Research for malaria prevention in West Africa

Prof Jean Louis Ndiaye,
University Iba der Thiam, Thies

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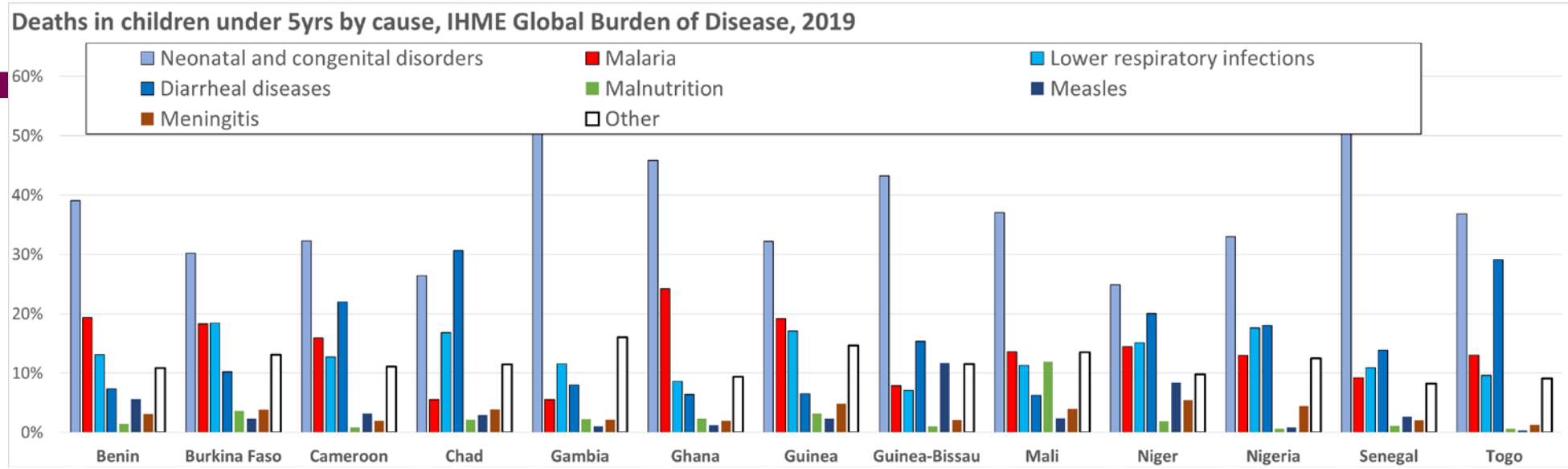
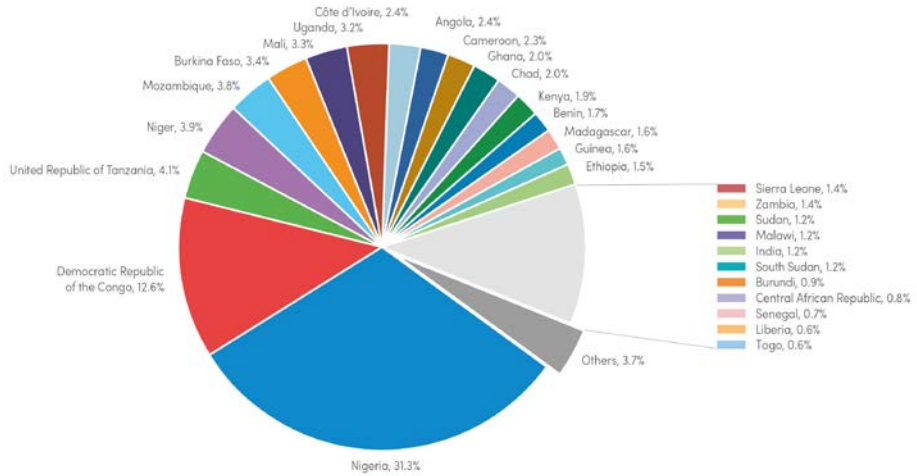
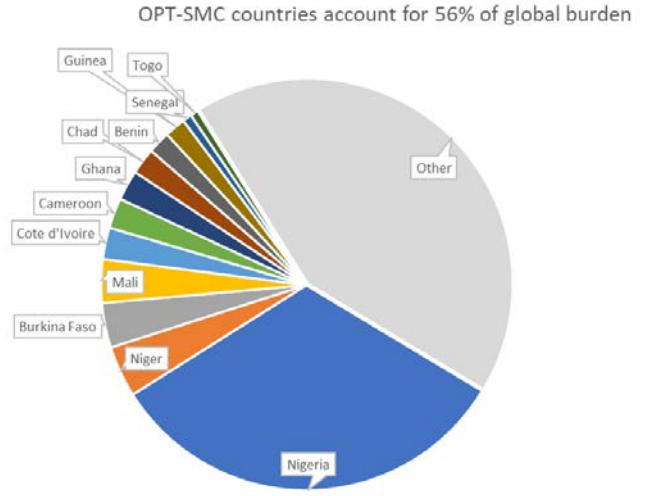
Malaria remains a leading cause of post-neonatal death



