malaria consortium
disease control, better health

Improving SP-IPTi by increasing numbers of doses and testing alternative strategies to EPI delivery channels

Olusola Oresanya

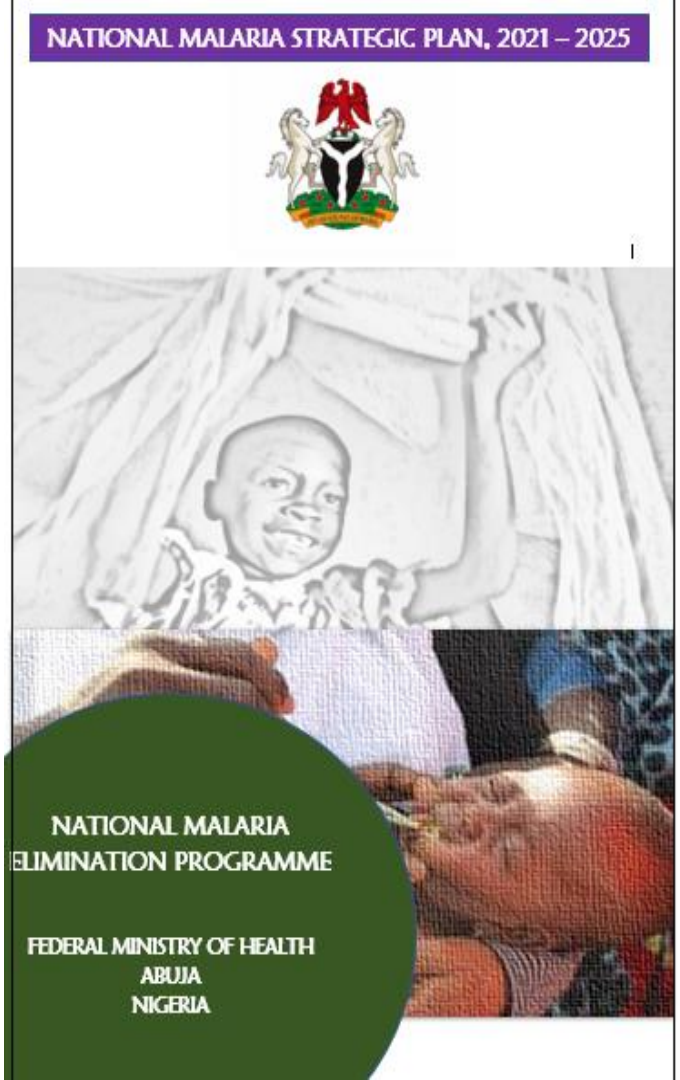
2021 Annual Meeting of the American Society of Tropical Medicine & Hygiene

Background

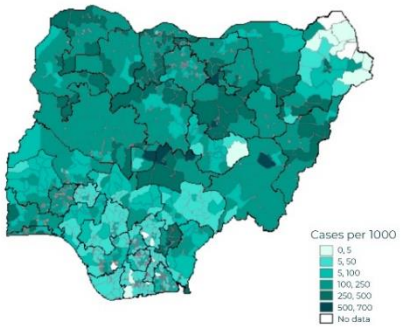
- Nigeria has made progress in malaria control in the last decade: decline in prevalence from 42 to 23 percent between 2010 and 2018.
- But, malaria remains a public health challenge: Nigeria contributes ~25 percent to the global burden, with children and pregnant women most affected.
- Between 2008 and 2013, reduction in infant mortality rate (IMR) was marginal (8.7 percent) compared to reduction in the under-five mortality rate (22.7 percent).
  - IMR declined only two percentage points (69 to 67 percent) from 2013 to 2018.
- This calls for more focused interventions regarding this age group.

