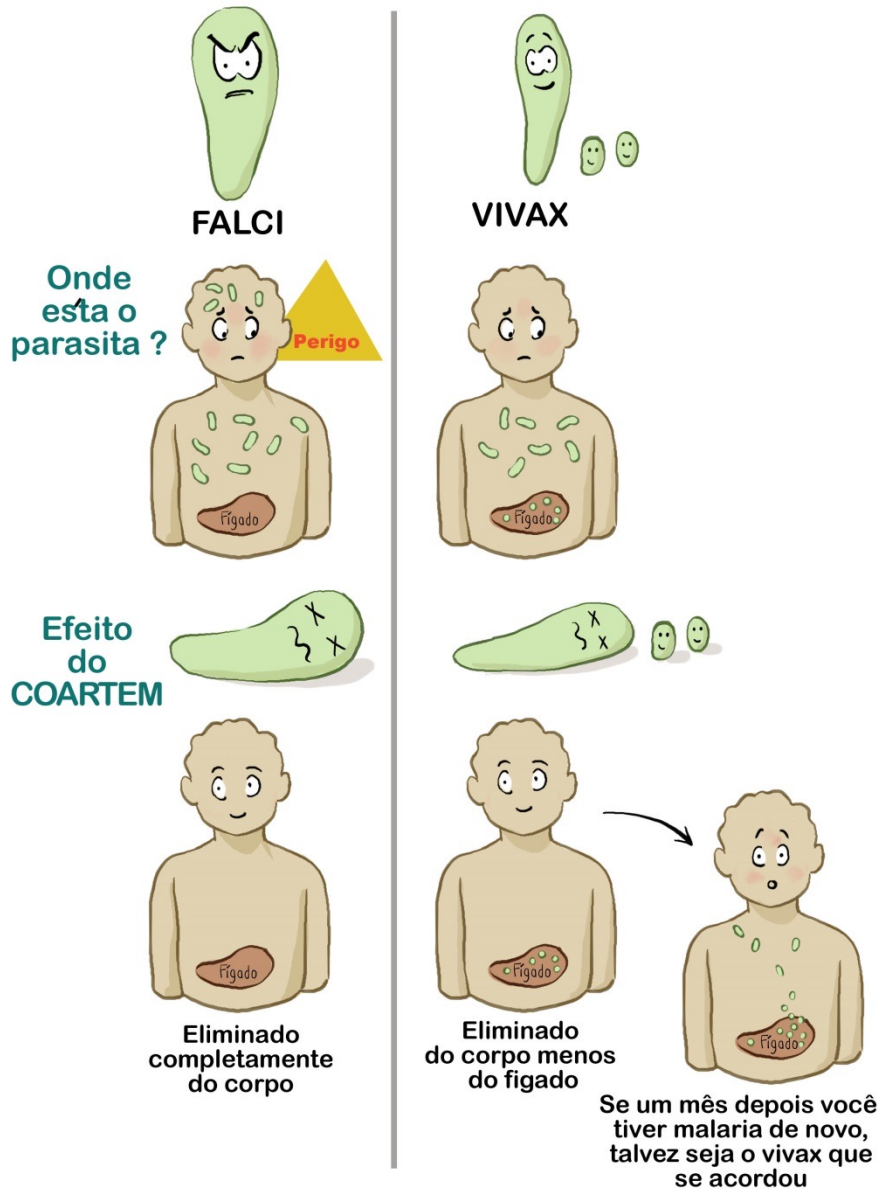


Um remédio para uma bactéria por exemplo, pode não ter efeito sobre um parasita.



