

Comprehensive malaria surveillance and birth cohort studies

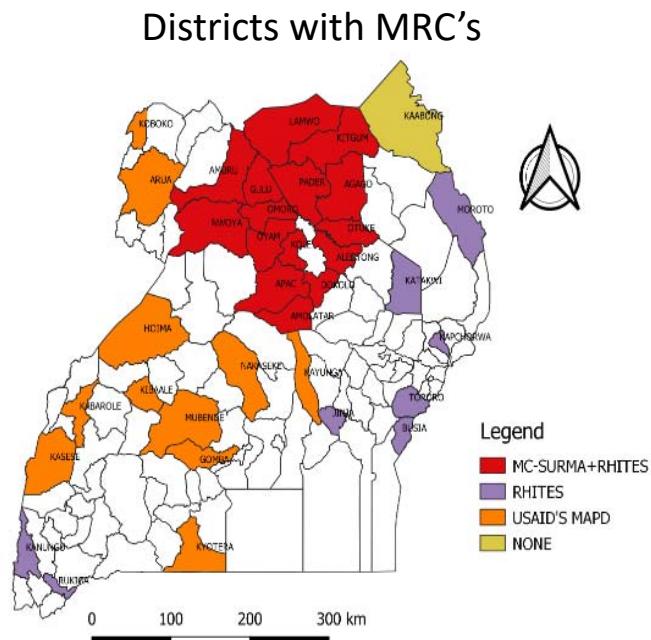
Moses Kamya
Makerere University and
IDRC

Malaria situation in Uganda

- Historically, malaria highly endemic in over 95% of country
- Perennial transmission
- Over 90% of malaria due to *P. falciparum*
- Primary vectors *An. gambiae s.s.*, *An. arabiensis*, *An. funestus*
- Control interventions
 - Prompt treatment with Artemisinin combination therapy (ACT)
 - Intermittent preventive therapy during pregnancy (IPTp)
 - Universal LLIN coverage: 2013-14 and 2017-18
 - IRS in 15 districts