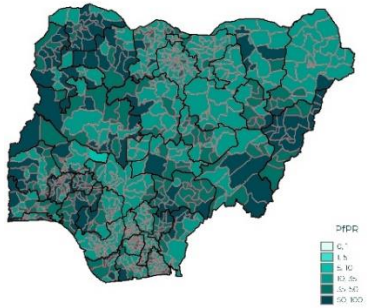
IPTi policy context for Nigeria

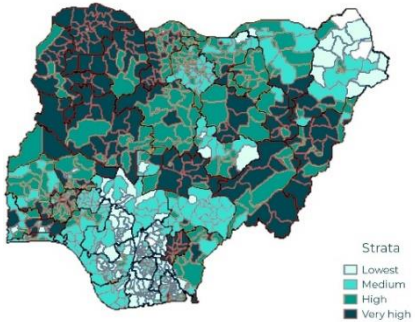
- Large population with diverse epidemiological contexts
- Intermittent preventive treatment in infants (IPTi) not yet a policy recommendation
  - IPTi currently recommended to be implemented in research mode
  - Country will benefit from evidence of IPTi's feasibility, acceptability and cost-effectiveness within Nigerian context to inform policy
- Malaria Consortium supporting National Malaria Elimination Programme (NMEP) to
  - gather information through four-year implementation research (funded by Bill & Melinda Gates Foundation)
  - scope for scale-up (support from GiveWell)

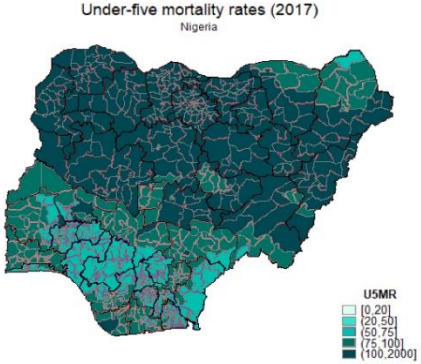


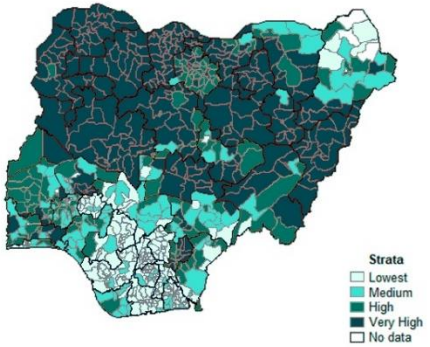
Epidemiological context and subnational tailoring

