



cism
centro de
investigação
em saúde de
manhiça



ISGlobal

**malaria
consortium**
disease control, better health

UCSF
University of California
San Francisco



**BILL &
MELINDA
GATES
foundation**

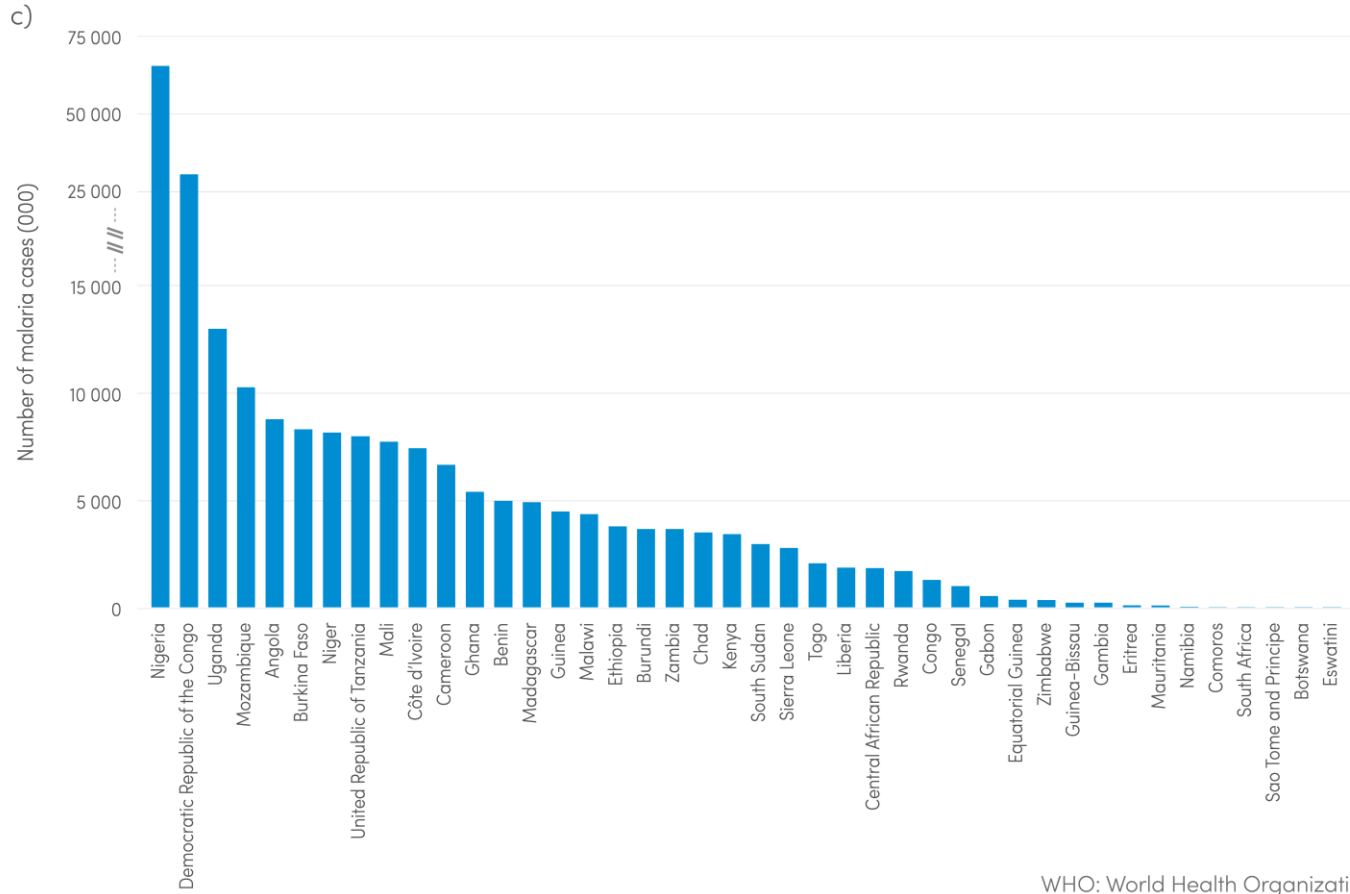


Sampling for malaria surveillance: lessons from Mozambique

Alfredo Mayor

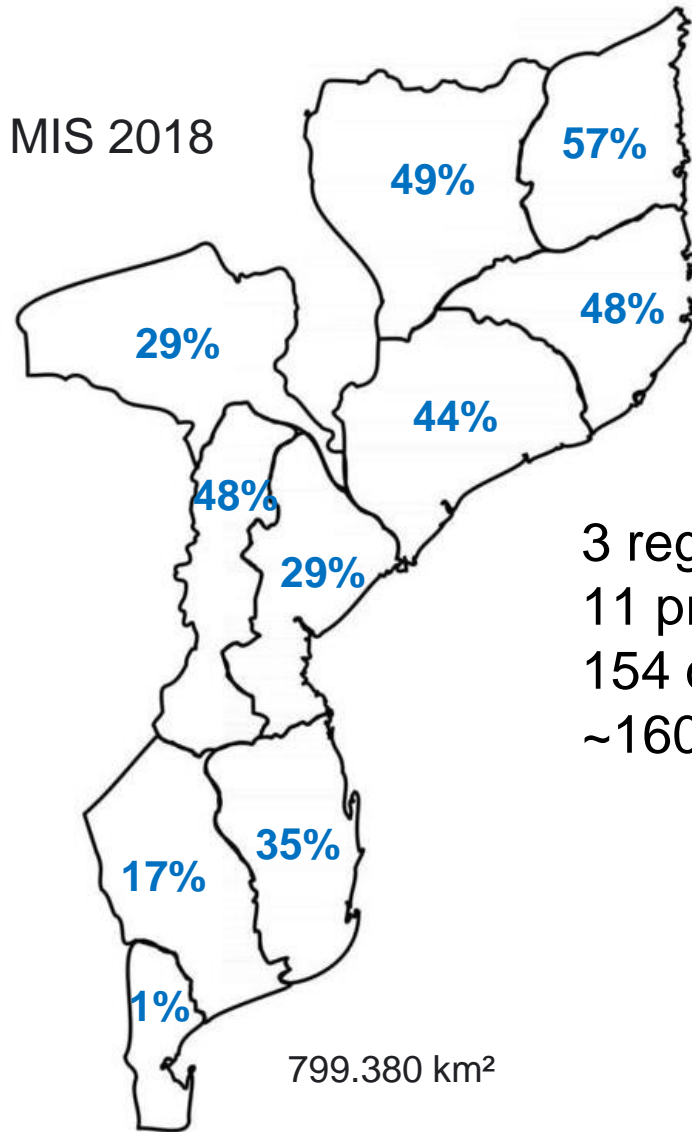
GenReMekong Annual Scientific Forum
20th Nov 2023