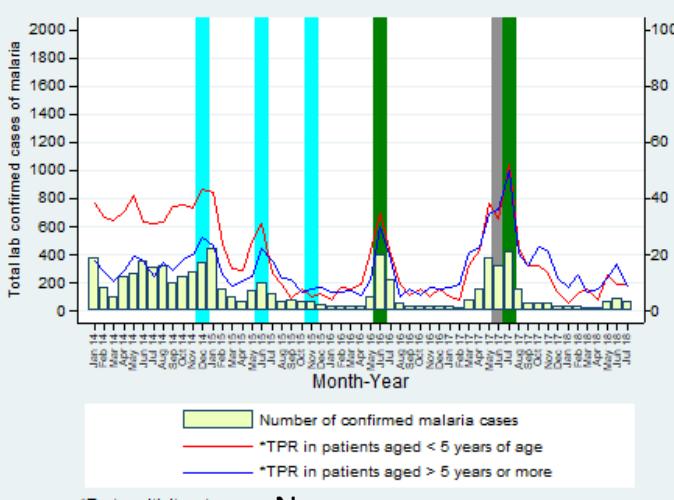
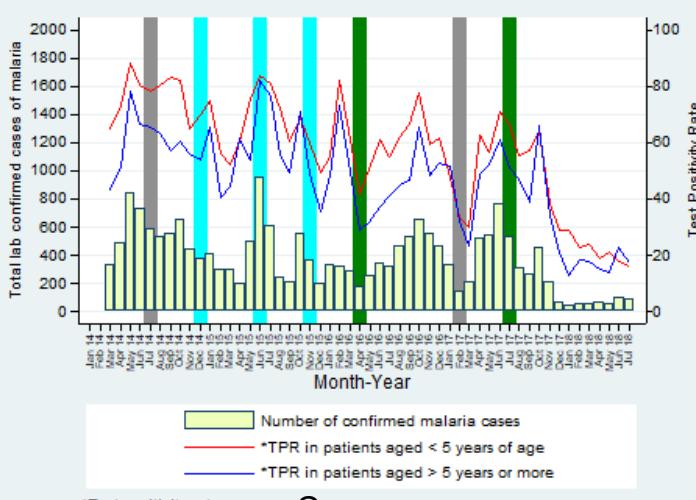
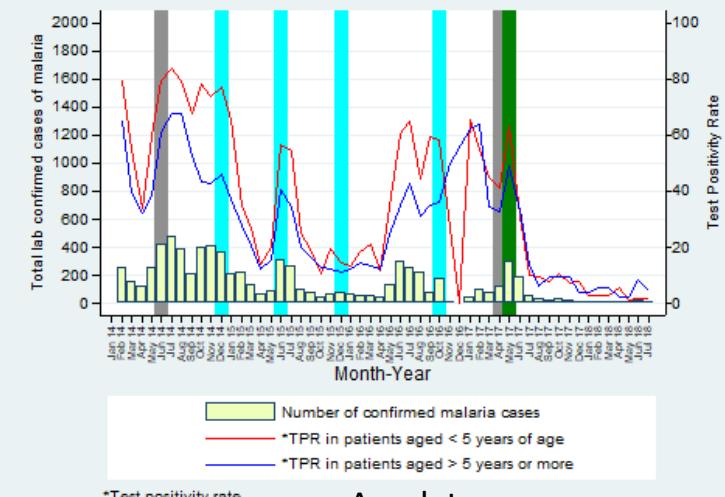
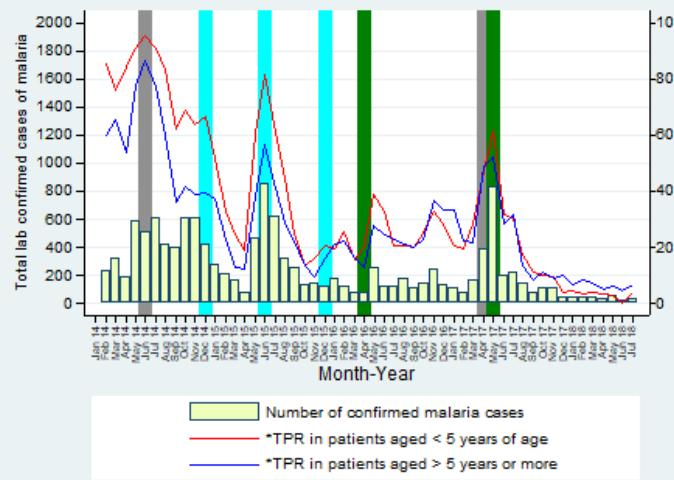
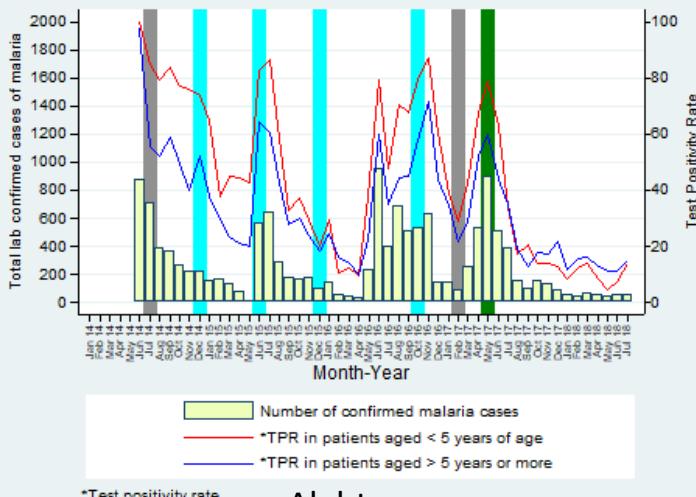
Health facility based surveillance (UMSP)