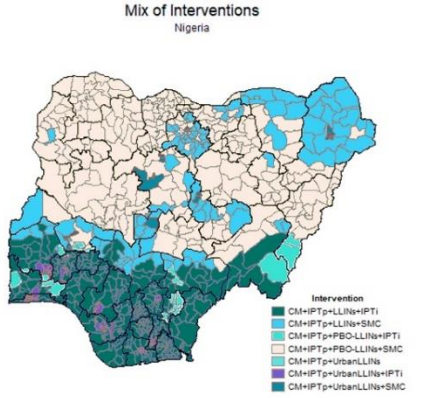








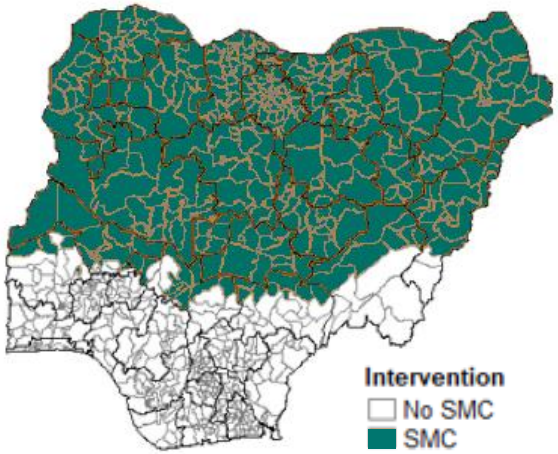




Seasonal malaria chemoprevention and IPTi eligibility maps

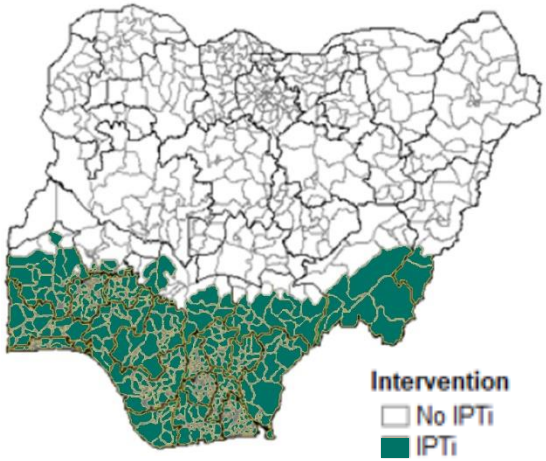
Pre-stratification

Nine states



Post-stratification

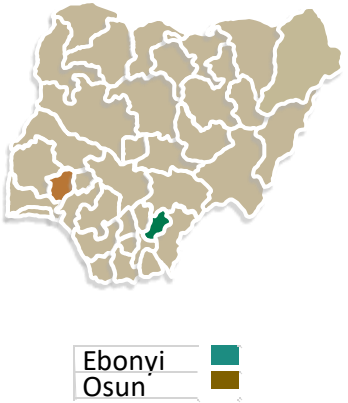
18 states



IPTi-eligible areas

Assessing operational feasibility and effectiveness of IPTi in Nigeria

- Location: Osun/Ebonyi.
- Duration: four years (2020–2024)
- Project aims
  - Provide health policy makers with quality evidence on effectiveness/operational feasibility of sulfadoxine-pyrimethamine (SP)-IPTi implementation
  - Catalyse decision-making in Nigeria on policy adoption of SP-IPTi.
- Implemented by Malaria Consortium in collaboration with Nigeria Institute of Medical Research, London School of Hygiene and Tropical Medicine and Northwestern University(NWU).



Objectives and research questions

Stakeholder engagement

Effectiveness

- Is there a measurable reduction in infant malaria after the introduction of SP-IPTi?

Operational feasibility

- Is the implementation of SP-IPTi as part of the Expanded Programme on Immunization (EPI) schedule feasible at scale in Nigeria?

Cost effectiveness

- What is the cost or cost effectiveness of scaling up SP-IPTi?

Collaboration

Optimisation of IPTi

- Does the inclusion of two additional touchpoints increase the clinical effectiveness of SP-IPTi?

Catalyse policy uptake

- To what extent is integration of IPTi into the EPI schedule judged as suitable, satisfying, or attractive to program implementers or recipients?

Study design

Type-2 hybrid effectiveness-implementation design (dual focus on effectiveness and implementation outcomes)

Evaluation of clinical effectiveness to be carried out using a cluster-randomised-trial design

Feasibility to be assessed using mixed-methods (qualitative and quantitative)

Three-arm study comparing:

- two arms of children receiving three/five doses of IPTi during immunisation (health facility/community level)
- control arm receiving only standard immunisation

Optimisation of IPTi

Each IPTi dose provides relatively short duration of protection: about 4–6 weeks (Cairns M *et al*).

