



Precision Medicine in sub-Saharan Africa: a step-wise approach

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Definitions

- ***“Personalised medicine refers to a medical model using characterisation of individuals’ phenotypes and genotypes (e.g. molecular profiling, medical imaging, lifestyle data) for tailoring the right therapeutic strategy for the right person at the right time, ...”***
- In sub-Saharan Africa, we should start with « **precision Public Health** »

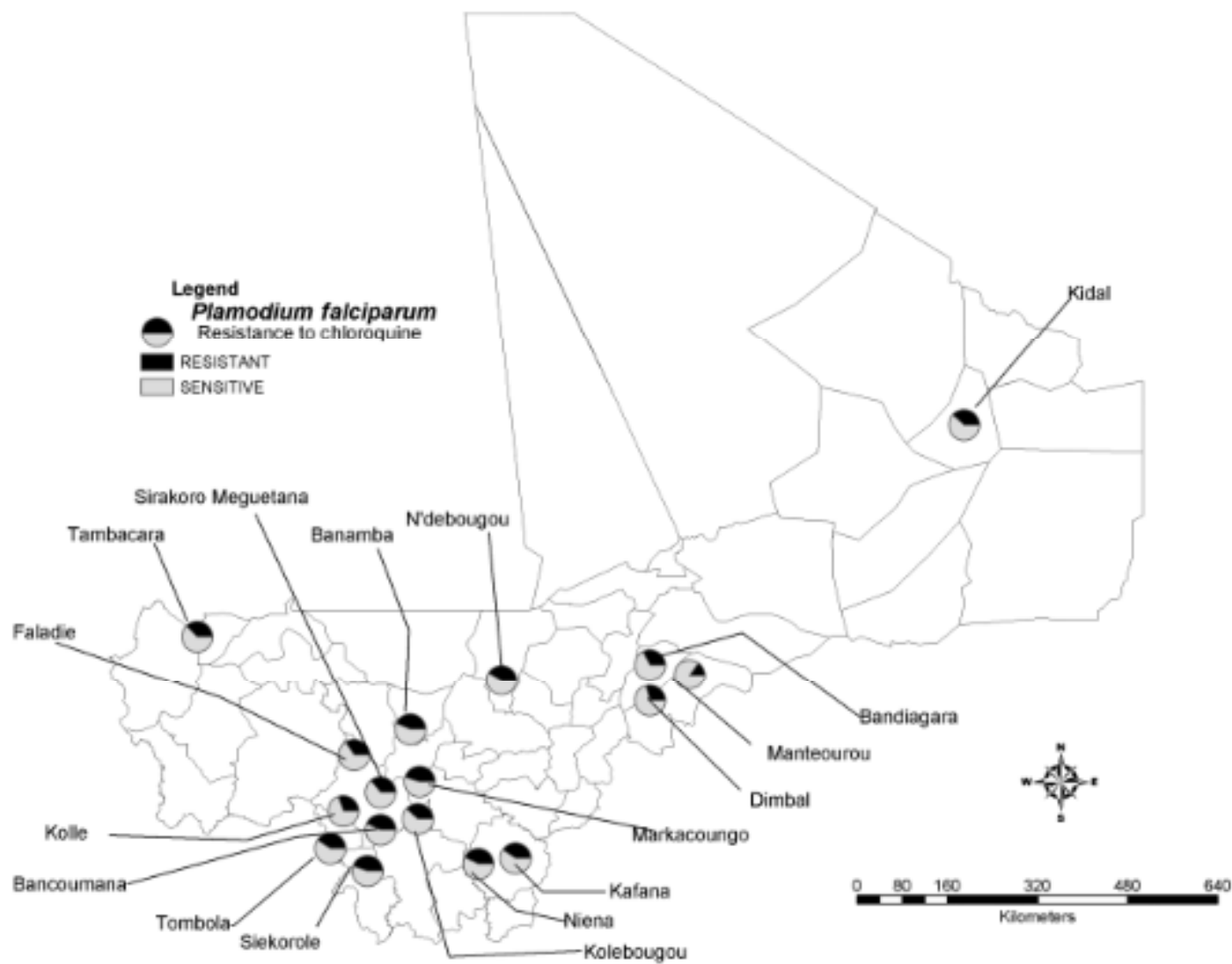
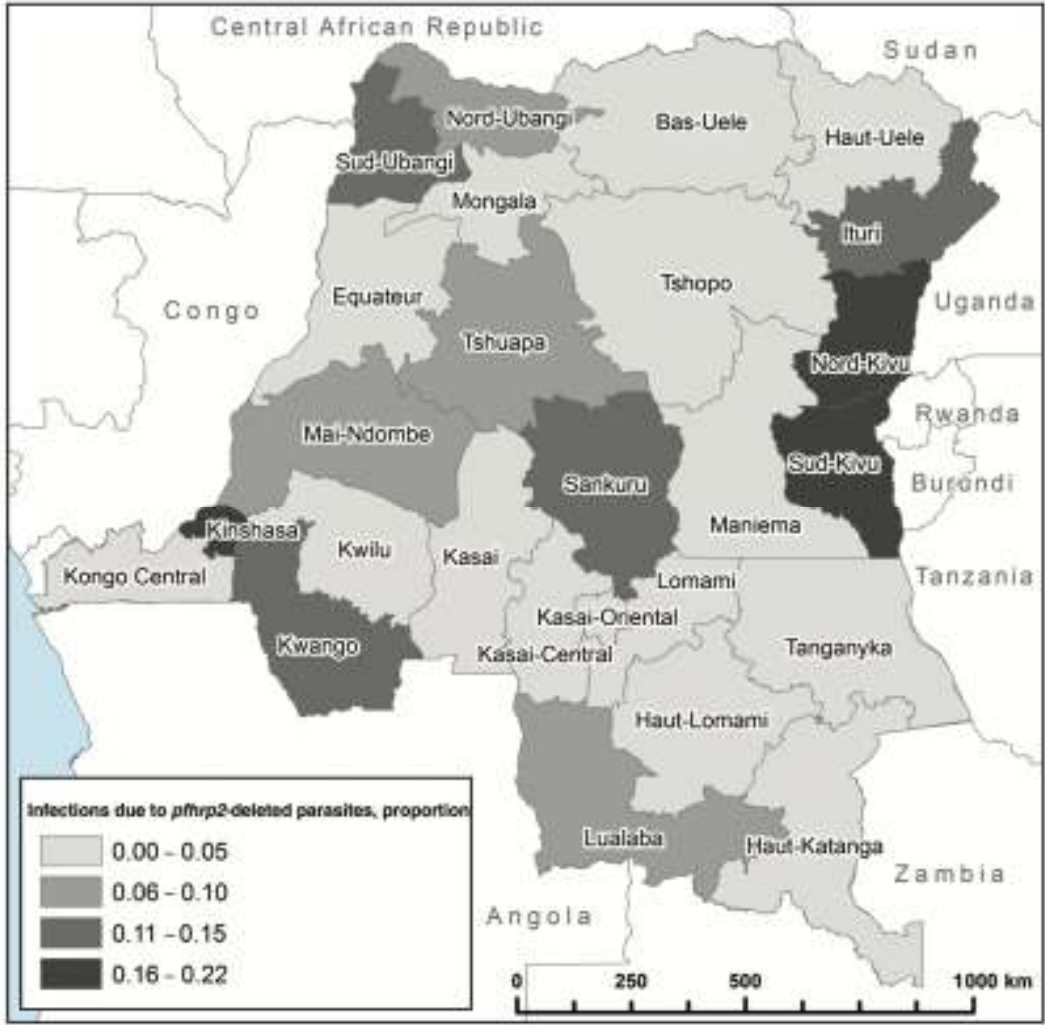


Fig. 3. Map of GRI predicted *in vivo* resistance to chloroquine in Mali.