- Malaria surveillance conducted at selected health facilities referred to as Malaria Reference Centers (MRCs) since 2006
- Individual level data from standardized log books entered into an electronic database
- Training in diagnostics and emphasis on testing all patients with suspected malaria
- Currently 35 sites
- Data collected on
 - Demographics
 - Patient address
 - Fever
 - Malaria tests
 - Malaria test results
 - Test positivity rate (TPR)
 - Prescription practices
- Over 3,500,000 observation

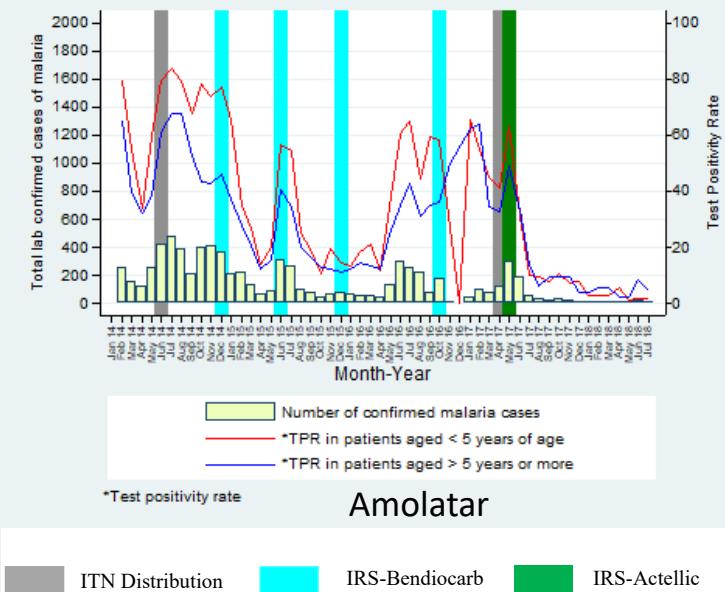


IRS Status	MRC	District	Year started
No recent history of IRS	Kasambya HCIII	Mubende	2006
	Kihiki HCIV	Kanungu	2006
	Kamwezi HCIV	Rukiga	2008
	Walukuba HCIV	Jinja	2007
	Opia HCIII	Arua	2014
	Maddu HCIV	Gomba	2018
	Kakuuto HCIV	Kyotera	2018
	Semuto HCIV	Nakaseke	2018
	Bbaale HCIV	Kayunga	2018
	Kigoroby HCIV	Hoima	2018
	Kibaale HCIV	Kibaale	2018
	Karambi HCIII	Kasese	2018
	Kataraka HCIII	Kabarole	2018
	Kaserem HCIII	Kapchorwa	2018
	Lumino HCIII	Busia	2018
	Lokolia HCIII	Kaabong	2018
	Tapac HCIII	Moroto	2018
	Toroma HCIV	Katakwi	2018
IRS conducted 2009-2014 then restarted in 2017	Padibe HCIV	Lamwo	2014
	Aduku HCIV	Apac	2006
	Awach HCIV	Gulu	2014
	Lalogi HCIV	Omoro	2014
	Pajule HCIV	Pader	2015
	Namokora HCIV	Kitgum	2014
	Aboke HCIV	Kole	2014
	Anyeke HCIV	Oyam	2014
	Patongo HCIII	Agago	2014
	Atiak HCIV	Amuru	2014
	Purongo HCIII	Nwoya	2014
	Alebtong HCIV	Alebtong	2014
	Amolatar HCIV	Amolatar	2014
	Dokolo HCIV	Dokolo	2014
	Orum HCIV	Otuke	2014
IRS active since 2014	Nagongera HCIV	Tororo	2007