World malaria report: breakdown of wordwide malaria deaths, by country:





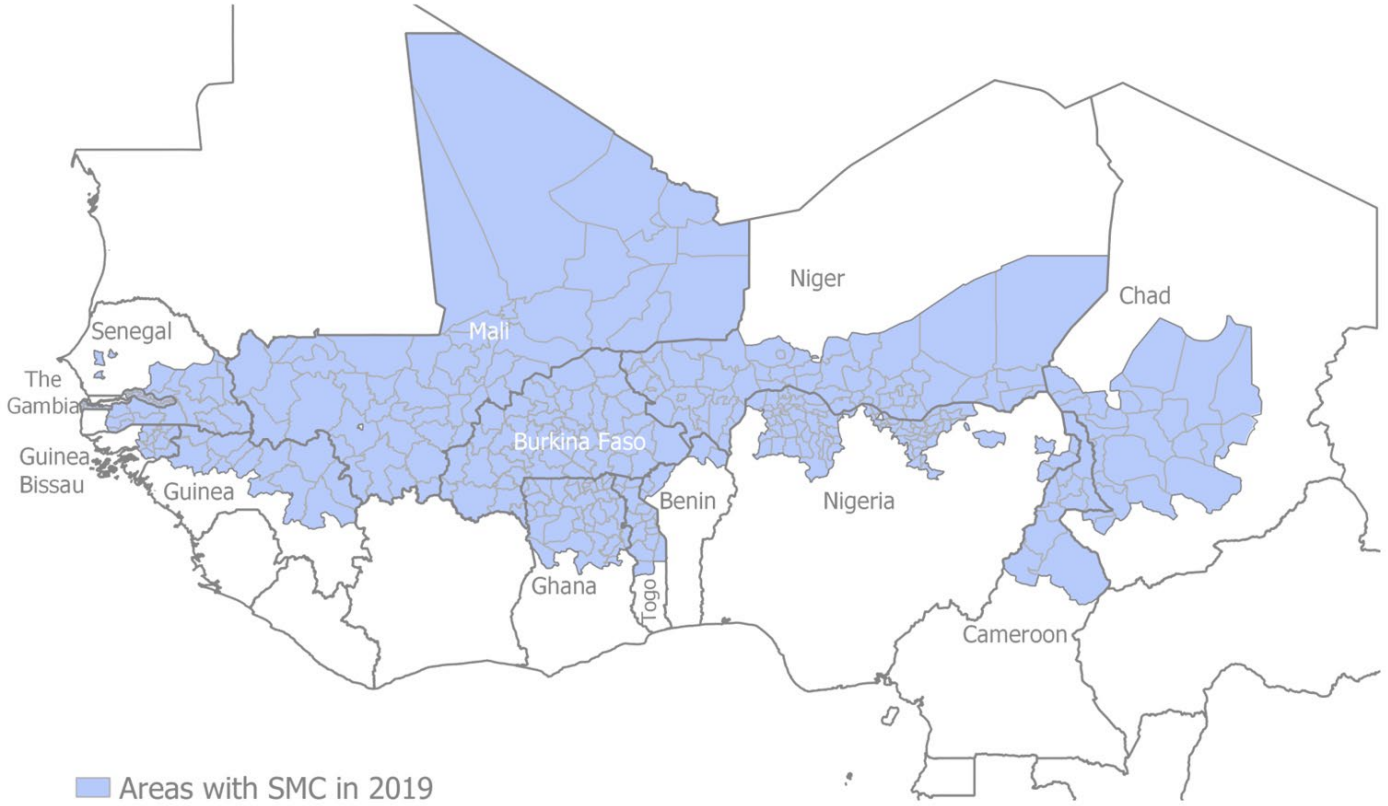
56% of the global burden of malaria mortality occurs in 12 countries in W and C Africa with (areas of) highly seasonal malaria

OPT-SMC
Optimizing Seasonal Malaria Chemoprevention in West and Central Africa

EDCTP
This project is part of the EDCTP2 programme supported by the European Union

OPT SMC Project Team and locations

NMPs from Benin, Burkina Faso, Cameroon, Chad, The Gambia, Ghana, Guinea, Guinea Bissau, Mali, Niger, Nigeria, Togo and Senegal
University of Thies : Jean Louis Ndiaye, Ibrahima Mbaye, Fatimatou Bintou Sall, Amadou Seck, Ndeye Fatou Diop
LSHTM: Paul Milligan, Susana Scott, Lucy Bell
WHO/TDR : Corinne Merle
MMV : Andre Tchouatieu, Abena Poku-A