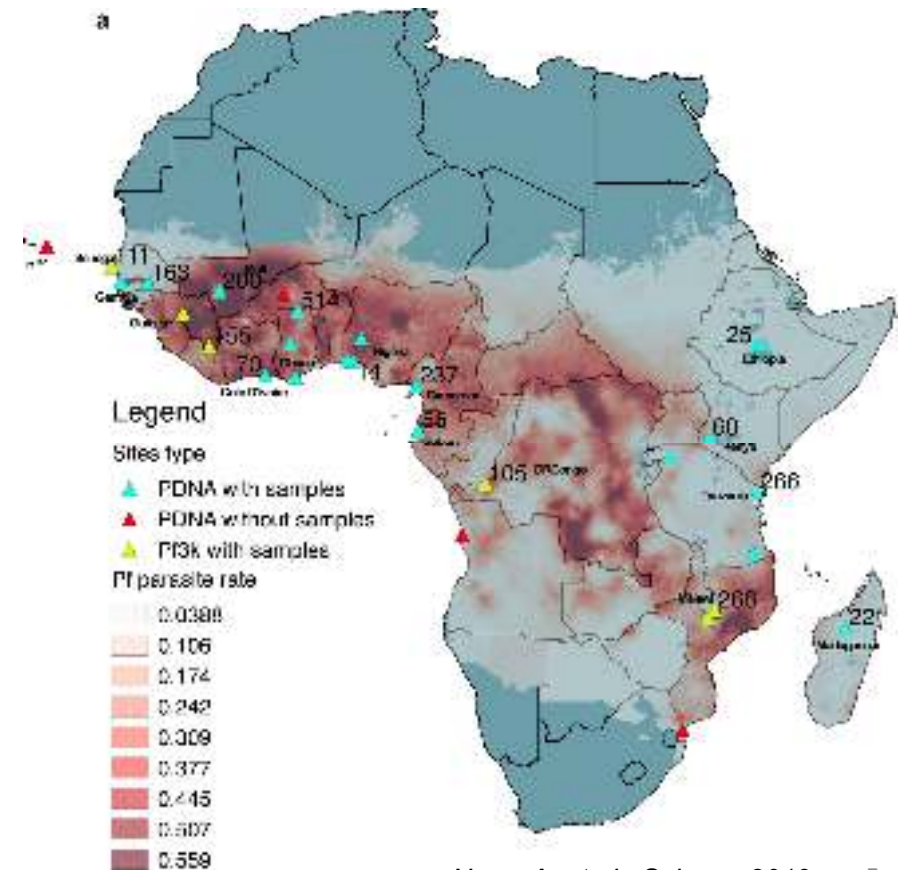
Distribution of *hrp-2* deleted *P. falciparum* in DRC