**O REMEDIO DA MALÁRIA TAMBEM É ESPECÍFICO**

## Parasita da Malária



## SINTOMAS TÍPICOS DA MALÁRIA



FEBRE



DOR DE CABEÇA



CALAFRIOS/FRIO



SUOR



DOR NO CORPO



DOR DE BARRIGA/  
DIARRÉIA

## SITUAÇÕES DE RISCO



### SINTOMAS GRAVES



OLHOS  
AMARELOS



FALTA DE AR



DIFICULDADE  
PARA URINAR



VERTIGEM OU  
SONOLÊNCIA



CONVULSÕES

### SE TIVER MALÁRIA E:



FAZ UM TRATAMENTO  
PARA O CORAÇÃO

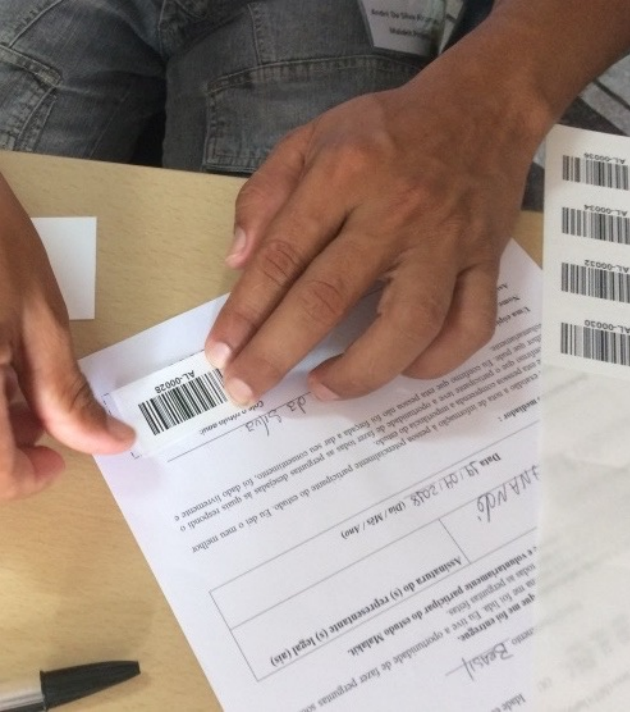


ESTÁ GRÁVIDA



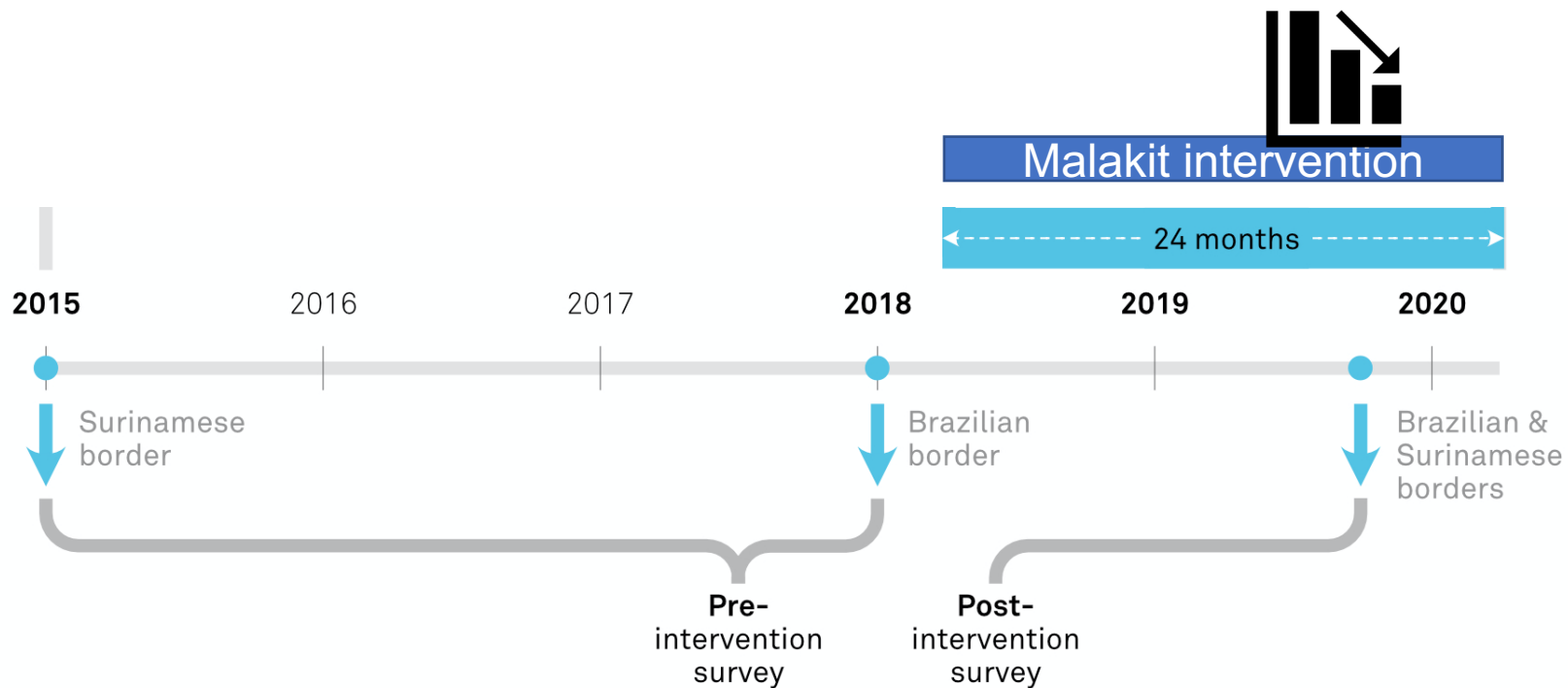
ESTIVER  
VOMITANDO







# EVALUATION



## Evaluation of the Malakit strategy

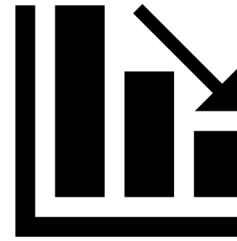
- Data collection during the intervention
  - First visit
  - Follow-up visits
- Pre/post intervention cross-sectional surveys
- Qualitative survey