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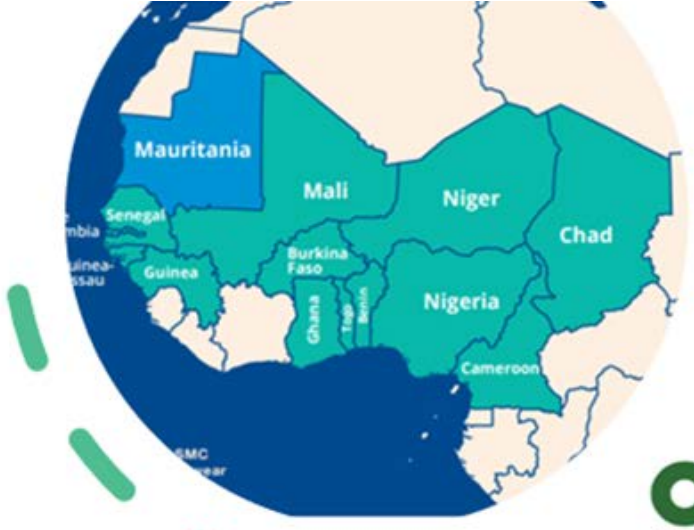
MMV Medicines for Malaria Venture

Objectives of OPT-SMC

Strengthening the capacities of the NMPs implementing SMC:

- To define research priorities for **optimizing SMC effectiveness**
- To **conduct IR/OR projects** for improving SMC effectiveness:
- interpret and make use of malaria surveillance data
- target effectively (high risk populations and periods of the year)
- monitor delivery, uptake and effectiveness

Promote inter-country collaboration, sharing of information and expertise



OPT-SMC
Optimizing Seasonal Malaria Chemoprevention in West and Central Africa

Country-led national Malaria programmes research projects:

Monitor and Evaluate

- **Ghana**: SMC coverage and factors associated with uptake and adherence
- **Benin**: Monitoring the effectiveness of SMC in northern Benin using the case-control method.
- **Senegal**: Estimating the delivery costs and cost effectiveness of SMC in southern Senegal
- **The Gambia**: Assessment of adherence to SMC in The Gambia
- **Guinea Bissau**: Strengthening health management information systems to assess the impact of SMC in three regions in Guinea Bissau

Barriers to uptake: Qualitative studies

- **Guinea**: Barriers to SMC uptake in mining areas in Guinea and an improved delivery approach.
- **Nigeria**: Barriers and facilitators of SMC uptake in Nigeria: a qualitative study in 5 States.
- **Burkina Faso**: Evaluating the determinants of variations in SMC coverage in Burkina Faso between urban and rural areas

Developing New Strategies

- **Mali** :
- Evaluation of SMC using 3 approaches: DOT 3, SMC plus and Classic
- **Cameroon:** Effectiveness of using household leaders to improve adherence during SMC
- **Senegal** : Mechanistic Model for cost effective evaluation of SMC delivery

Adapting target groups

- **Niger**: Applying the updated WHO SMC guidelines in Niger: timing and number of cycles, and age ranges at risk of severe malaria
- ongoing
- **Togo:** Defining optimal SMC strategies in Togo: timing and number of cycles, and age ranges at risk of severe malaria
- ongoing
- **Chad**:
- Development stage

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Monitoring drug resistance molecular markers after scale up of Seasonal Malaria Chemoprevention in Southern Senegal

- **Isaac Akhenaton MANGA** MD, PhD at UCAD
  - 4 southern regions in Senegal : 45 villages and 8 health posts

Prevalence of mutations in Pfmdr1		<10 years	> 10 years	
Codon	Period	Frequency	Frequency	Difference (95%CI)
86Y	Incident cases	(6/113) 5.3%	**(11/156) 7.1%**	-1.7% (-7.5%,4.0%)
184Y	December survey	(26/147) 17.7%	**(38/84) 45.2%**	-27.6% (-39.9%,-15.2%)

Pfdhfr/Pfdhps haplotype mutations		<10 years	> 10 years	
51I/59R/108N/437G	Incident cases	**65,7 % (90/137)**	51,9% (70/135)	0,013
	December survey	**74,1% (97/131)**	59,6% (28/47)	0,048
51I/59R/108N/437G/540E	Incident cases	**1,5% (2/137)**	0%	0,498

