PvSTATEM

SerolyzeR - an R package for automated analysis of serological data

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UseR! 2026 conference

Warsaw 07.07.2026

Faculty of Mathematics and Information Science

WARSAW UNIVERSITY OF TECHNOLOGY

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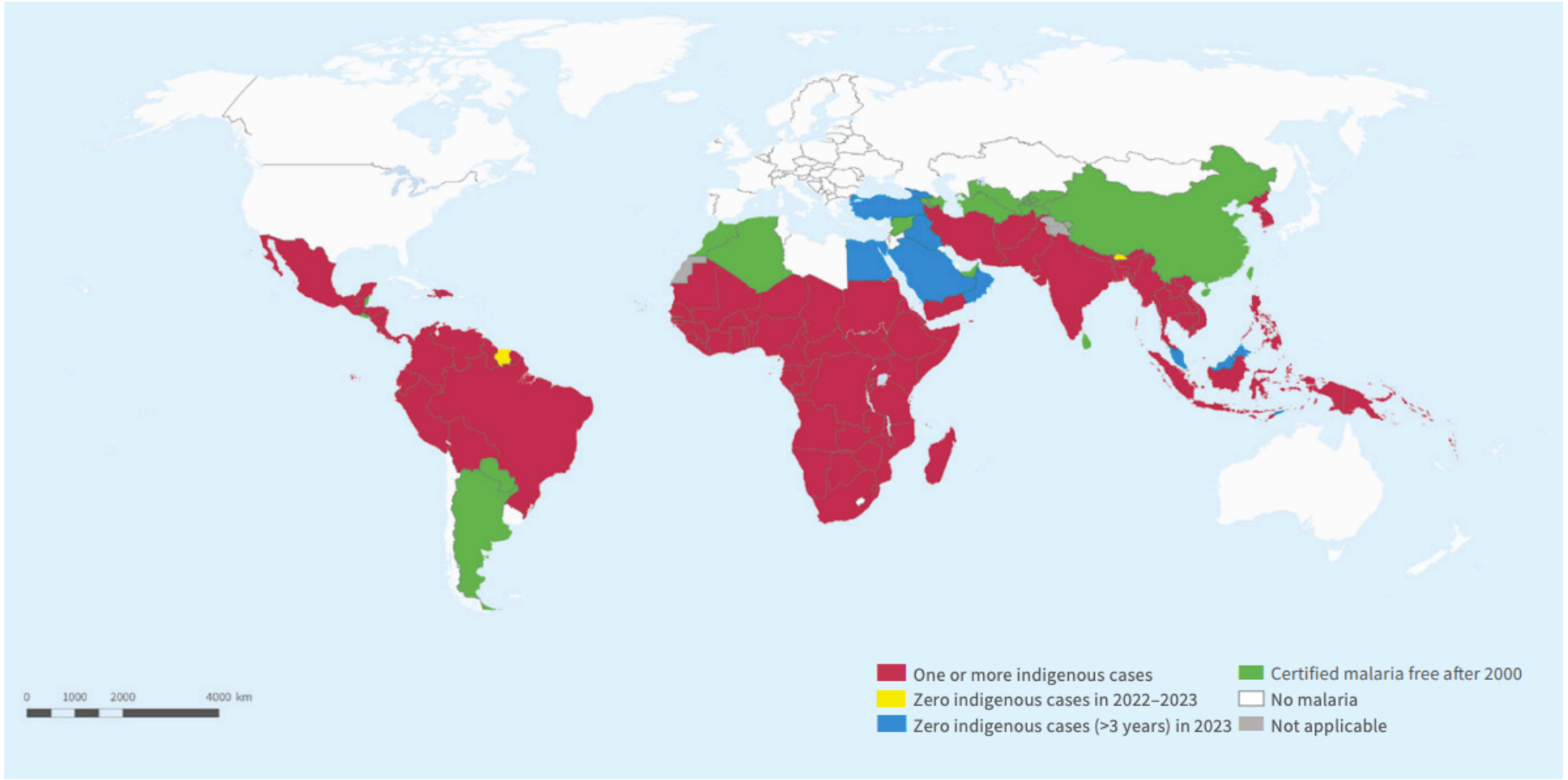
Malaria



World Malaria Report (2024). WHO

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The big challenge of malaria elimination

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Plasmodium falciparum	Plasmodium vivax
More virulent and lethal	Less virulent and lethal
Less diverse genome	Highly diverse genome
No dormant infection	Dormant infection/reactivation
Anti-malarial drugs are efficacious	Anti-malarial drugs are less efficacious
Easier to detect and control	Less easy to detect and control