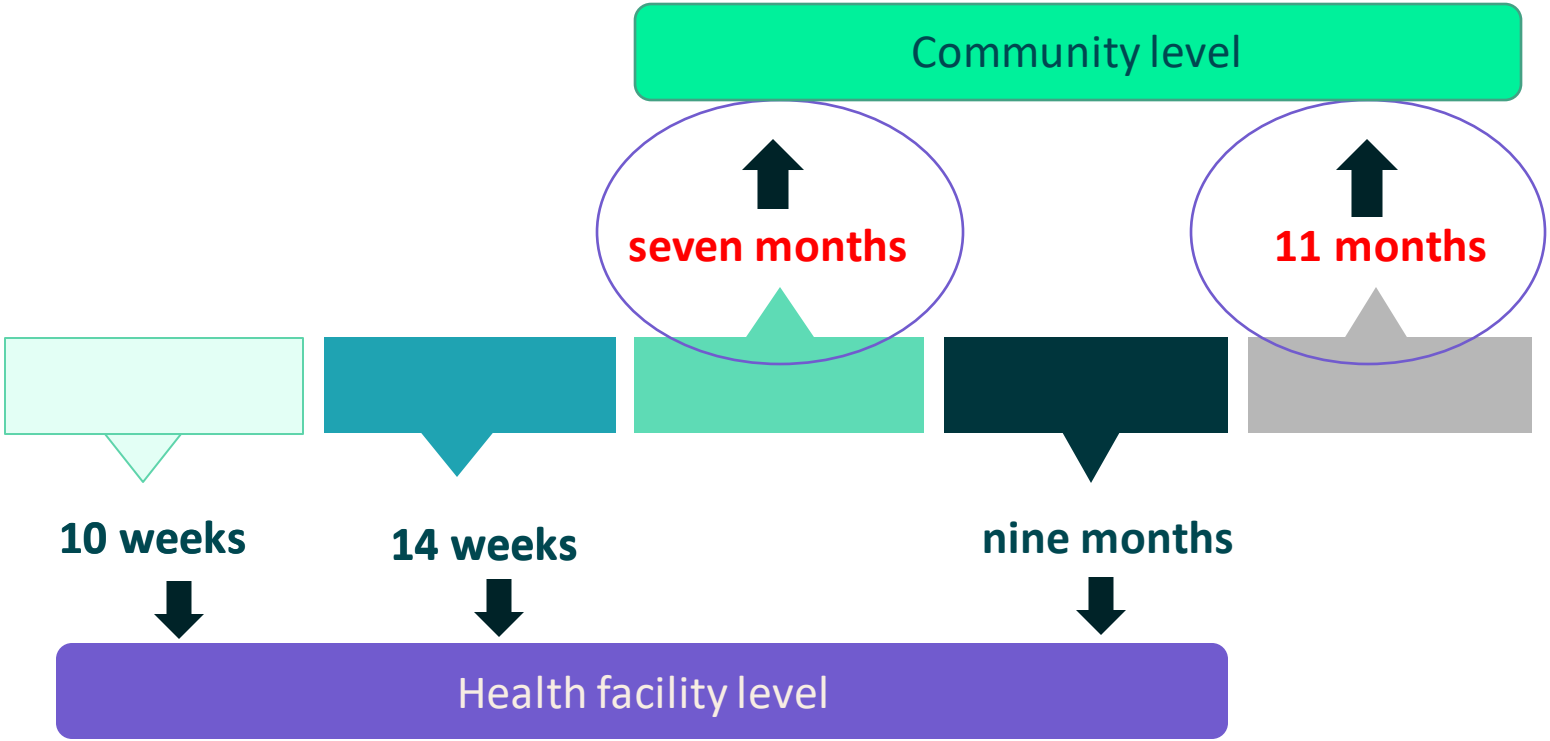
Current recommended doses during first year of life at 10 weeks, 14 weeks and nine months correspond to the routine vaccination schedules of EPI (WHO 2011).

Schedule based on feasibility of IPTi delivery via EPI rather than maximising potential benefits.

IPTi could have larger impact if mechanisms allowing greater flexibility established in administration window.

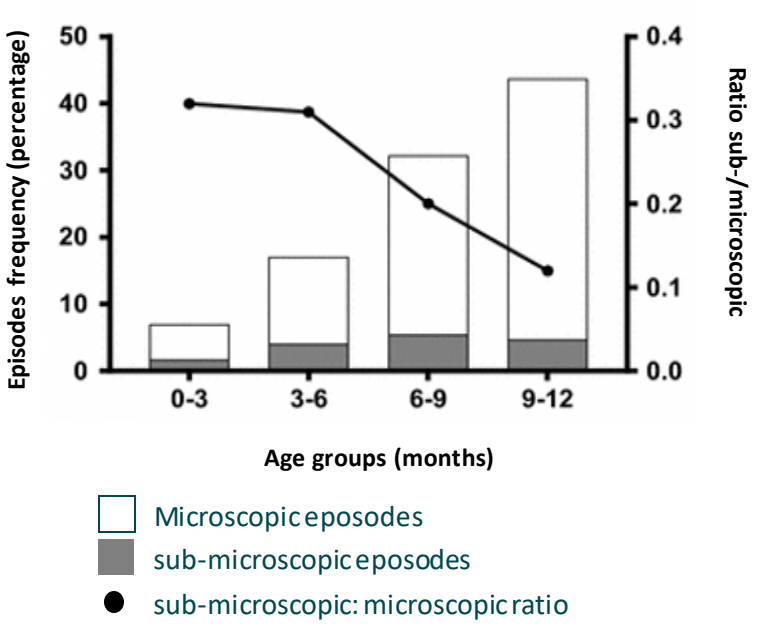
Greatest benefit of IPTi best achieved when delivered at peak malaria incidence in target population.