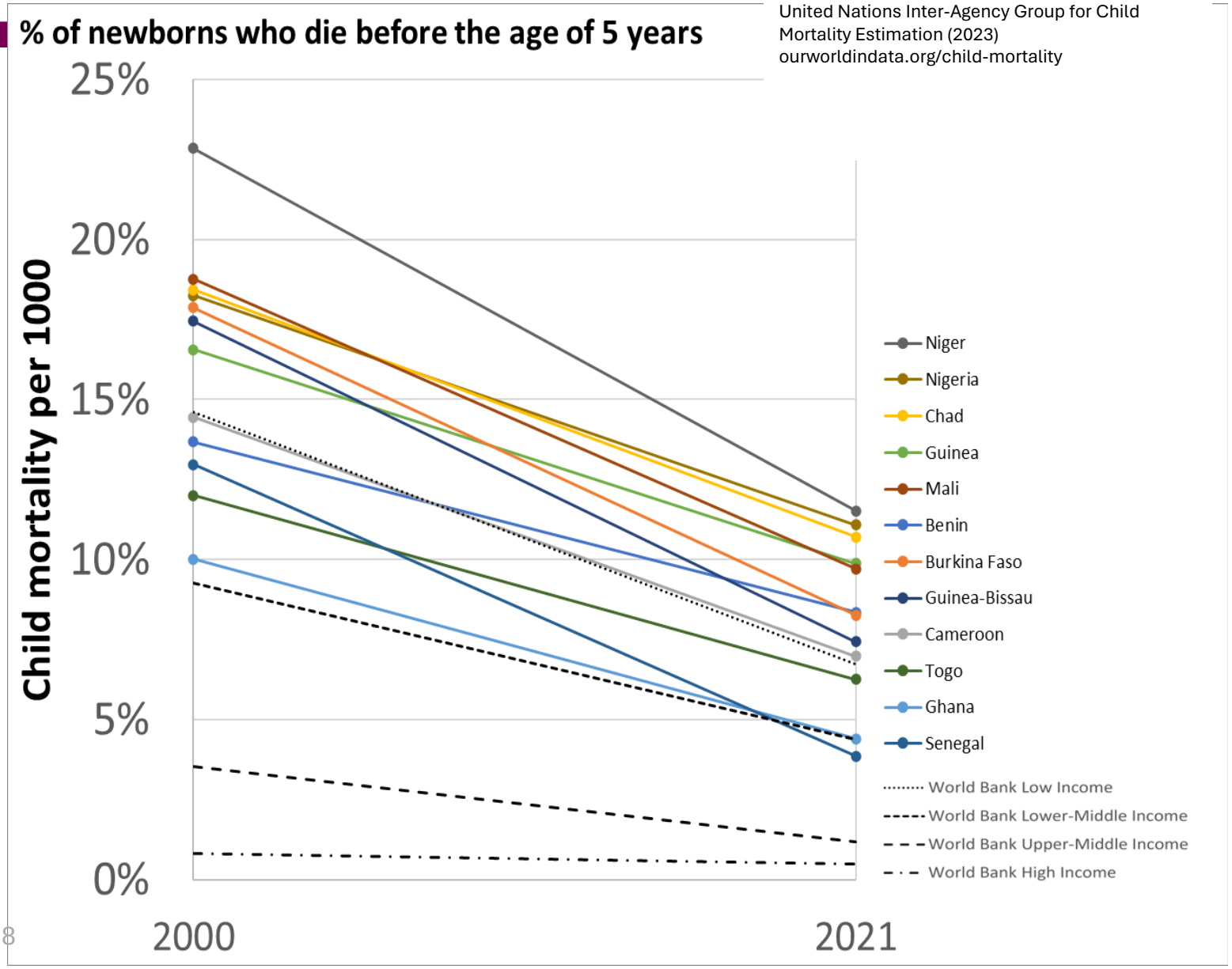
Monitoring the efficacy of Intermittent Preventive Treatment in pregnant woman efficacy through Antenatals clinics in Senegal

- **Marie Pierre DIOUF**
- PhD student ED2DS, Iba Der Thiam University, Thies
- **Parasite carriage in women attending ANC**
  - 20% by RDTs
  - 48% by PCR (VarATS gene)

  } Important asymptomatic parasite carriage
- **Prevalence of molecular markers of resistance to SP**
  - No association between resistance marker and gravidity or SP intake
  - Absence of the quintuple mutation *dhfr/dhps:* SP still effective in Senegal