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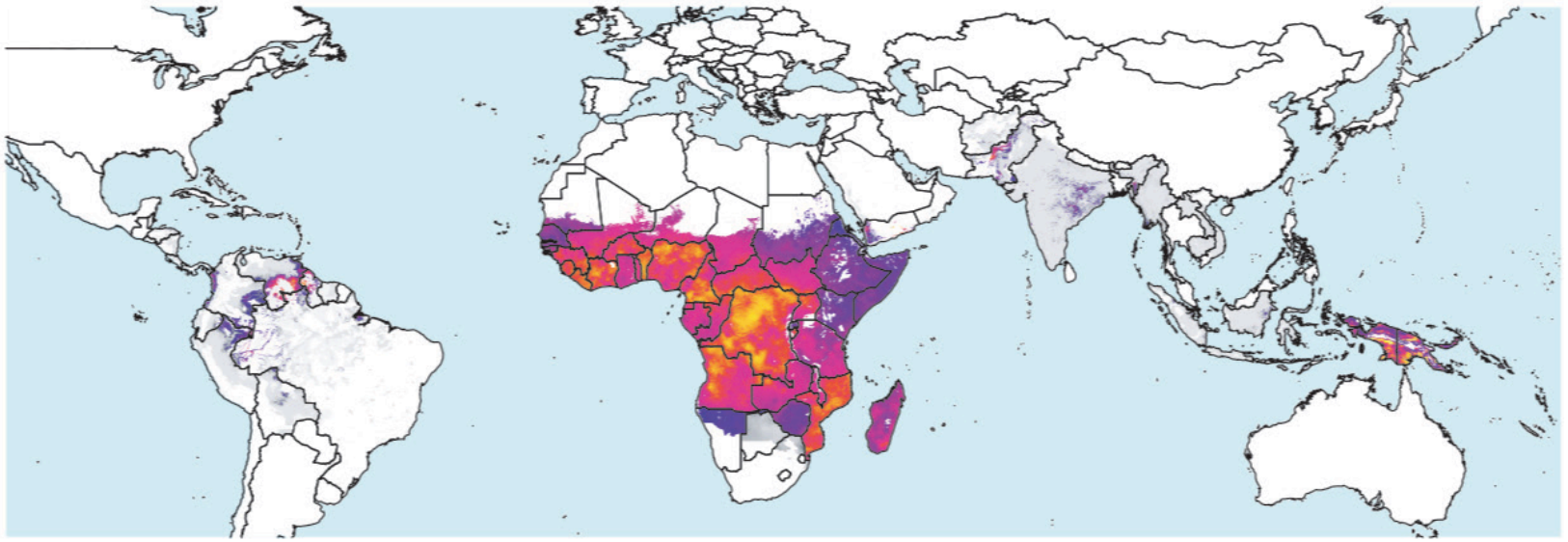
Global distribution of *P. falciparum*



Weiss DJ et al. Lancet. 2025;405(10483):979-990.

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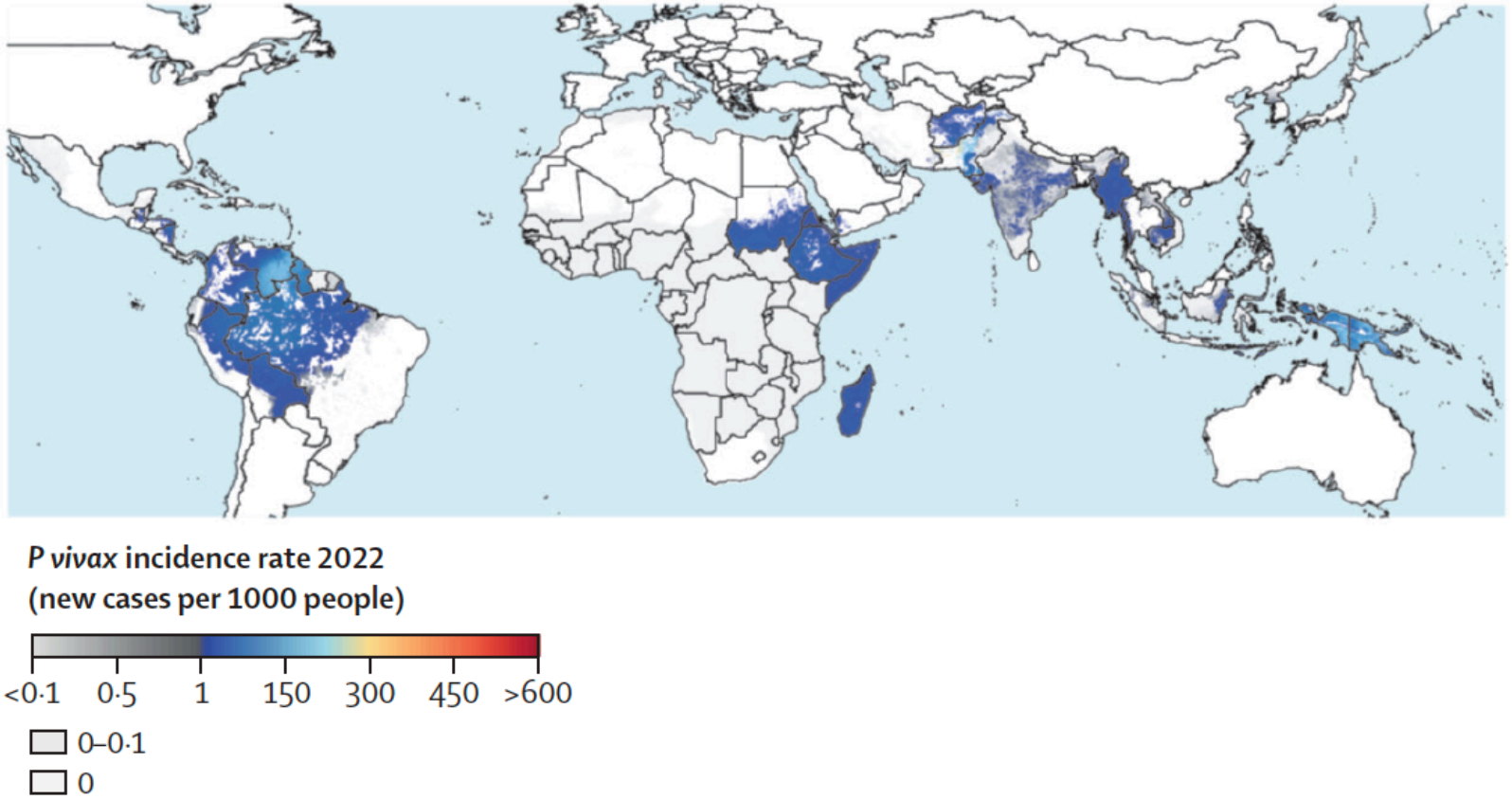
Global distribution of *P. vivax*