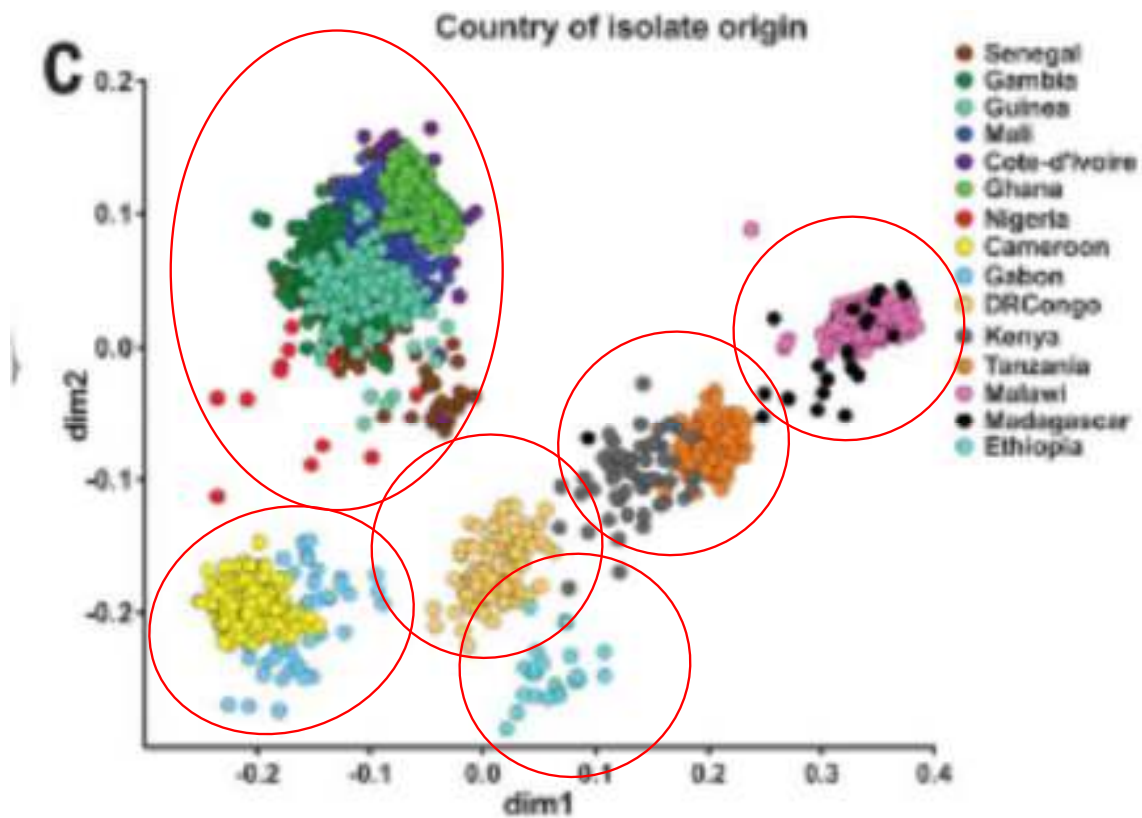
Parr JB et al., JID, 2017

Learning from *Plasmodium falciparum* genetic diversity in sub-Saharan Africa

- 15 countries East, West, Central Africa
- 2263 *P. falciparum* genomes from
 - PDNA network countries
 - Pf3K
- Custom SNP pipeline at SANGER
 - ~ 30,000 SNPs
- Complex analyses
 - Chromopainter and t-sne
 - Combination of Tess3r (STRUCTURE-like) for 'admixture' qmatrix
 - Data reduction with PCoA or t-sne