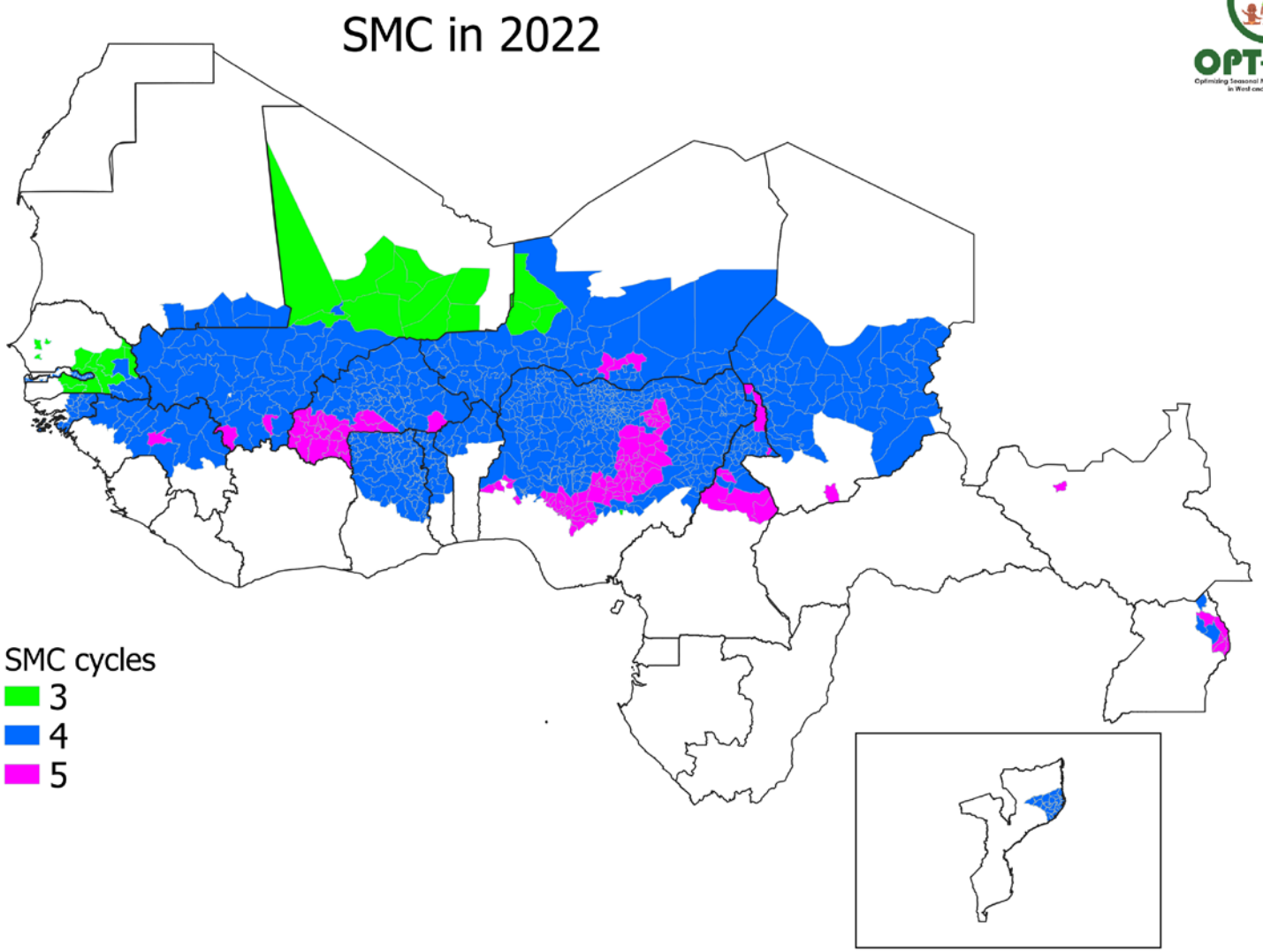
Diouf et al. Am. J. Trop. Med. Hyg., 110(2), 2024

Although child survival has improved, child mortality (% dying before age of 5) remains above 10% in most 'SMC' countries:



- The world's highest rates of under-5 mortality are in sub-Saharan Africa
- Malaria remains a leading cause
- 50% of global *malaria* deaths occur in 12 countries in W and C Africa with highly seasonal transmission

Additional tools are needed



SMC has been scaled-up, despite the challenges of delivering 4 or 5 monthly cycles door to door, and has proved highly effective, but a high burden of malaria remains

Two malaria vaccines

WHO recommends groundbreaking malaria vaccine for children at risk

Historic RTS,S/AS01 recommendation can rein fight against malaria

6 October 2021 | News release | Geneva |Reading time: 3 min (859 words)

WHO recommends R21/Matrix-M vaccine for malaria prevention in updated advice on immunization