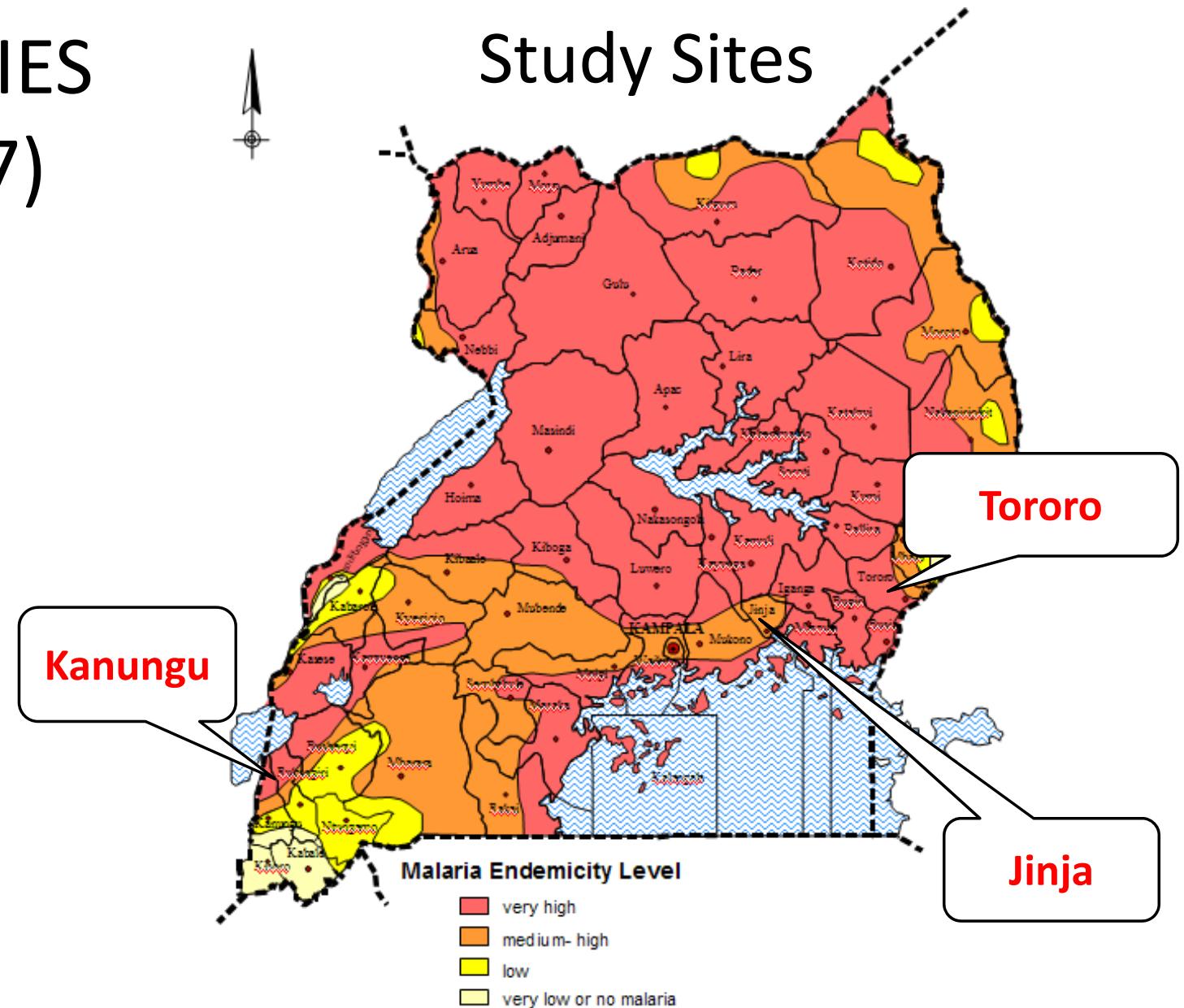
Sites where IRS was started in 2014



- Dramatic declines in malaria burden after starting IRS
 - Magnitude and speed of decline varies from site to site
 - “Mini-epidemics” just prior to most rounds of IRS



PRISM 1 STUDIES (2011 – 2017)