Plasmodium vivax



Weiss DJ et al. Lancet. 2025;405(10483):979-990.

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Identifying individuals with dormant infections

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Plasmodium falciparum

More virulent and lethal

Less diverse genome

No dormant infection

Anti-malarial drugs are efficacious

Easier to detect and control

Treating people

Plasmodium vivax

Less virulent and lethal

Highly diverse genome

Dormant infection/reactivation

Anti-malarial drugs are less efficacious

Less easy to detect and control

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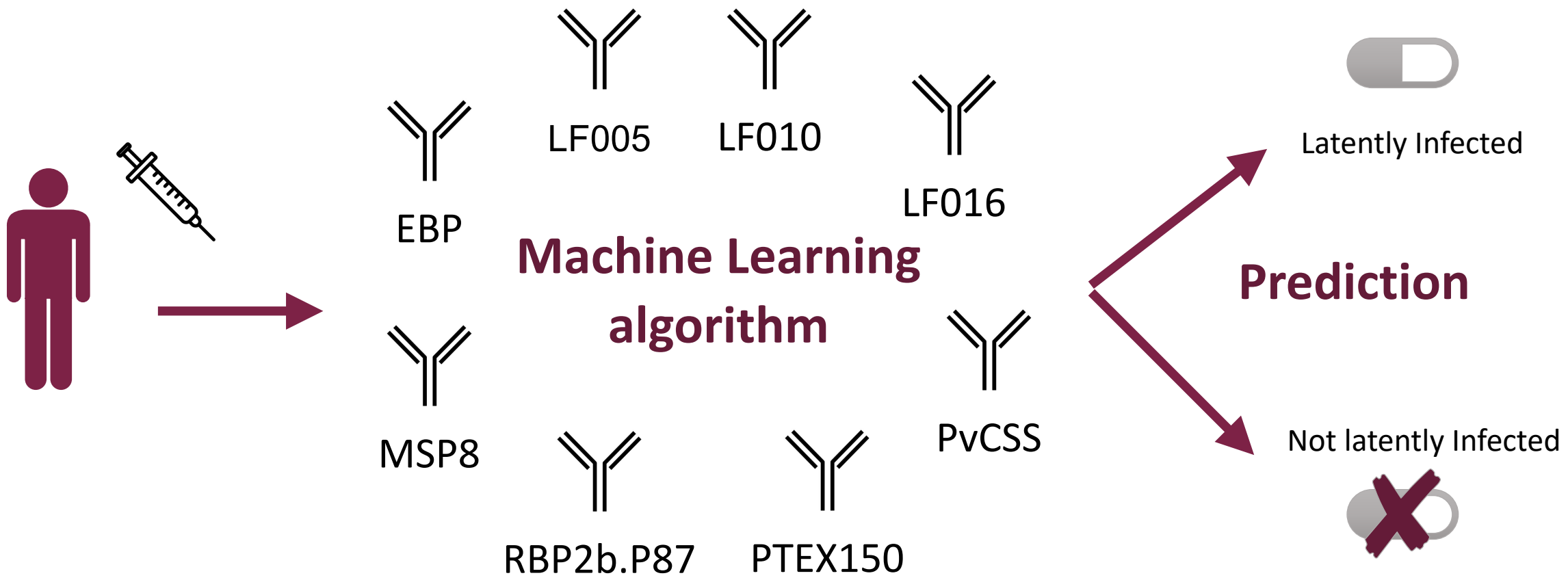
Basic idea