2 October 2023 | News release | Geneva |Reading time: 5 min (1351 words)

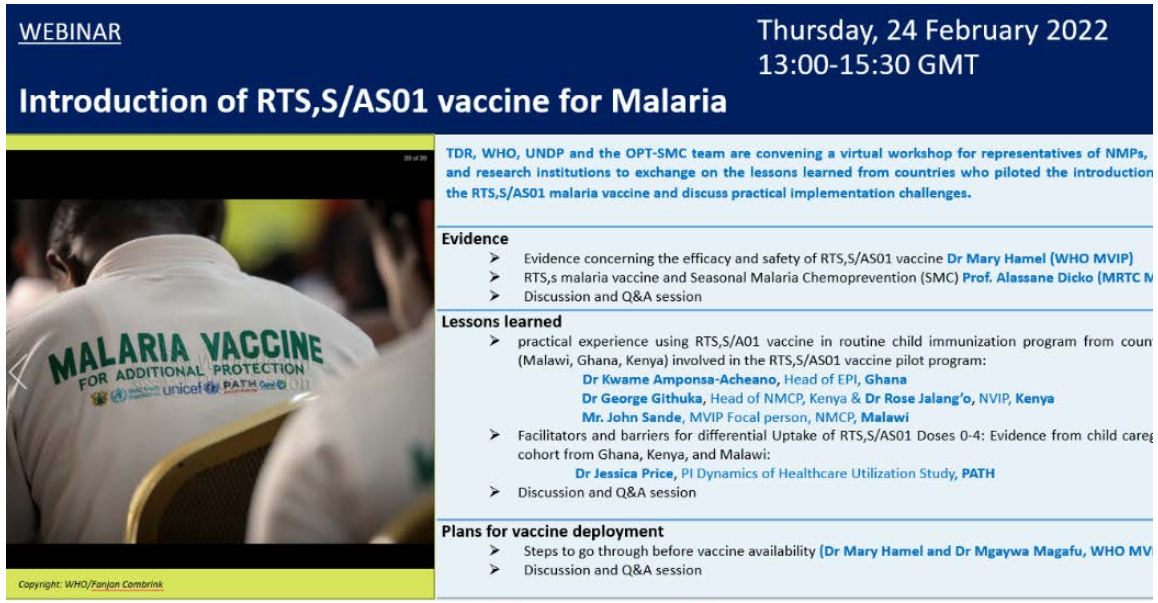
The World Health Organization (WHO) has recommended a new vaccine, R21/Matrix-M, for the prevention of malaria in children. The recommendation follows advice from the WHO: Strategic Advisory Group of Experts on Immunization (SAGE) and the Malaria Policy Advisory Group (MPAG) and was endorsed by the WHO Director-General following its regular biannual meeting held on 25-29 September.

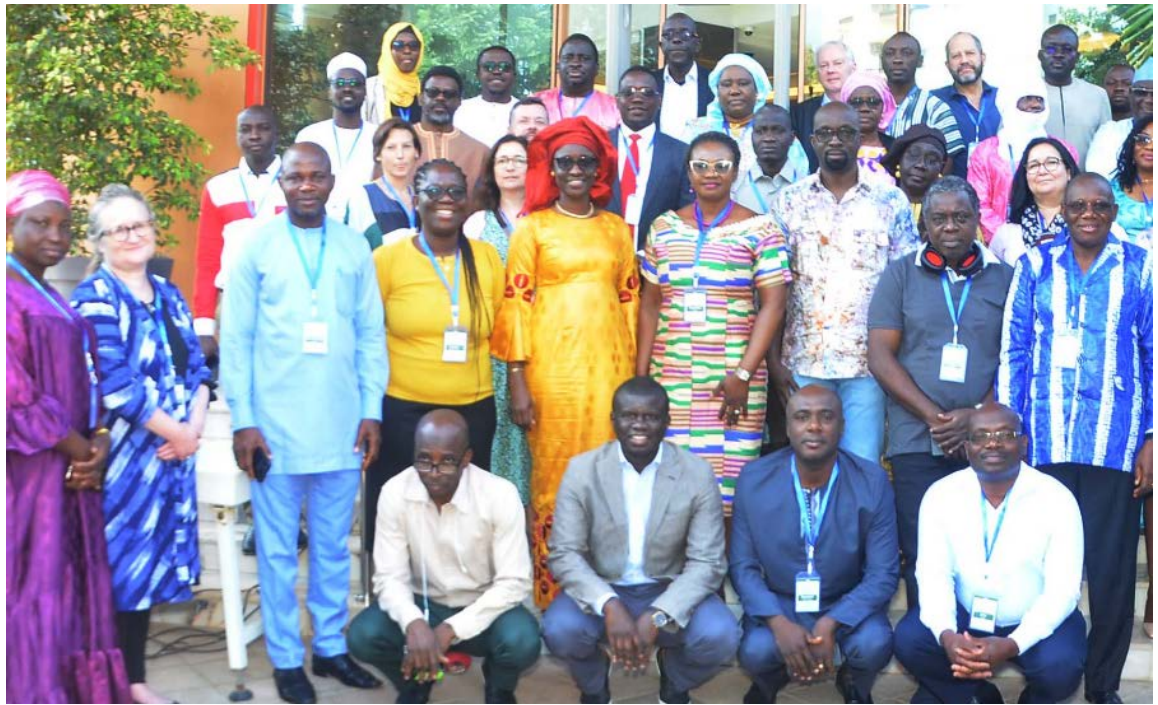
- **RTS,S/AS01 was implemented at large scale in Ghana, Kenya and Malawi, three countries with good immunization coverage**