Malaria surveillance activities

Method	Sampling frame	Frequency	Data collected
Health facility-based surveillance	All patients presenting to the outpatient department	Longitudinal	Fever Malaria tests done Test positivity rate (TPR) Anti-malarial drugs prescribed or not
Cross-sectional surveys	200 randomly selected houses in each study site	Once a year in 2012, 2013, 2015	Malaria parasites prevalence Coverage level of control interventions
Cohort studies	All children 0.5-11 years of age from 100 randomly selected houses in each study site	Longitudinal	Malaria episodes Microscopic and sub-microscopic parasitaemia Housing structure
Entomology surveys	CDC light trap collections in same houses participating in cohort study	Collections once a month in each house	Number of mosquitoes collected Species identification Sporozoite testing using ELISA Human biting rate

Malaria episodes among children 0.5-10 years of age

Prompt effective treatment of uncomplicated malaria with ACTs works

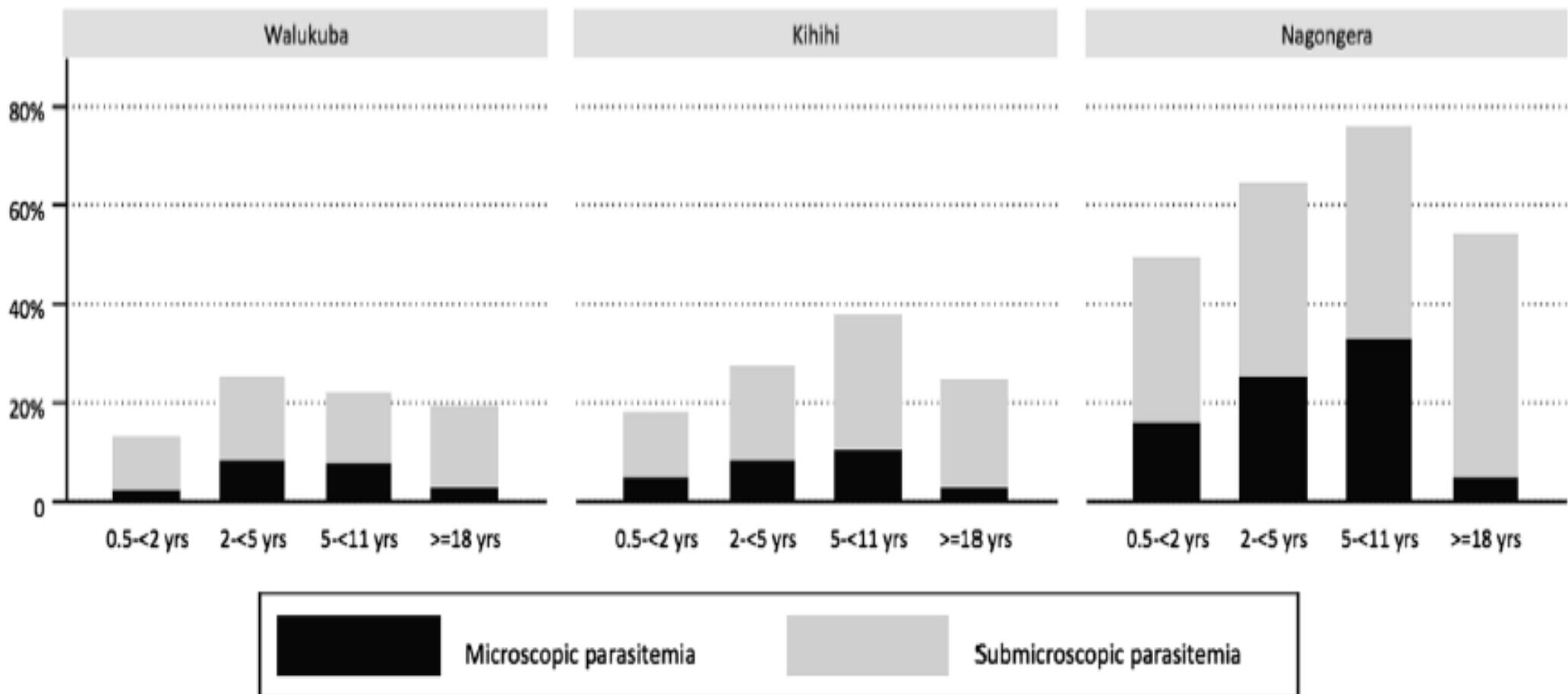
Measurement	Study site			
	All sites	Walukuba	Kihikihi	Nagongera
Treatments for malaria	5,559	282	2,424	2,853
Uncomplicated malaria	5,521	279	2,402	2,840
Danger signs	25 (0.4%)	2	13	10
Severe malaria*	13 (0.2%)	1	9	3