- Data from malaria surveillance system

# Objectives



## Main objective

Increasing the use of adapted treatment (certified ACT) after a positive diagnosis for malaria



## Secondary objectives

Improving knowledge and practices (prevention et care)

Decreasing malaria prevalence

Safety of the intervention (misuse, side-effects...)



# RESULTS

# Characteristics of the study population

N= 3,733



Sex

women = one third



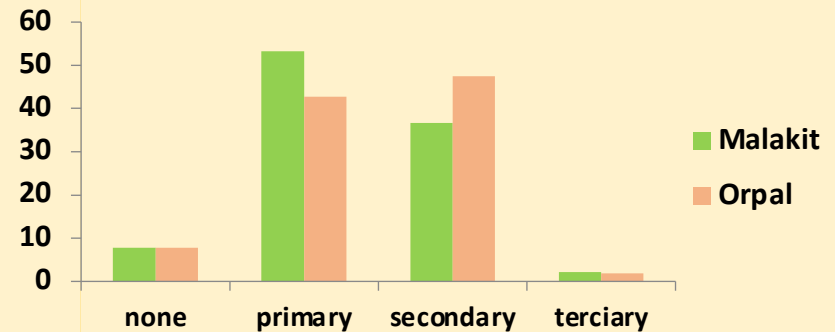
Age

38 years [30-47]

%



Educational Level





# Kits distribution

Research paper

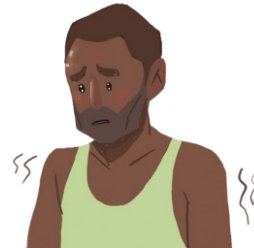
Self-diagnosis and self-treatment of malaria in hard-to-reach and mobile populations of the Amazon: results of Malakit, an international multicentric intervention research project.