Introduction of malaria vaccines in West and Central Africa

As part of the OPT-SMC project, we organized **webinars and meeting** in 2022 and early 2023 with National Malaria and Immunization programmes of 13 West and Central Africa to discuss:

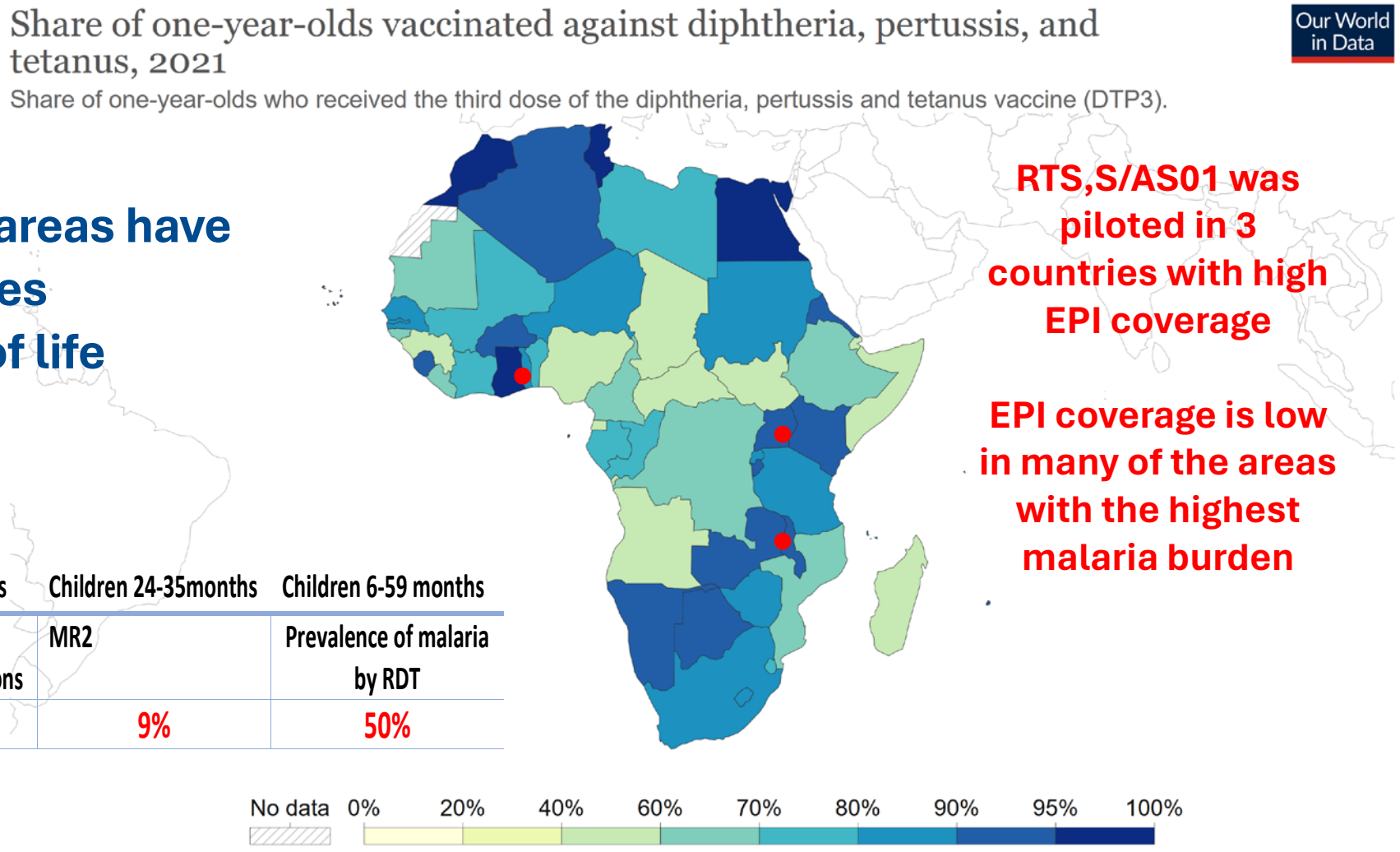
- Malaria vaccine characteristics
- The specific context of WCA with high malaria seasonality in some areas
- Implementation challenges but also Opportunities