*Severe malaria

- Multiple convulsions within 24 hours (n=5)
- Severe anemia (n=5)
- Cerebral malaria (n=2)
- Respiratory distress (n=1)

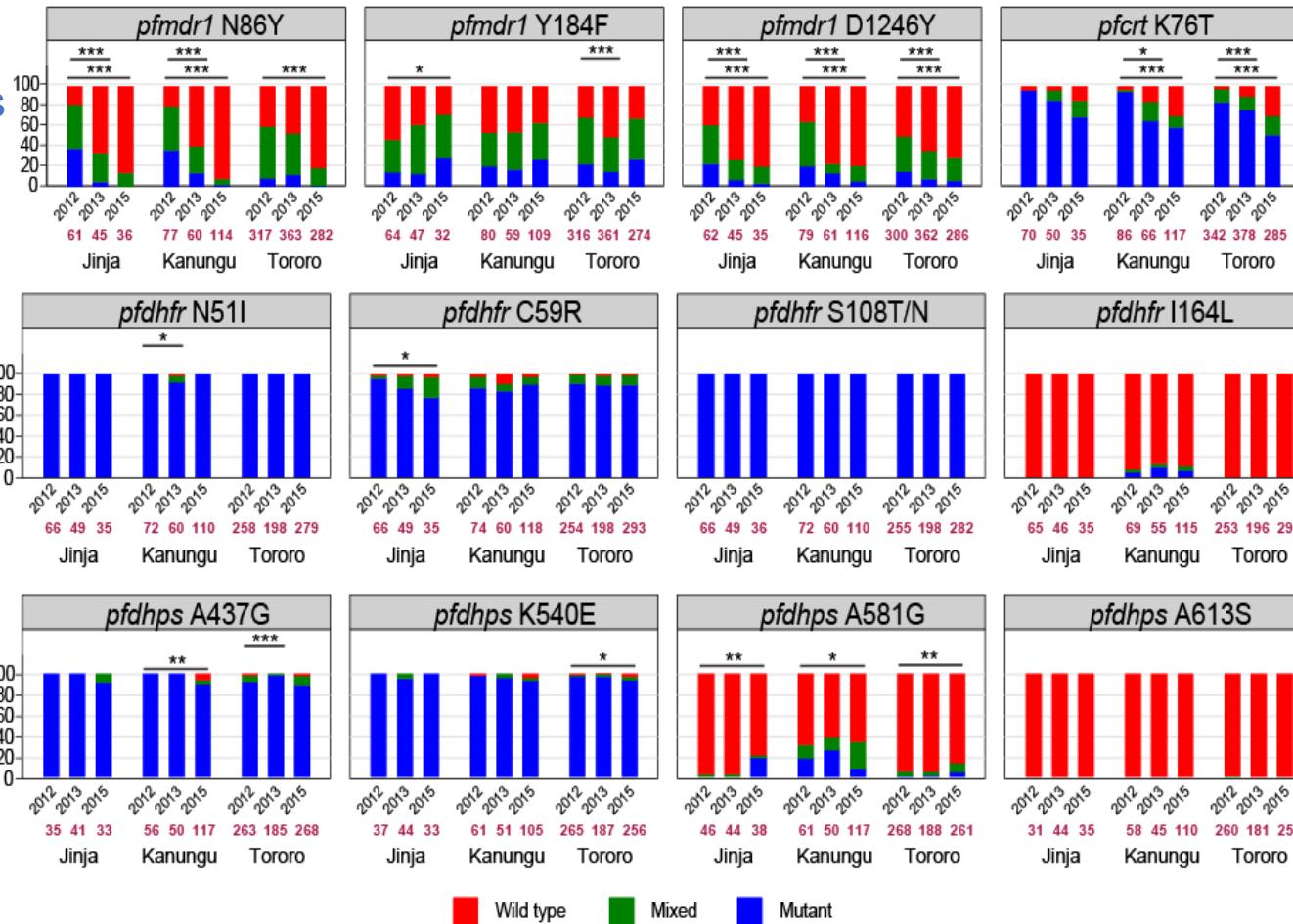
No deaths due to malaria!