Douine Maylis<sup>1,2,4</sup>, Lambert Yann<sup>1</sup>, Galindo Muriel Suzanne<sup>1</sup>, Mutricy Louise<sup>1</sup>, Sanna Alice<sup>3</sup>, Peterka Cassio<sup>4</sup>, Marchesini Paola<sup>4</sup>, Hiwat Helene<sup>5</sup>, Nacher Mathieu<sup>1,2</sup>, Adenis Antoine<sup>1,2</sup>, Demar Magalie<sup>2,6</sup>, Musset Lise<sup>7</sup>, Yasmine Lazrek<sup>7</sup>, Cairo Hedley<sup>5</sup>, Bordalo Miller Jane<sup>8</sup>, Vreden Stephen<sup>9</sup>, Suarez-Mutis Martha<sup>10</sup>

**4 766 kits**  
distributed



to **3 733**  
participants



**631**

Follow-up visits



**303**

reported kit use

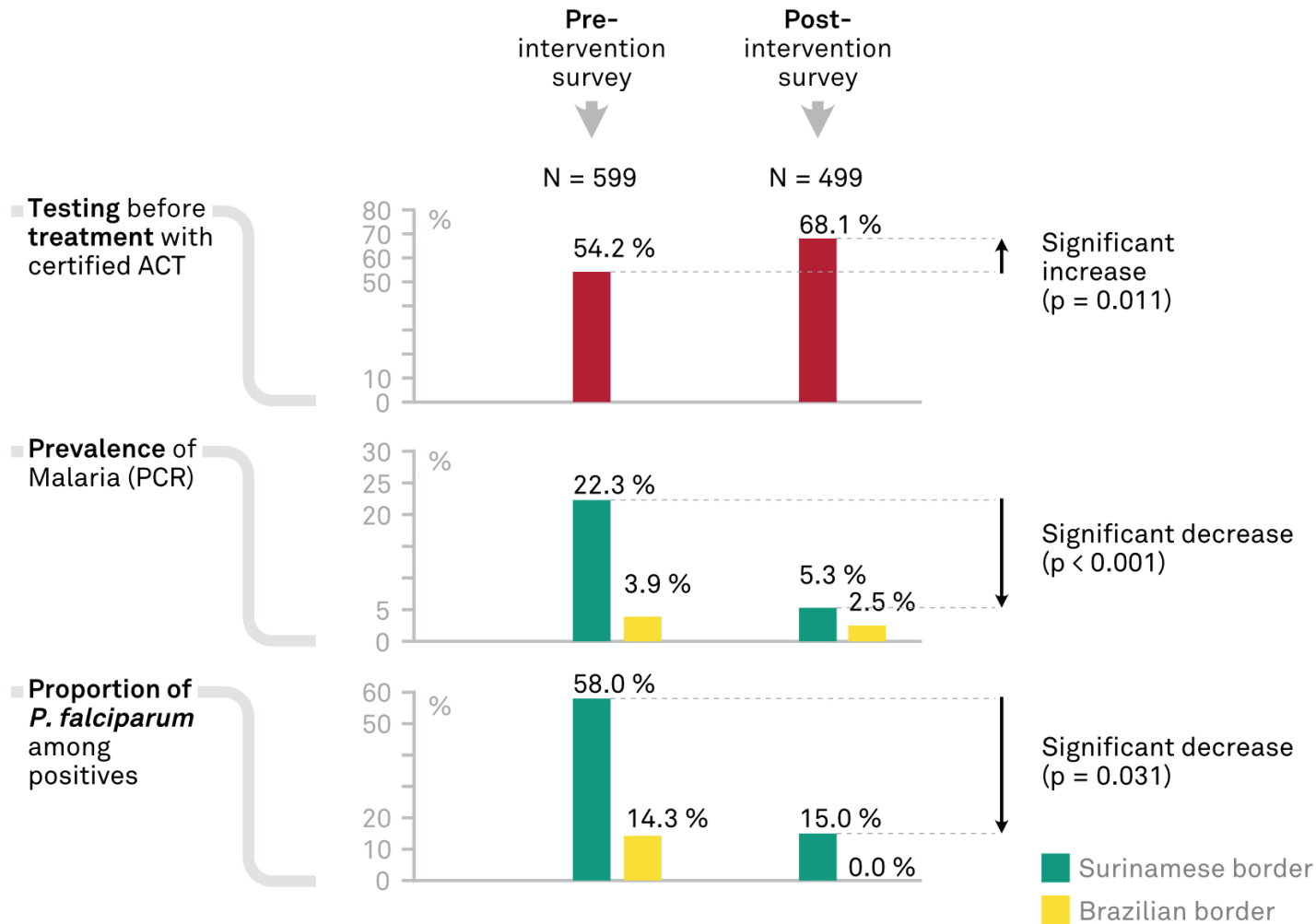


**30% of population**

**70% correct utilization**

**2 years intervention**  
**2018 - 2020**

# Results



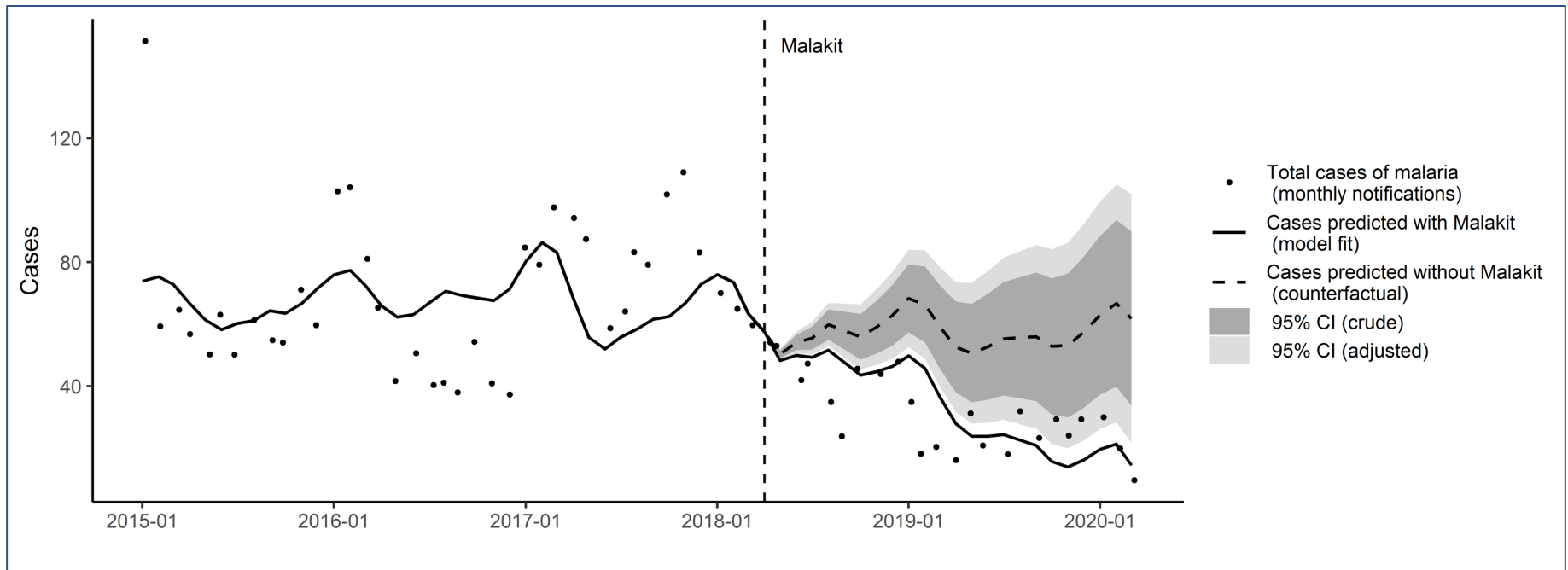
Increase in appropriate behavior  
OR=1.8 [1.1-3.0]