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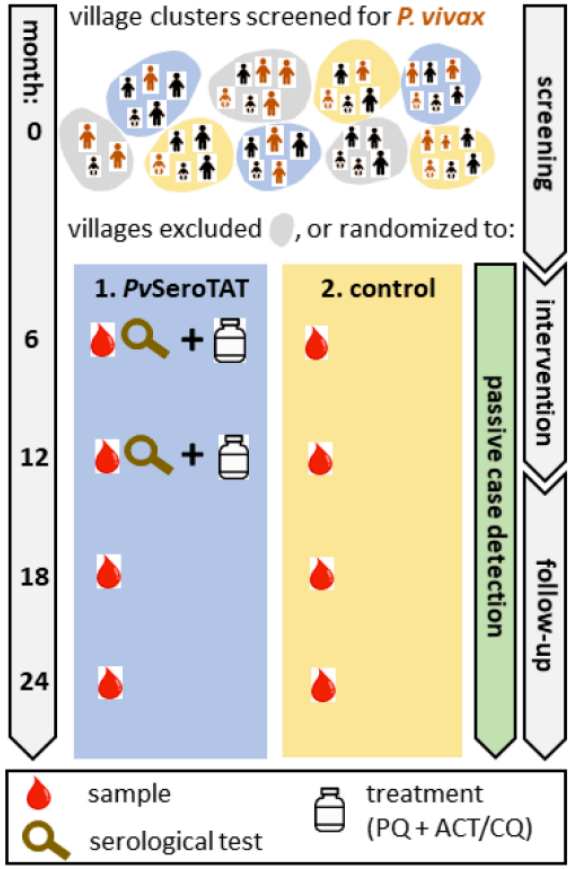
Two clinical trials (Madagascar and Ethiopia)



Box 2: Cluster Randomised Trial design summary.

- **Sites.** (i) Ethiopia; (ii) Madagascar.
- **Arms.** (i) Control; (ii) Intervention: *Pv*SeroTAT.
- **Clusters screened per site.** 36
- **Clusters per arm per site.** 12
- **Total clusters.** (2 sites)*(2 arms)*(12 clusters) = 48
- **Participants per cluster.** 400 (200 – 600)
- **Samples per cluster.** 200
- **Target prevalence.** 3% (1% – 10%) *P. vivax* PCR prevalence.
- **Coefficient of variation.** $k = 0.4$ (0.3 – 0.5)
- **Intervention diagnostic test.** Serological test for recent *P. vivax* infection.
- **Intervention treatment.** Primaquine for 7 days at 1 mg/kg with G6PD testing. Directly observed.
- **Intervention rounds.** 2 rounds 6 months apart.
- **Expected effect size.** 60% (50 – 70%) reduction in *P. vivax* PCR prevalence.
- **Duration of follow-up.** 12 months.

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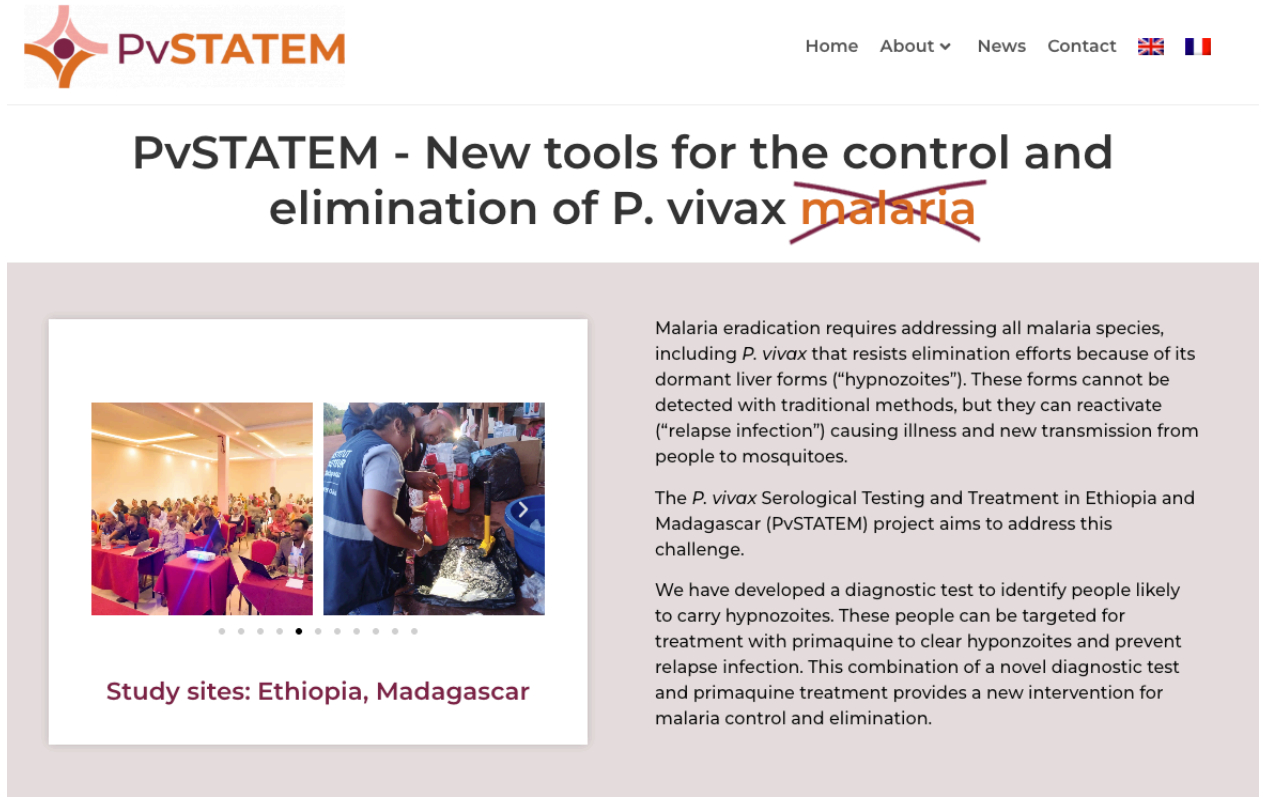