Additional touch points

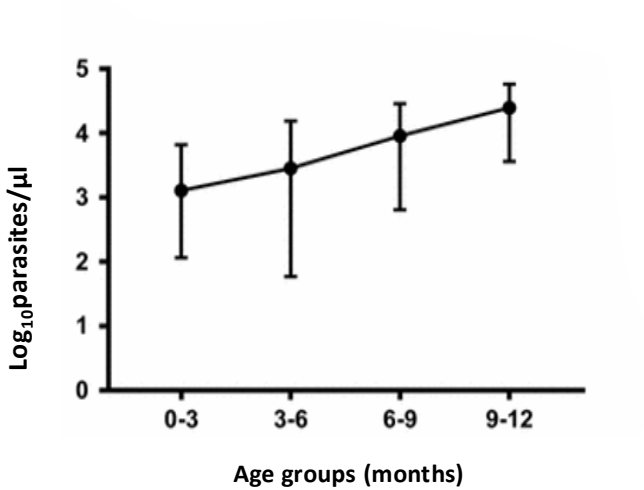


Rationale for two additional doses at seven and 11 months: Prospective study

Frequency of clinical episodes by age group stratified by microscopic and sub-microscopic malaria episodes



Median parasite density (qPCR) on a log-scale by age group with interquartile ranges



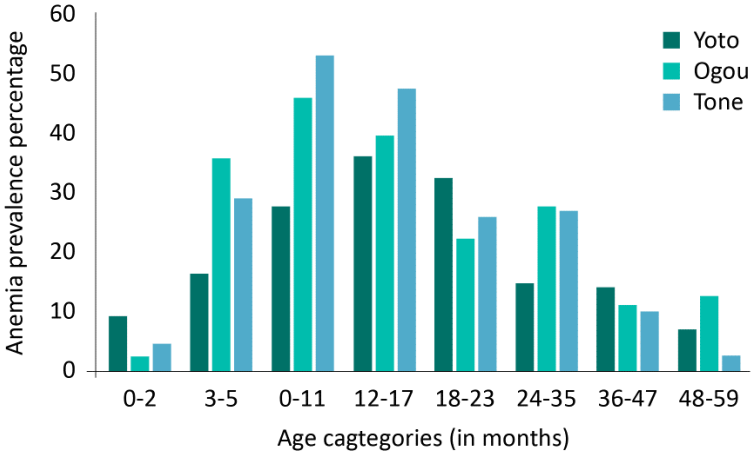
Prospective birth cohort study in Burkina Faso*

- Proportion of clinical episodes increased: **seven percent at 0–3 months to 43.8 percent at 9–12 months**
- Clinical episodes occurring in the 6–12month age group had **6.4 times higher parasite density** than those during the first six months of life ($p<0.001$).
- Nearly two-thirds (65.6 percent) of first malaria episodes occurred during the period 6–12 months of age compared to one-third (34.4 percent) during the period birth to six months.

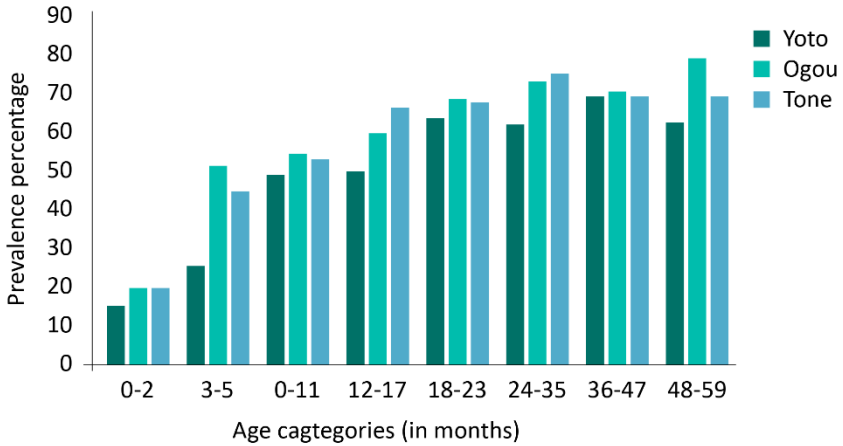
*Natama HM *et al*

Rationale for two additional doses at seven and 11 months: Cross-sectional survey