Decrease of prevalence and % of *P. falciparum*



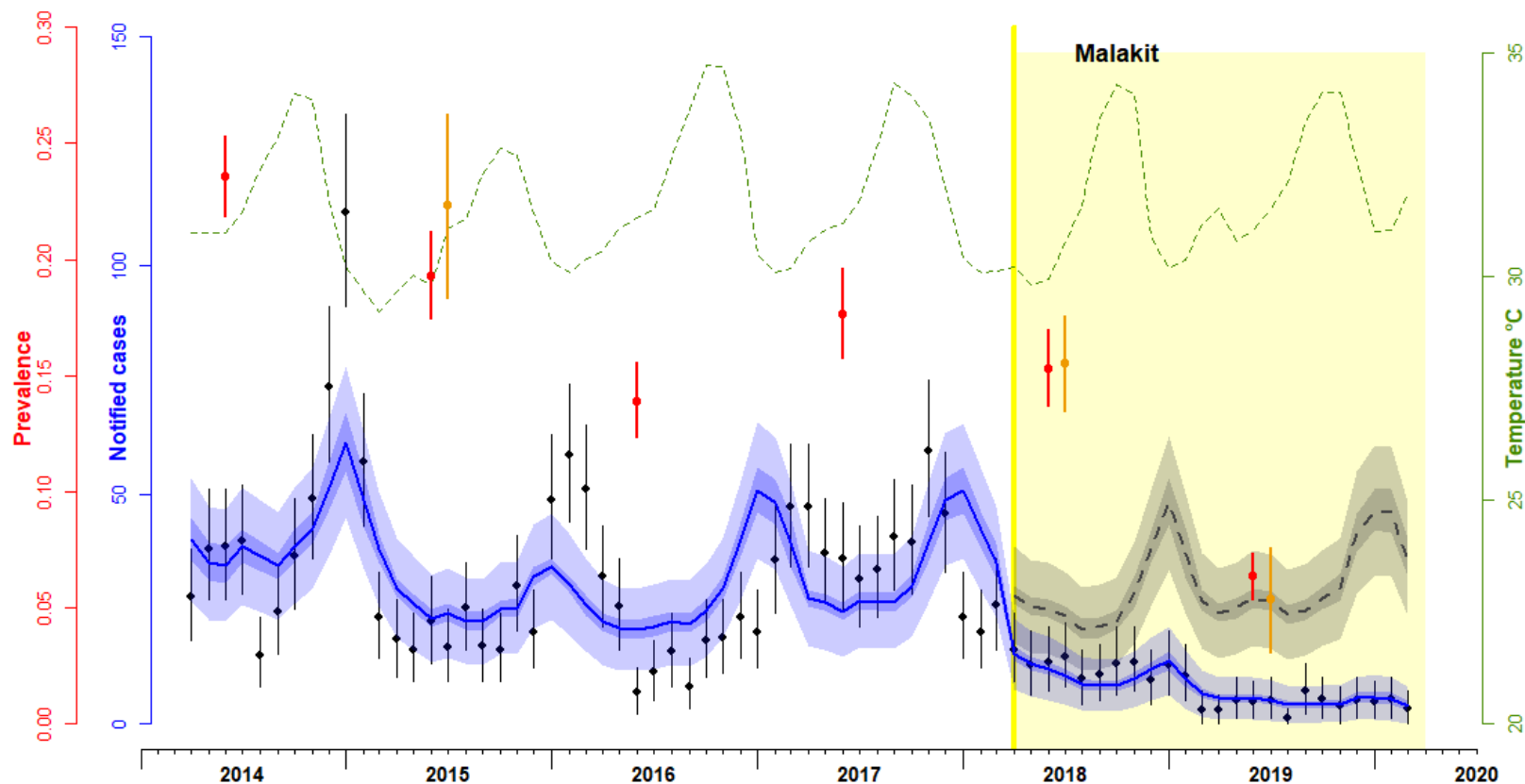
# Impact on malaria incidence

## Interrupted Time Series



**Malakit helped prevent an estimated 43% of the cases of malaria** imported from French Guiana in Brazil and Suriname between April 2018 and March 2020.