Implementation challenges

Many malaria high burden areas have low uptake of basic vaccines especially in second year of life



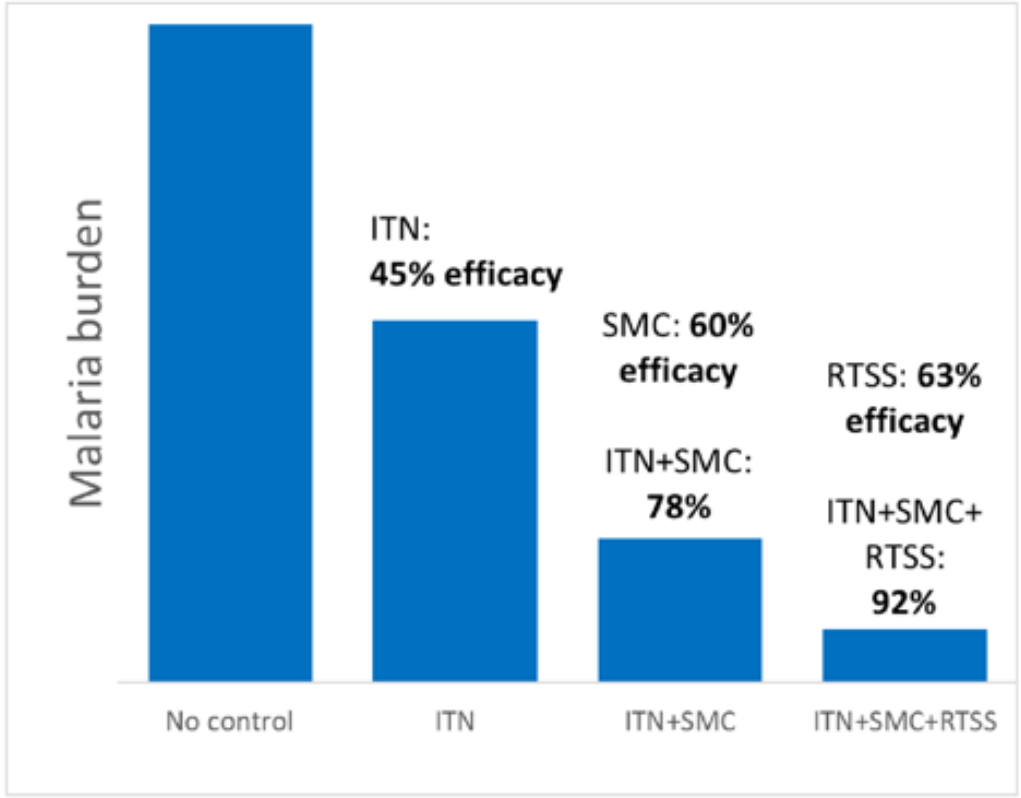
RTS,S/AS01 was piloted in 3 countries with high EPI coverage

EPI coverage is low in many of the areas with the highest malaria burden

	Vaccine uptake in children 12-23months				Children 24-35months	Children 6-59 months
	DTP3	MR1	All basic vaccinations	No vaccinations	MR2	Prevalence of malaria by RDT
North West zone Nigeria	29%	39%	20%	31%	9%	50%

Opportunities : highest impact when malaria interventions are strategically used together

Reduction in malaria burden when interventions are strategically used together



Insecticide Treated Net (ITN) efficacy: https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD000363.pub3/full

Seasonal Malaria Chemoprevention (SMC) efficacy: https://journals.plos.org/plosmedicine/article/authors?id=10.1371/journal.pmed.1003727

RTS,S/AS01 efficacy of seasonal vaccination **63% efficacious over 3 years** https://www.nejm.org/doi/full/10.1056/NEJMoa2026330

World Health Organization

Prof Paul Milligan, LSHTM

OPT-MVAC project

- **Overall Goal :** Improve modes of delivery, deployment, and uptake of vaccines through phase IV/Implementation research

- Primary objective : **to support countries technically and financially to optimize malaria vaccine delivery**
  - Series of mixed-method studies to inform vaccine delivery strategy
  - Coverage surveys (MVac and EPI)
  - Studies to understand the barriers to vaccine uptake (acceptability & feasibility)
  - Health economic evaluation
  - Vaccine safety monitoring
  - Case-control study (morbidity and mortality)

Acknowledgments