Mozambique



WHO: World Health Organization

MIS 2018



3 regions
11 provinces
154 districts
~1600 health facilities

799.380 km²

32,08 millones (2021)

GenMoz



May 2021

2 MiSeq at CISM

May 2022

4 Dashboard

October 2023



1 Field activities

January 2022

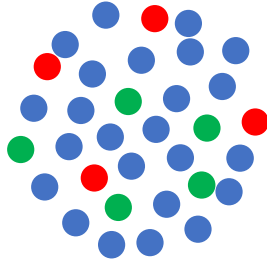
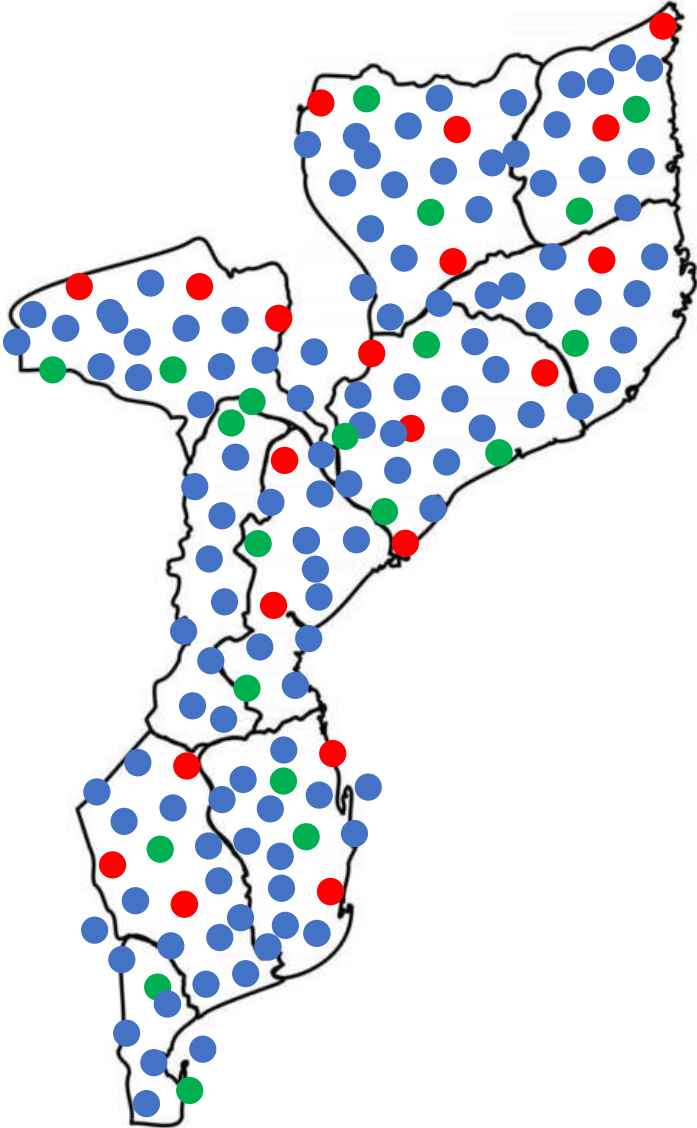