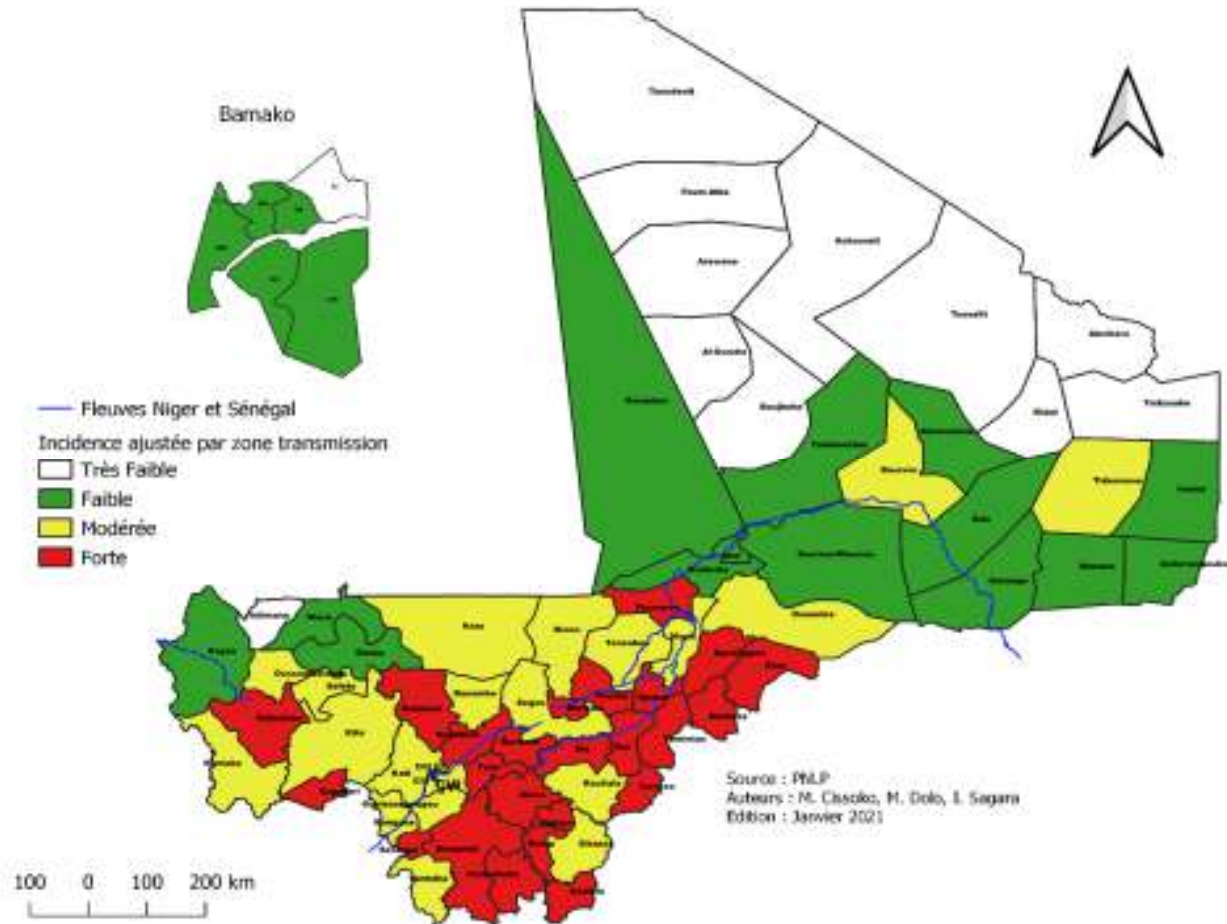


Major sub-populations of *P. falciparum* in ssAfrica



Adapted from: Ngwa A, et al, *Science* 2019

Sub-national stratification of malaria incidence in Mali



Towards personalized medicine

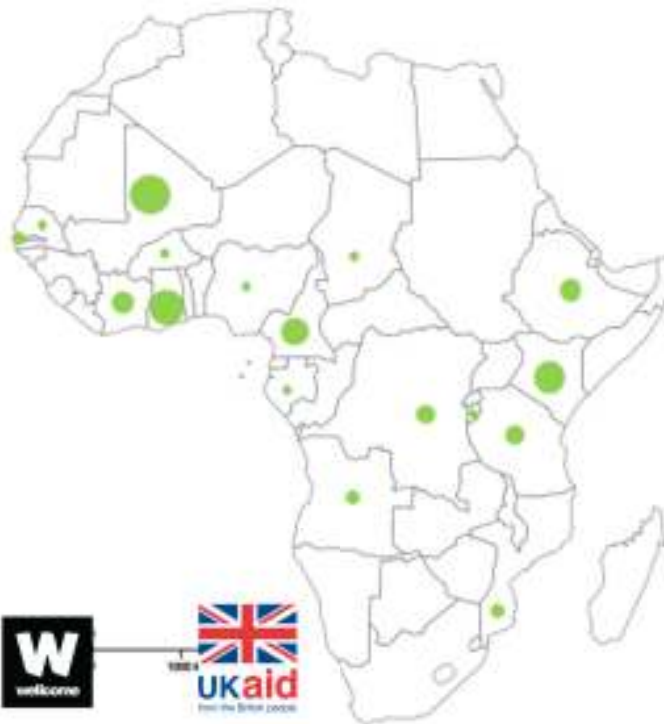
- Will require
 - Creating scientific ecosystem capable of generating the required data
 - Training specialized scientists to translate that data into knowledge
 - Engaging with policy makers, hospitals, patient groups and communities for optimum impact