Large reservoir of asymptomatic parasitemia predominantly submicroscopic



Prevalence of key *P. falciparum* resistance-mediating SNPs

Transporters



- Rapid changes over time
- Prevalence of WT transporter mutations increasing
- Concerning antifolate mutations, esp in SW.

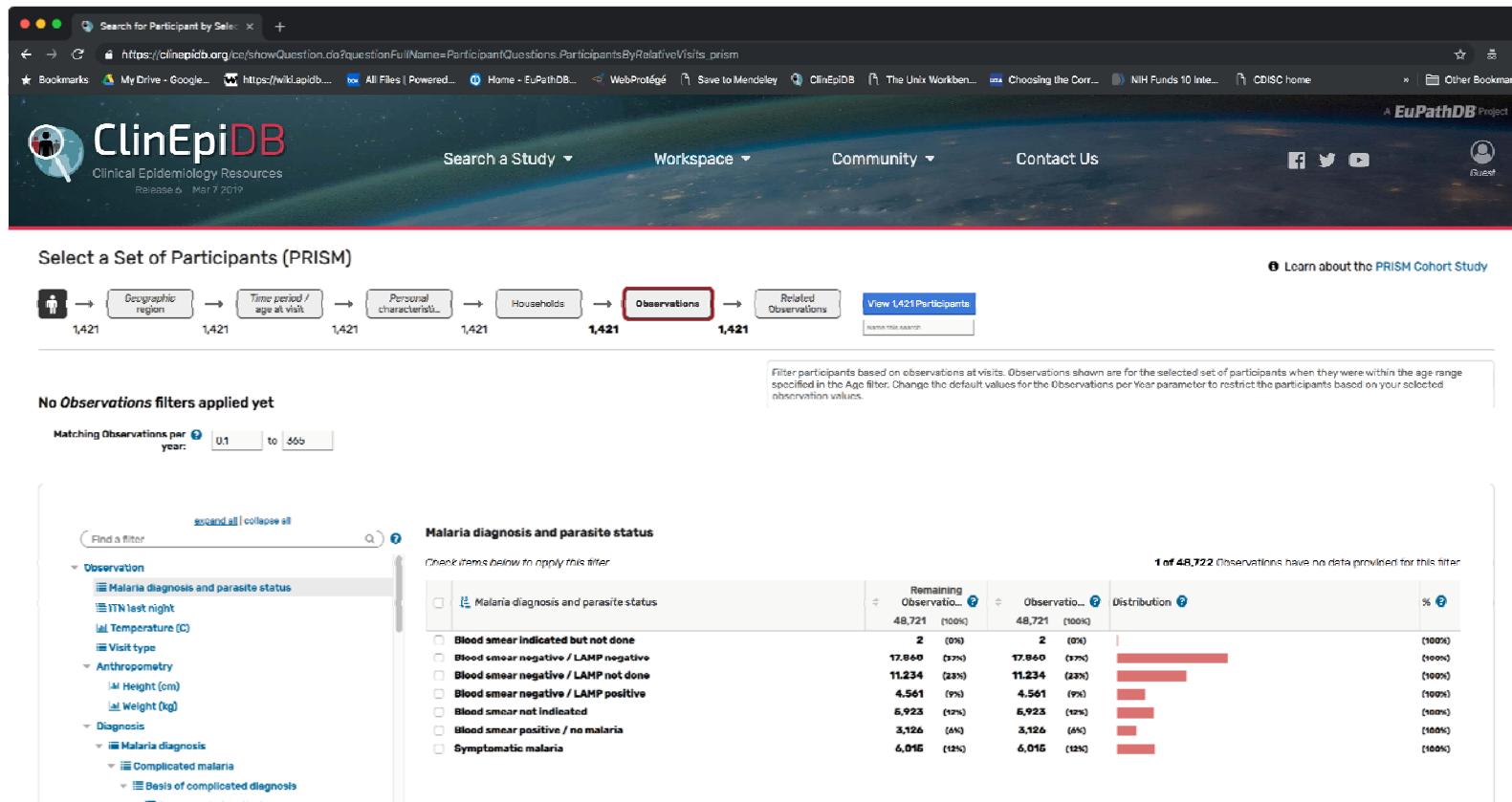
PROMOTE birth cohort Studies

Three Randomized Controlled Trials from 2014-2019; Birth cohort 1, 2 & 3

- Birth cohort 1 (2014-2018)
 - 300 HIV-uninfected pregnant women and their children
 - 3,194 study clinic visits
 - Data collected: Fever, malaria parasitaemia, placenta malaria by microscopy and histology, birth weight, and haemoglobin levels
- Birth Cohort 2 (2014-2016)
 - 200 HIV-infected pregnant women and their children
 - 1,880 follow up visits
 - Data collected: Fever, malaria parasitaemia, placenta malaria by microscopy and histology, birth weight, and haemoglobin levels
- Birth Cohort 3 (2016-2019)
 - 782 HIV-uninfected pregnant women and their children
 - 8,046 study clinic visits in mothers
 - 16,423 study clinic visits in infants
 - Data collected: Malaria parasitaemia in infants

ClinEpiDB Project

- All data from PRISM 1 cohort studies and entomological surveys
- Interactive website which includes analytical and visualization tools
 - 1,421 cohort study participants, Over 44,000 clinic visits



- Visualization of variables collected (on the left), and values (on the right)

Malaria status over time

My Strategies X +

https://clinepida.org/ce/showApplication.do