3 First NGS run

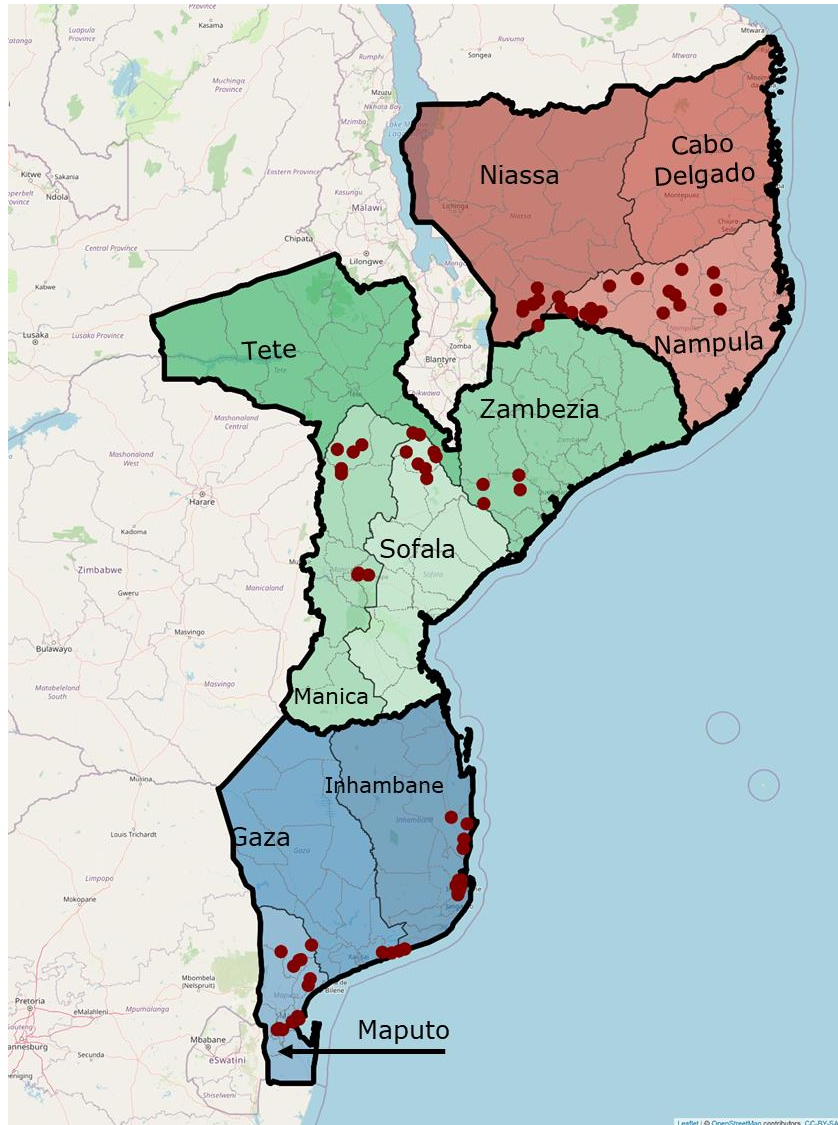
June 2022



Sampling



Convenience sampling



hrp2/3 del

0.1%

Kelch13/pip

0%

imported

26%

q-dhfr/dhps

89%

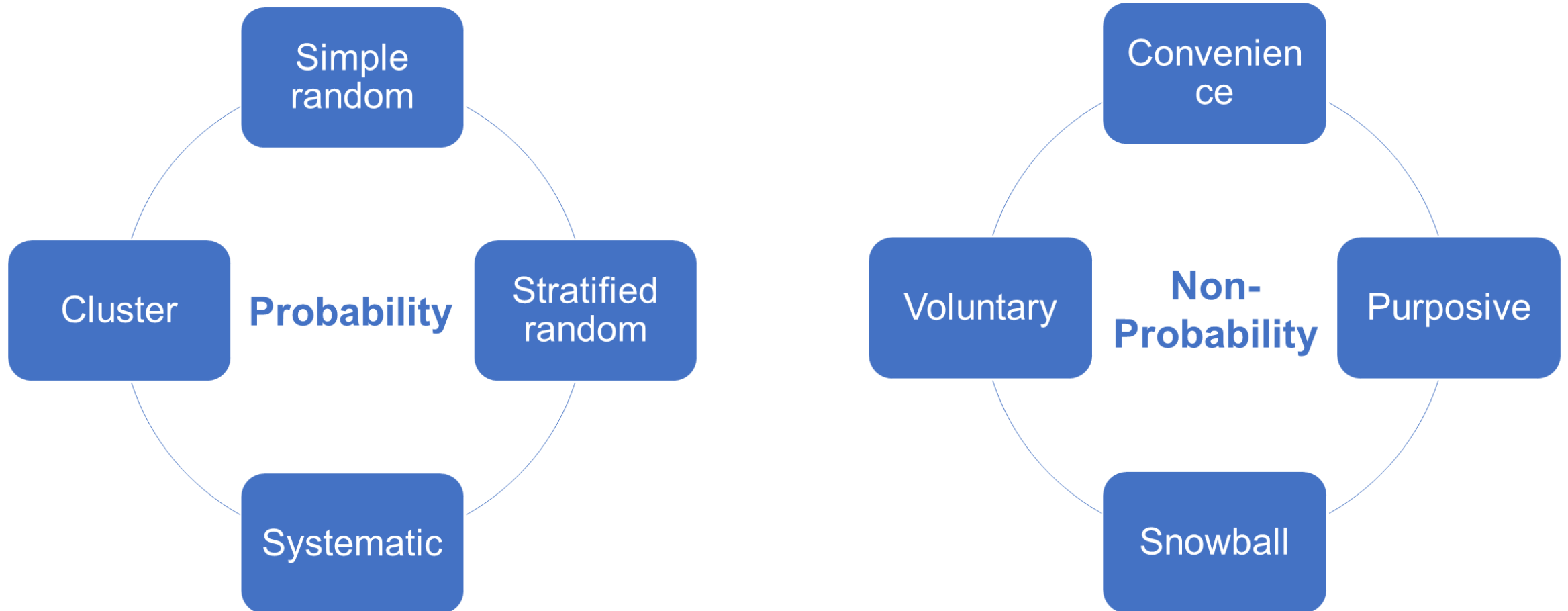
dhps-581

0.9%



But...