DELGEME (www.delgeme.org)

DELGEME Permanent training facility



DELGEME Fellows in 17 countries
50 MSc, PhD, Postdocs; 44% women



«Precision training»



PhD in Pharmacokinetics



PhD itudent in Pharmacogenomics

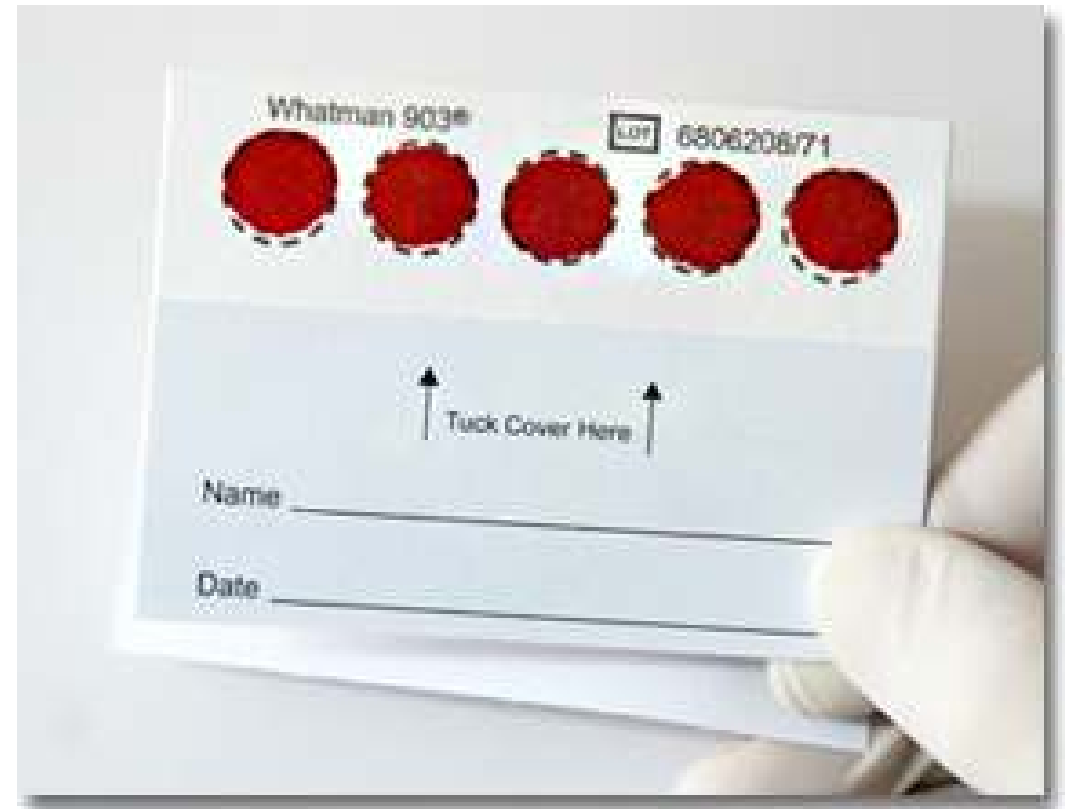
Lab equipment at the MRTC in Bamako, Mali

- SeqStudio
- MiSeq
- 10X Genomics Chromium Controller—Single cell sequencing
- MinION
- Vitek MS



Personalized medicine

- RT-PCR
- NGS
- Pharmacogenomics
- Metagenomics
- Culturomics
- MALDI-TOF
- => which bug? which drug?
which dosage? For how long?
Etc.



Acknowledgements



National Institutes of Health



Training Leaders for a Malaria-free Africa



IAEA

BILL & MELINDA GATES foundation



MalariaGEN
GENOMIC EPIDEMIOLOGY NETWORK