http://pvstatem.eu

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Project partners

PvSTATEM

France

Institut Pasteur

UK

London School of Hygiene & Tropical Medicine

Ethiopia

Armauer Hansen Research Institute (AHRI) – Since 1970 – ...for better health

Madagascar

Institut Pasteur de Madagascar – Pasteur Network

Ireland

Ollscoil na Gaillimhe – University of Galway

Switzerland

FIND – Diagnosis for all

Italy

MEDEA

Australia

WEHI – brighter together

Poland

Politechnika Warszawska – Warsaw University of Technology

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Serological data is central to the project

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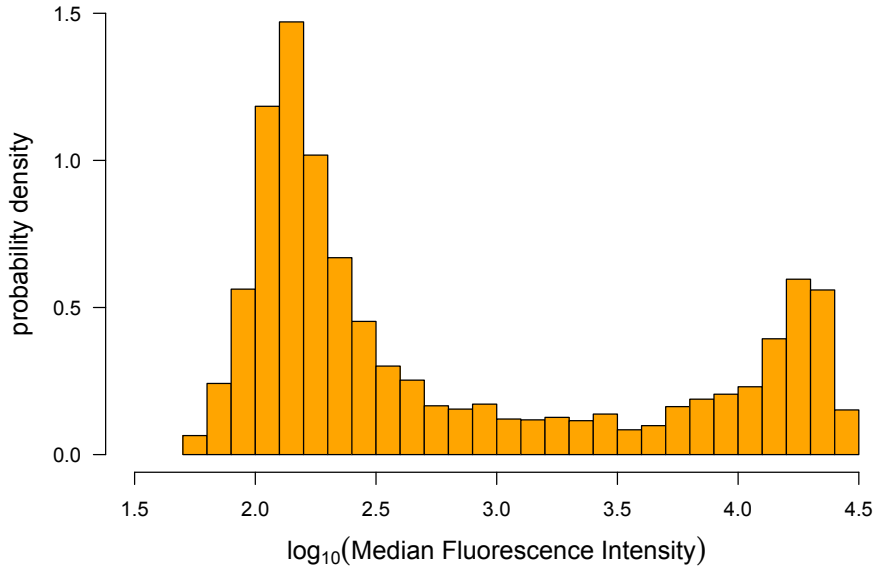
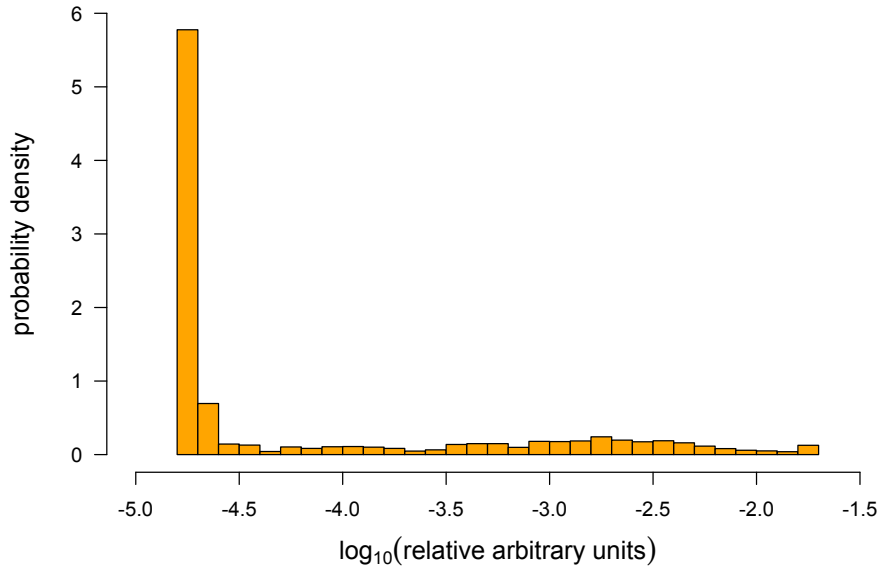