Sampling methods



Surveillance design

1

Use case

2

Goal

3

Target
population

4

Sampling
approach

5

Frequency

6

Parameters for
sample size

Surveillance design

1

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Parameters for sample size



1. Detection of **emerging** VOCs
2. Measuring the prevalence of already **existing** VOCs



3. Comparing the prevalence of VOCs against **thresholds**

Surveillance design

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Parameters for sample size



1. Detection of **emerging** VOCs

2. Measuring the prevalence of already **existing** VOCs



3. Comparing the prevalence of VOCs against **thresholds**



Simple random sampling: Not possible

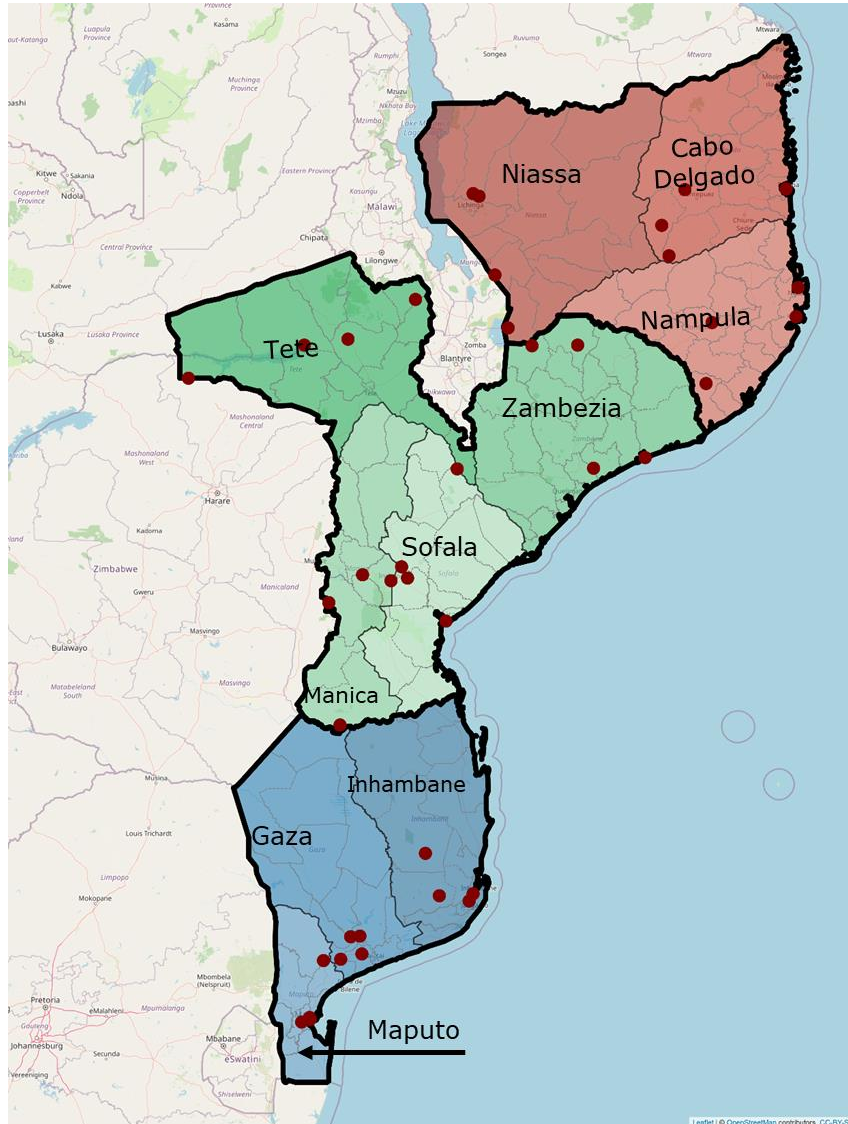