# Modeling the impact of Malakit intervention

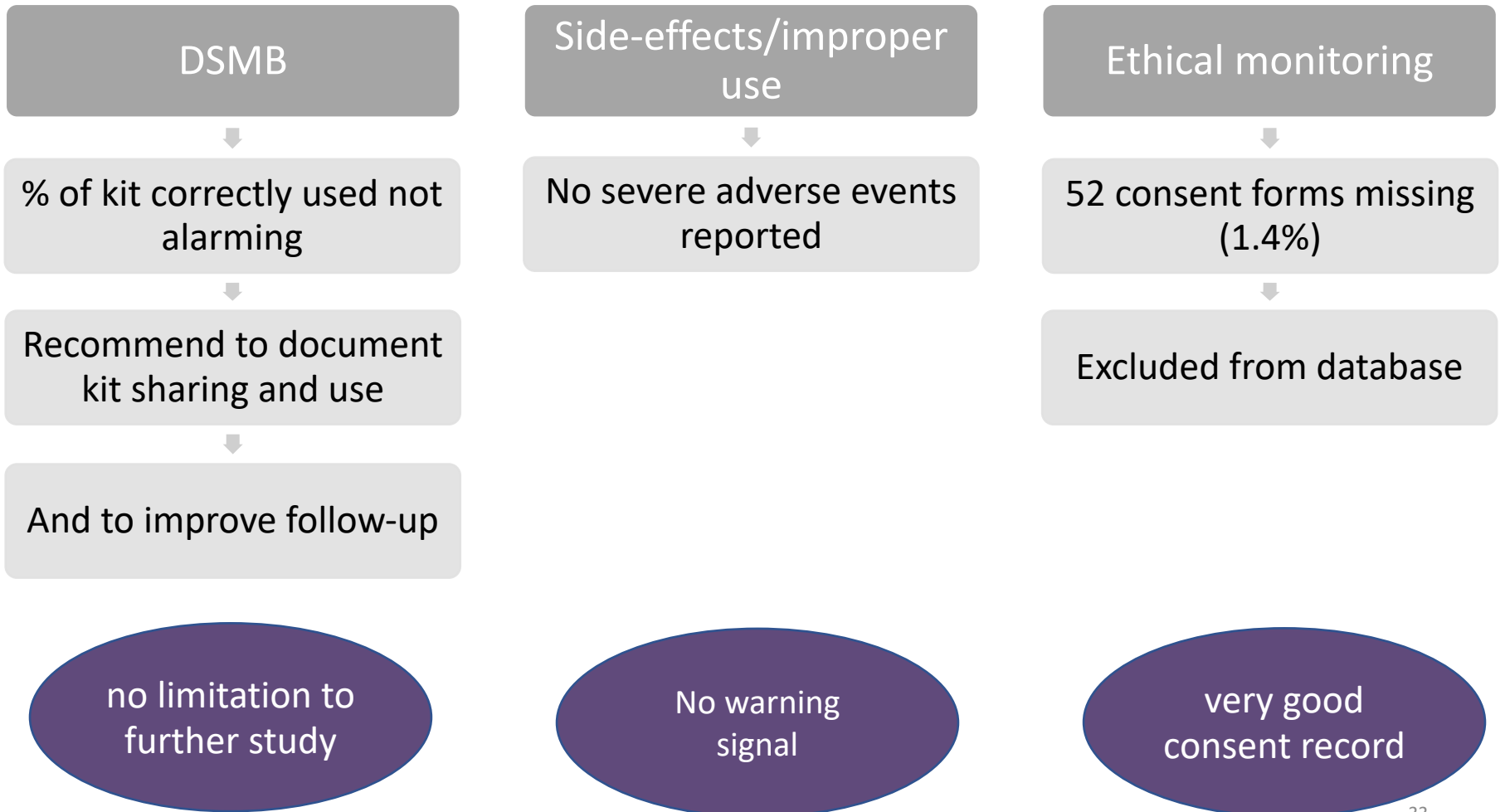


Monthly incidence of all-species cases of malaria imported from gold mining sites in French Guiana and notified to Suriname or Brazil surveillance systems (black dots), model-fitted simulations (blue solid line) and counterfactual estimates (dashed grey line).