Normalization via calibration curves



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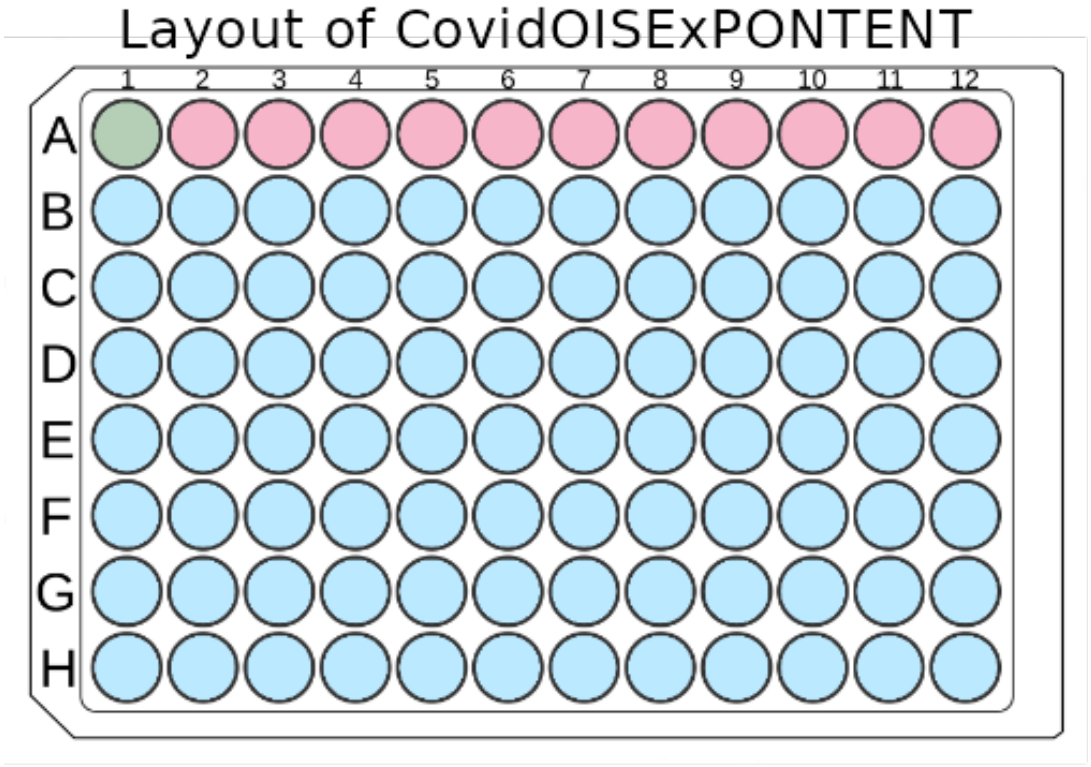
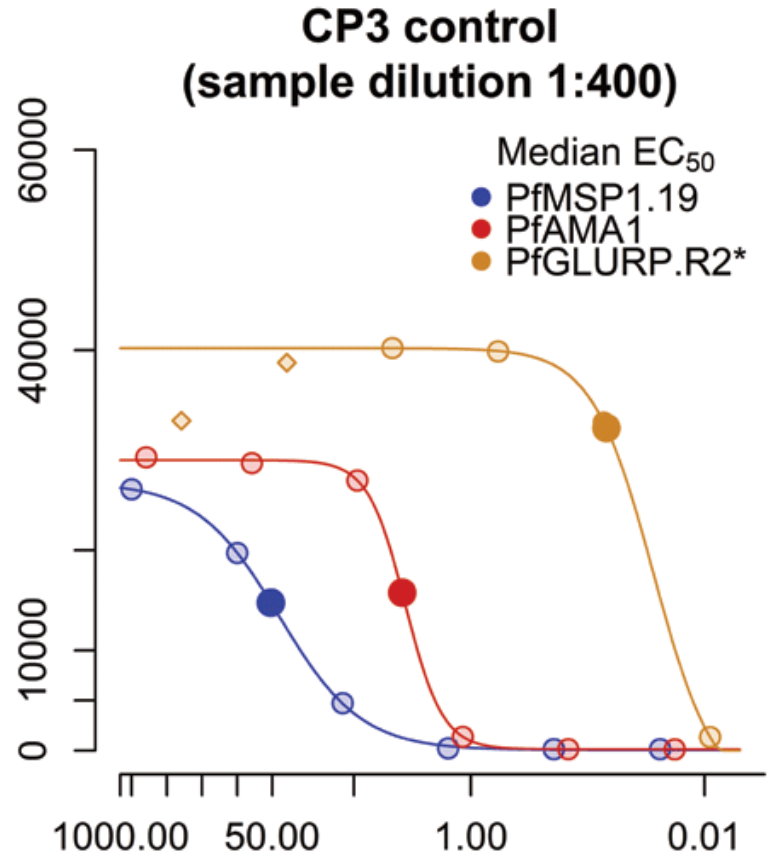
Data is generated in batches



BLANK
TEST
STANDARD CURVE



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Challenges

Ensure high quality within a batch (calibration curve/bead counts)

Ensure comparability among batches (calibration curve/data normalisation)