Multistage cluster sampling



Intracluster correlation coefficient (ICC): Level of correlation within clusters

Sample size

40 clusters (4 clusters/province)
60 samples/cluster

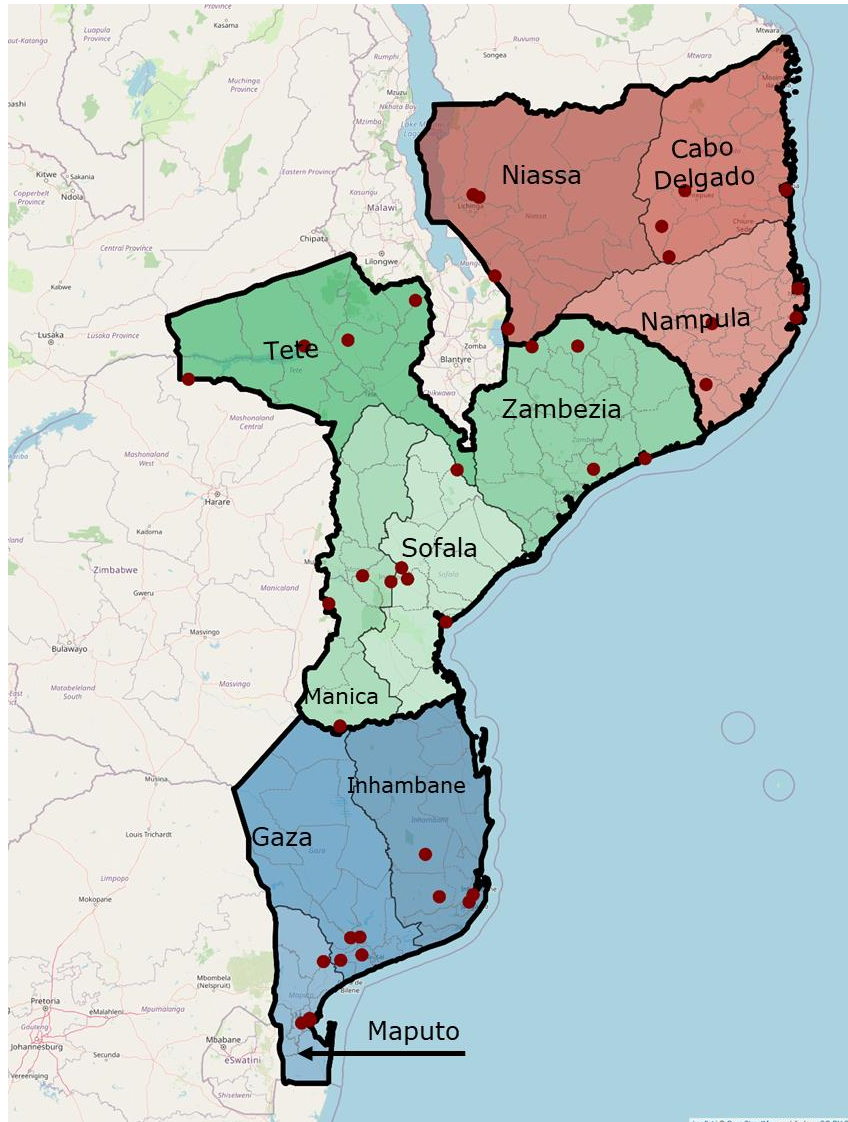


Sample size

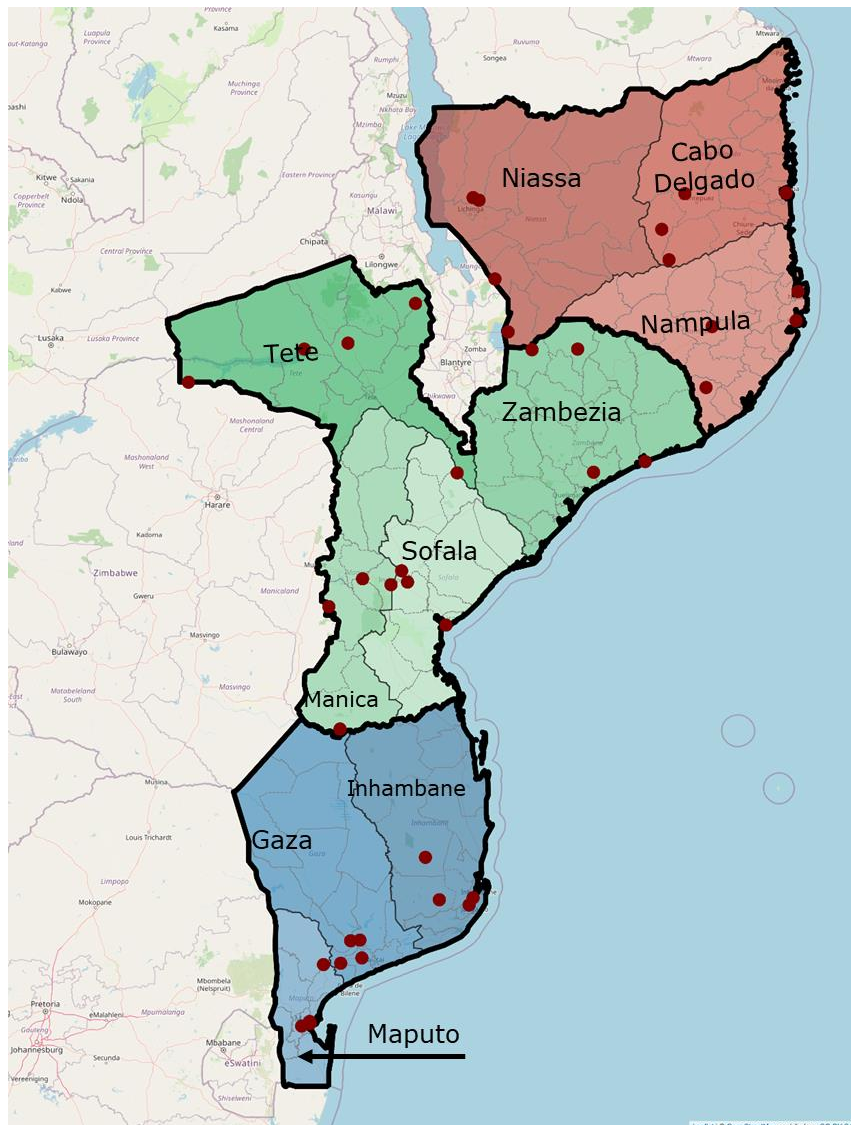
40 clusters (4 clusters/province)
60 samples/cluster

Prevalence test against threshold: *hrp2/3 del* > 5%):

- 64.7% per province if ICC = 0.05
- 92.4% power per region if ICC = 0.05
- 78.6% power per region if ICC = 0.1



Sample size



40 clusters (4 clusters/province)
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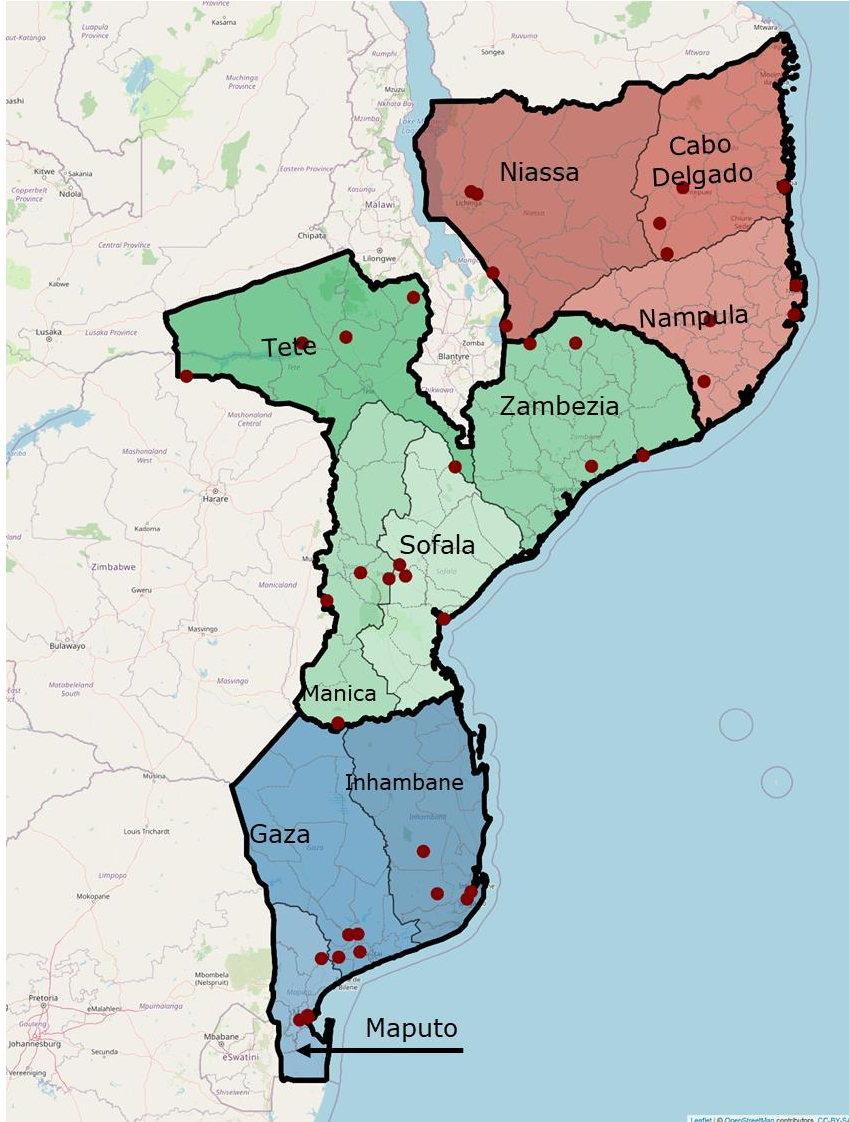
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Margin of error analysis (*dhps-540*): Assuming 90% prevalence