Annual all-species prevalence measured in PCR surveys (orange dots) and model-fitted estimates of prevalence (red dots). Maximum daily temperature (monthly average) is shown in green dashed line.



# Safety and ethical monitoring



# Main results

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**Increased access  
to diagnosis and  
treatment**



**Good kit use  
(~71%)**

People even with little education are able to correctly perform self-RDT and interpret the results themselves with appropriate training/tools



**Probable impact  
on the disease**

Estimated 43% decrease of malaria malaria incidence in the Region

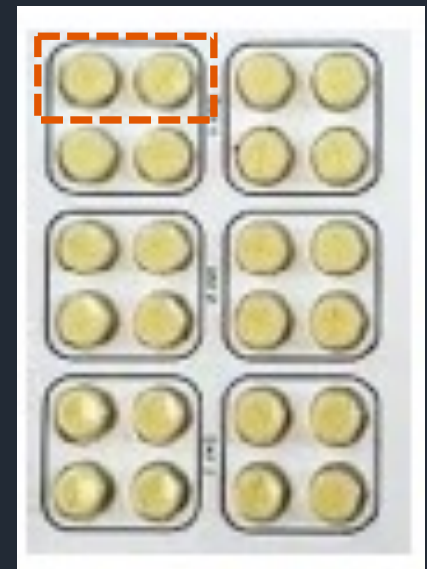


**Safety of the  
intervention**

Few adverse events reported  
  
Limited kit circulation outside of the project

# Interest in other settings? FOR WHO?

- Populations who can not access health centers
- Living in high transmission areas
- A family kit?
  - Training of parents
  - Dosage according to weight
  - If AM-LM: easy to dose tt (1 to 4 pills x2/d)





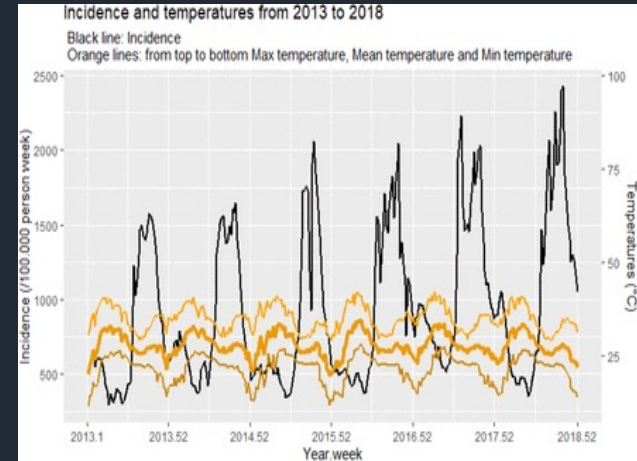
# WHAT?

- RDTs single packaging
  - easy to read, HRP2 délétion?...
- Which ACT?
- Monodose of primaquine?
- Possibility to make the pockets locally
- To be added to SMC?



# HOW?

- By health mediators/nurse
- One shot training before malaria season?
- In places where people move
- With adapted training tools
- How to refer for severity symptoms/vomiting/pregnant women?...



Bationot 2021



# WHICH FORMAT?

- Pilot of public health intervention? Research?
- Which stakeholders?
- Which data to be collected, indicators?
- Which funds?









Thank you  
for your  
attention

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[malakit-project.org](http://malakit-project.org)