Ensure feasibility to large number of samples (e.g., n~3500 samples at baseline in Madagascar) and of analytes (e.g., ~8 antibodies in PvSTATEM)

No software available for processing serological data (**Opportunity**)

serostat

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SerolyzeR package for R

SerolyzeR: Reading, Quality Control and Preprocessing of MBA (Multiplex Bead Assay) Data

Speeds up the process of loading raw data from MBA (Multiplex Bead Assay) examinations, performs quality control checks, and automatically normalises the data, preparing it for r for a user, who does not necessarily have experience with R language. The package is developed within the project 'PvSTATEM', which is an international project aiming for malaria

Version:	1.4.1
Imports:	dplyr, ggplot2, nplr, R6, readxl, stringi, stringr, grid, png, tools, ggrepel, lubridate, R.utils, svglite, fs, scales, rlang, patchwork, cellranger
Suggests:	knitr, qpdf, furrr, future, qs2, rmarkdown, testthat (≥ 3.0.0)
Published:	2026-02-20
DOI:	10.32614/CRAN.package.SerolyzeR
Author:	Jakub Grzywaczewski [aut, cre], Tymoteusz Kwiecinski [aut], Mateusz Nizwantowski [aut], Przemyslaw Biecek [ths], Nuno Sepulveda [ths]
Maintainer:	Jakub Grzywaczewski <jakubzgrzywaczewski at gmail.com>
BugReports:	https://github.com/mini-pw/SerolyzeR/issues
License:	BSD_3_clause + file LICENSE
URL:	https://github.com/mini-pw/SerolyzeR, https://mini-pw.github.io/SerolyzeR/
NeedsCompilation:	no
Materials:	README
CRAN checks:	SerolyzeR results

Documentation:

Reference manual:	SerolyzeR.html , SerolyzeR.pdf
Vignettes:	Basic SerolyzeR functionalities (source, R code)

Downloads:

Package source:	SerolyzeR_1.4.1.tar.gz
Windows binaries:	r-devel: SerolyzeR_1.4.1.zip, r-release: SerolyzeR_1.4.1.zip, r-oldrel: SerolyzeR_1.4.1.zip
macOS binaries:	r-release (arm64): SerolyzeR_1.4.1.tgz, r-oldrel (arm64): SerolyzeR_1.4.1.tgz, r-release (x86_64): SerolyzeR_1.4.1.tgz, r-oldrel (x86_64): SerolyzeR_1.4.1.tgz
Old sources:	SerolyzeR archive

Current version 1.4.1

ggplot2
(Plotting)

nlpr
(N-parameter logistic regression)

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Software development team

PvSTATEM

Tymoteusz Kwiecinski

Jakub Grzywaczewski

Mateusz Nizwantowski

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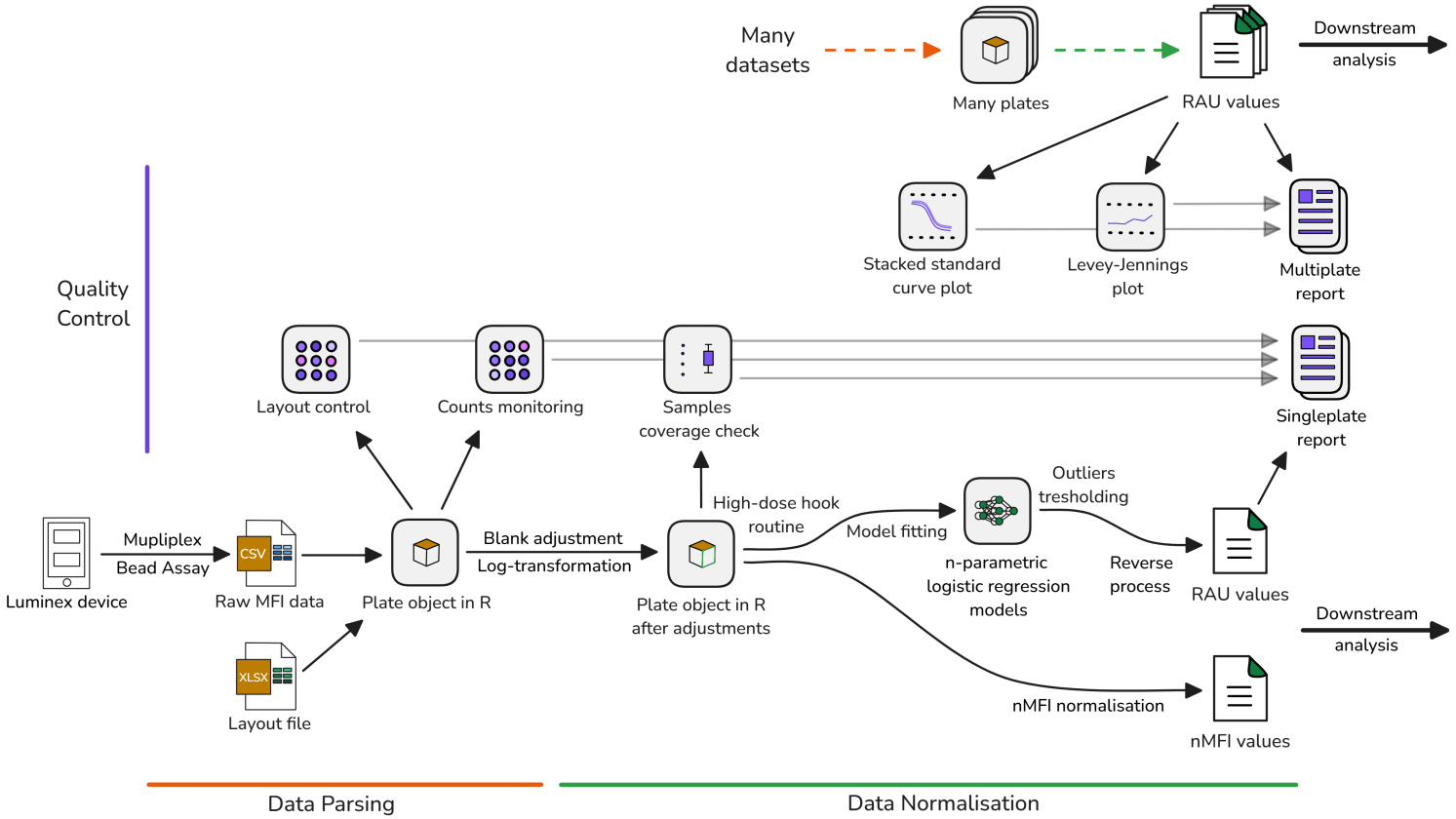
Overview