- 5% margin of error per province if ICC = 0.01
- 7.5% margin of error per province if ICC = 0.05

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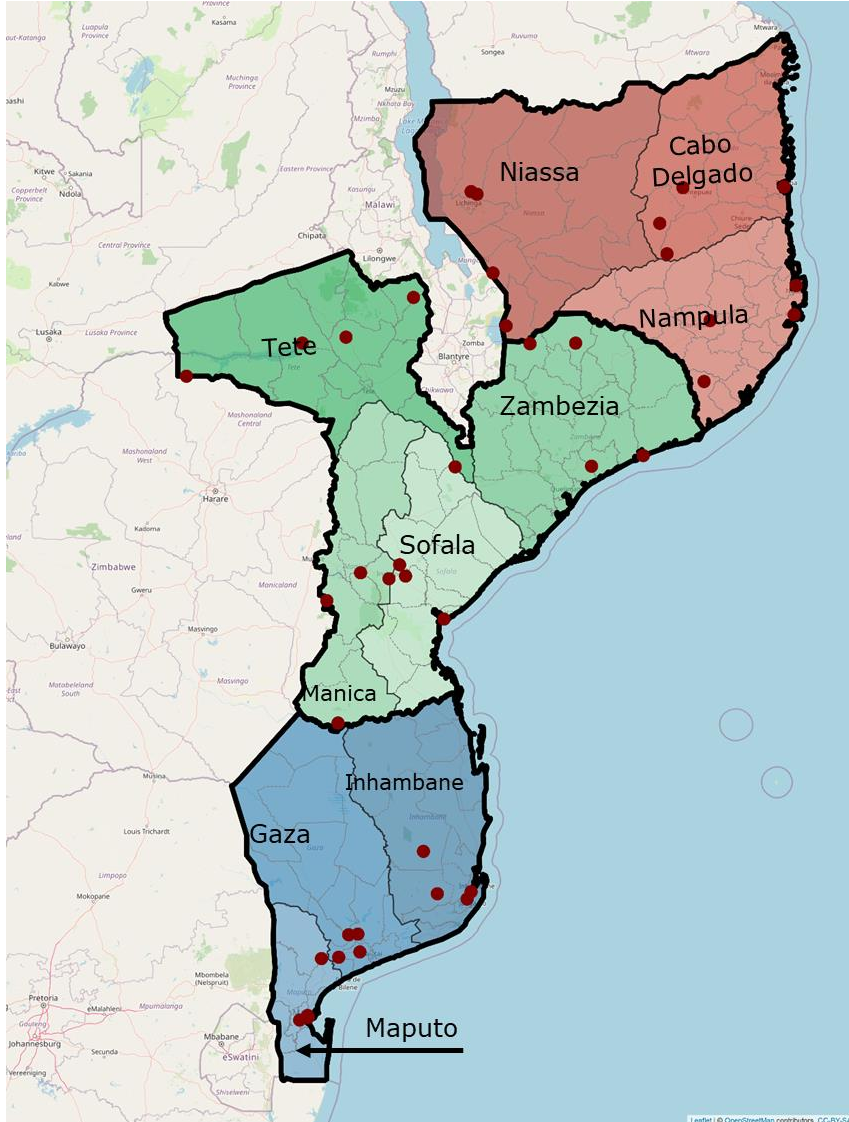
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Presence/absence analysis (*kelch13* and *dhps 581*): at 1%

- 45% power at per-cluster level
- 85% power at province level if ICC = 0.01
- 67% power at province level if ICC = 0.05