Bookmarks My Drive - Google https://wikispaces... All files | Powered by Home EuPathDB WebPrintAgA Save in Mendeley ClinEpiDB The Uni Worker Choosing the Corr... NIDF Funds 10 Inter... CDISC home Other Bookmarks

A EuPathDB Project

ClinEpiDB

Clinical Epidemiology Resources

Release 6 · Mar 7 2019

Search a Study Workspace Community Contact Us

f t y

My Strategies: Opened (0) All (3) Basket Public Strategies (21) Help

Show search strategy panel

1103 Participants Revise Combinewith another search Save Share

Participant Results Analyze Results

First 1 2 3 4 5 Next List Advanced Filtering Download Add to Basket Add Columns

Participant Id	Sub-county in Uganda	Age at enrollment	Avg female Anopheles	Malaria status timeline	Household wealth index, categorical	G6PD genotype	Sex
3067	Nagongera	2.99	15.6		Middle	Normal (male)	Male
3047	Nagongera	2.48	26.3		Poorest	Hemizygote (male)	Male
3077	Nagongera	1.56	16		Least poor	Normal (female)	Female
3014	Nagongera	1.14	31.3		Middle	Normal (female)	Female
3088	Nagongera	2.99	19.3		Least poor	Normal (female)	Female
3087	Nagongera	4.28	19.2		Least poor	Heterozygotes (female)	Female
3061	Nagongera	4.15	11.4		Poorest	Normal (female)	Female
3063	Nagongera	2.52	11.4		Poorest	Normal (male)	Male
3019	Nagongera	2.27	12.8		Poorest	Normal (male)	Male

- Study clinic visits represented by circles
 - Episodes of symptomatic malaria during follow up represented by Red filled in circles

Special thanks to our partners and collaborators



THE REPUBLIC OF UGANDA



LONDON
SCHOOL of
HYGIENE
& TROPICAL
MEDICINE