Very important!
Feedback and testing from lab researchers with different R skills/knowledge.

Very important!
Wiki page with comprehensive tutorials.

Very important!
Shiny apps.

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Take-home messages

Research-driven opportunities

Collect information on research protocols related to serological data and their processing.

Standardise data labelling and quality control protocols

Creation of a new package with automated functionality on serological data processing.

To work with strong research groups who are in the forefront of generation data

Possible Impact

Increase data quality and the quality of the subsequent research output

Utilisation of the package beyond PvSTATEM (e.g., sero-surveillance of multiple infectious diseases).

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Opportunity to impact public health

PvSTATEM

ORIGINAL RESEARCH article

Front. Public Health, 25 October 2022

Sec. Infectious Diseases – Surveillance, Prevention and Treatment

Volume 10 - 2022 | https://doi.org/10.3389/fpubh.2022.924316

Assessing seroprevalence and associated risk factors for multiple infectious diseases in Sabah, Malaysia using serological multiplex bead assays

YuYen L. Chan [1*] Catriona L. Patterson [1]

Jeffrey W. Priest [2] Gillian Stresman [1] Timothy William [3]

Tock H. Chua [4] Kevin Tetteh [1] Patrick Lammie [5]

Chris Drakeley [1] Kimberly M. Fornace [6,7]

communications medicine

A Nature Portfolio journal

Article

https://doi.org/10.1038/s43856-025-01162-5

Investigation of the sero-epidemiology of vaccine preventable diseases and common viral infections in French populations

Check for updates

Emma Bloch[1], Gaëlle Baudemont[1], Françoise Donnadieu[1], Laura Garcia[1], Stéphane Pelleau[1], SeroPed Study Consortium*, Milieu Intérieur Consortium*, Lluis Quintana-Murci[2,3,22], Darragh Duffy[4,22], Arnaud Fontanet[5,6] & Michael White[1]

nature communications

Article

https://doi.org/10.1038/s41467-025-62305-9

Multiplex bead assays enable integrated serological surveillance and reveal cross-pathogen vulnerabilities in Zambezia Province, Mozambique

Received: 12 December 2024

Accepted: 18 July 2025

Published online: 26 August 2025

Check for updates

Andrea C. Carcelen[1], Celso Monjane[2], Sophie Bérubé[3], Saki Takahashi[4], Thebora Sultane[2], Imelda Chelene[2], Gretchen Cooley[5], E. Brook Goodhew[5], Catriona Patterson[6], Kevin Tetteh[6], Manuel Mutambe[2], Melissa M. Higdon[1], George Mwinnyaa[1], Gilberto Nhapure[7], Pedro Duce[7], Diana L. Martin[5], Christopher Drakeley[6], William J. Moss[1,4] & Ivalda Macicame[2]

The Journal of Infectious Diseases

MAJOR ARTICLE

IDSA OXFORD

Whose Line Is it Anyway? Defining Seropositivity Cutoffs for Infectious Disease Surveillance

Michael T. White,[1] Gaëlle Baudemont,[1] Françoise Donnadieu,[1] Arona Sabene Diatta,[2] Ibrahima Sarr,[2] Aissatou Diagne,[2] Aissatou Toure-Balde,[2] Fatoumata Diene Sarr,[3] Joseph Faye,[3] Cheikh Sokhna,[4] Hubert Bassene,[4] Inès Vigan-Womas,[2] Stéphane Pelleau,[1] and Makhtar Niang[2]

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Agata Balak-Kuśmierska

PvSTATEM family!

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