Sample size



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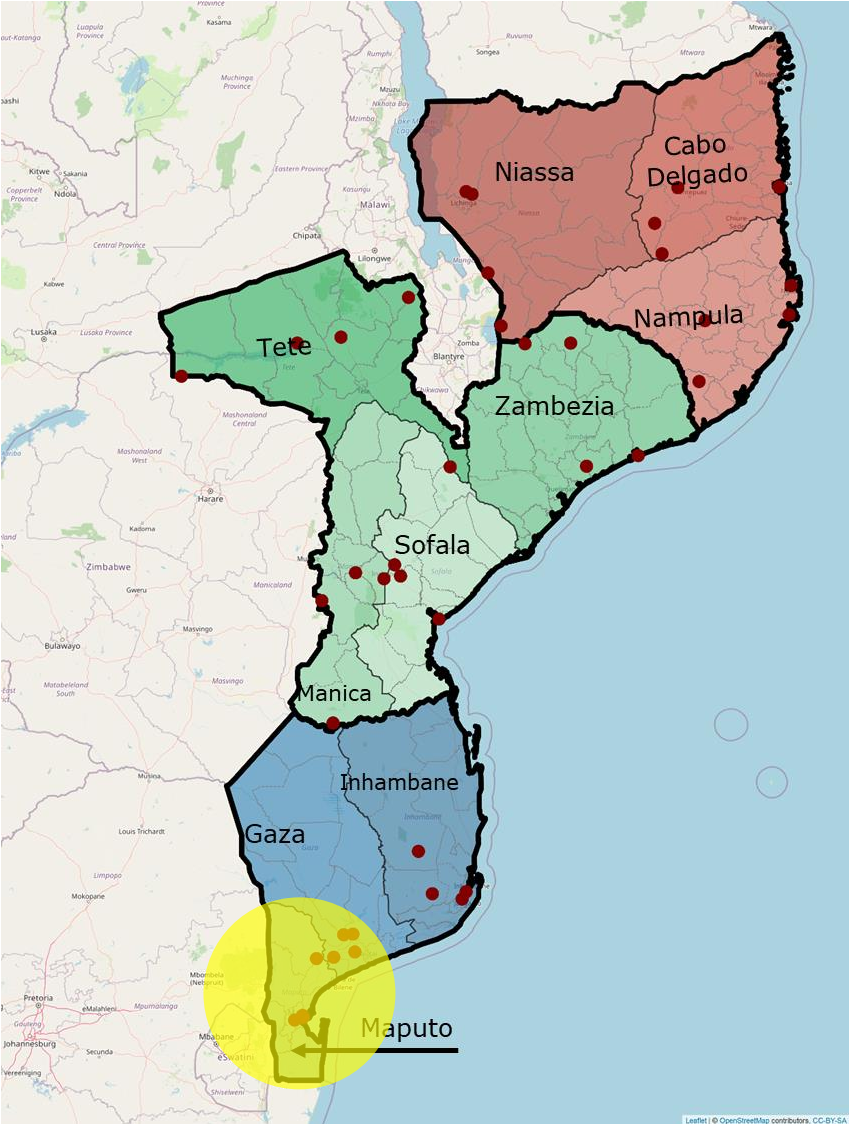
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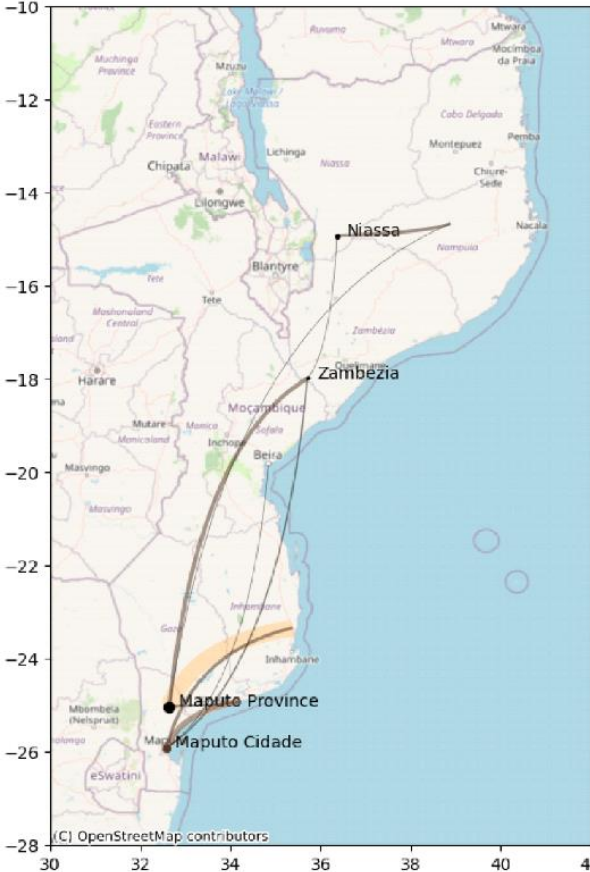
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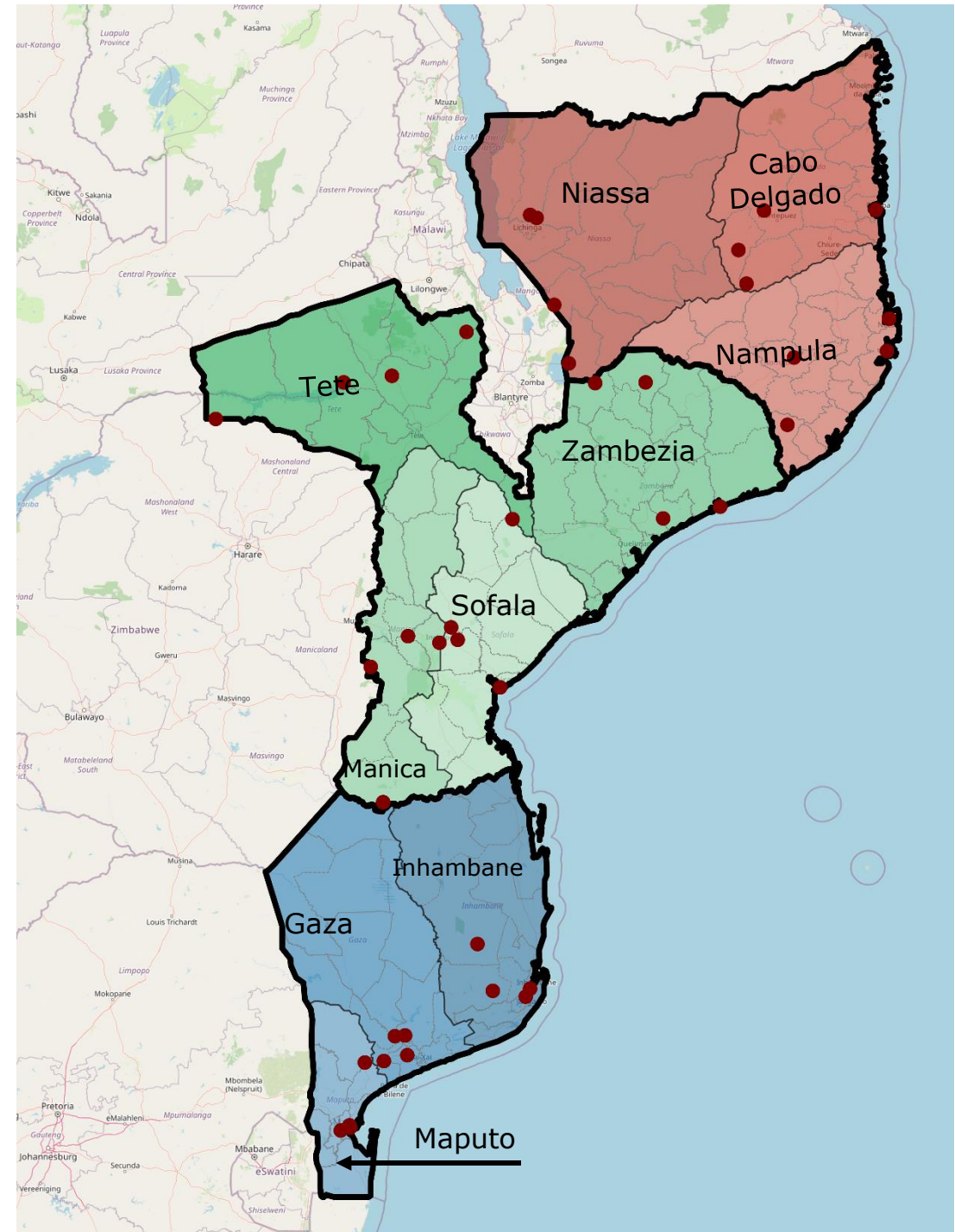
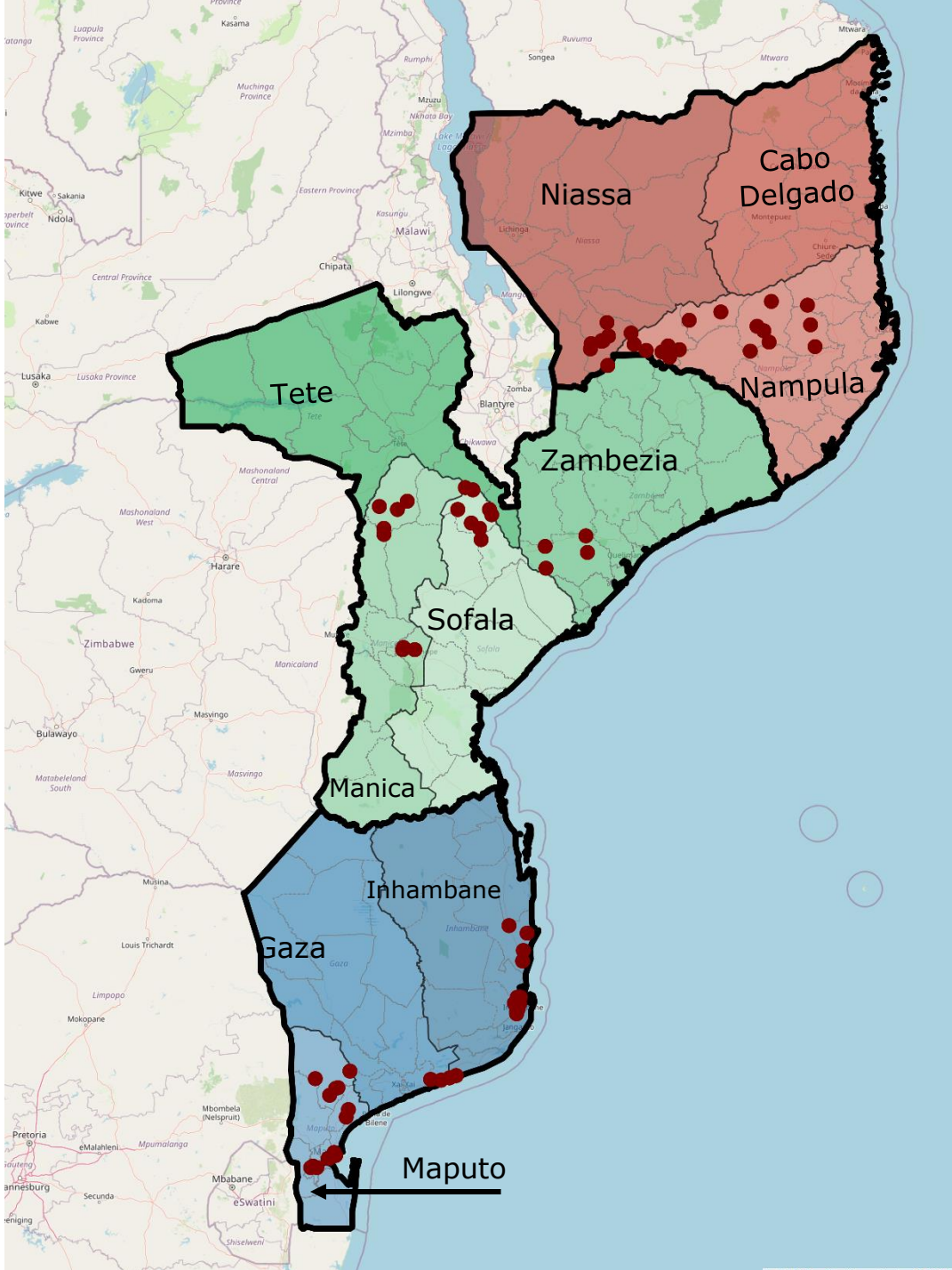
Dense sampling



RDTs from all clinical cases:

- 600 Namaacha
- 600 Matutuine
- 200 Magude





Review

Sampling for malaria molecular surveillance

Alfredo Mayor ^{1,2,3,*} Deus S. Ishengoma ^{4,5,6} Joshua L. Proctor ⁷ and Robert Verity ⁸

GenMoz team