Mild and moderate-to-severe anaemia prevalence by age (Hb<8g/dl)



Prevalence of microscopically confirmed parasitemia by age group

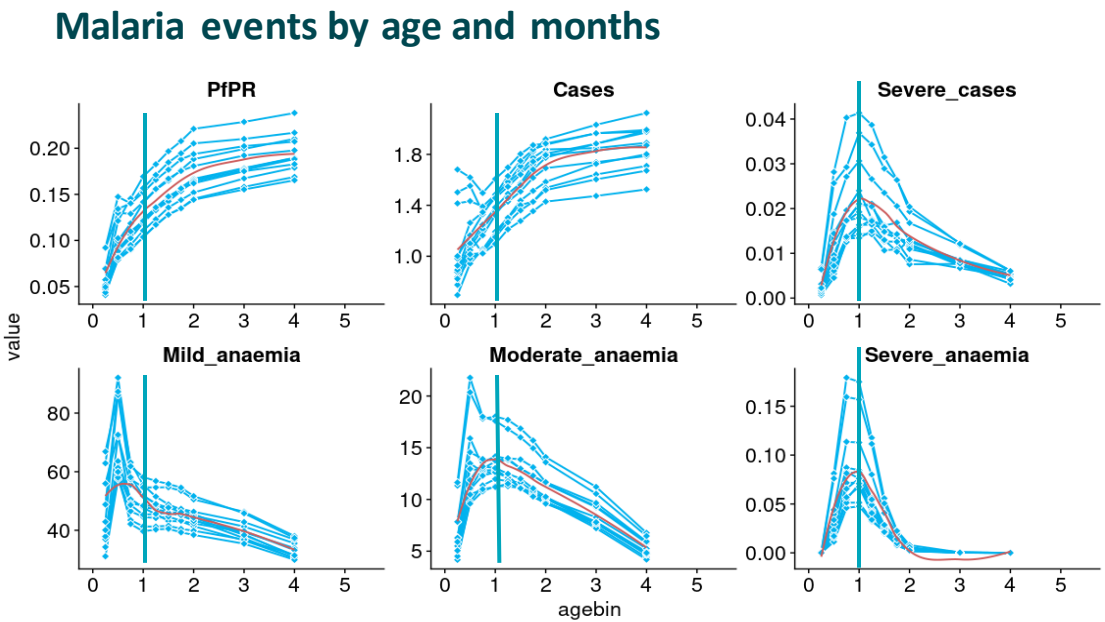


A cross-sectional survey across three districts in Togo assessed parasite prevalence and clinical malaria in a random sample of children at community level from the age of two months onwards[+]

- The prevalence of moderate-to-severe anaemia varied considerably with age, with **peak prevalence** between six and 17 months
- Parasitemia prevalence increased from 18.2 percent in children 0–2 months to 43.0 percent in children 3–5 months (previous slide)

[+]Eliades MJ *et al*

Rationale for two additional doses at seven and 11 months: Modelling



- Charts show predictions of malaria events by age and months as modeled by NWU
- Findings in line with empirical studies documenting relation between parasitemia, malaria incidence and severe anemia in infants
  - Events increase 0–12 months, with older infants more affected

Different lines indicate month predictions were averaged per scenario, local government area and year. The red line shows the smoothed curve across all months.
Agebins: 0.25, 0.50, 0.75 1.00, 1.25, 1.50 , 1.75, 2.00, 3.00, 4.00, and 5.00 years.

Source: Northwestern University, 2020

Conclusion

- IPTi is an efficacious intervention that could contribute to further reductions in malaria morbidity if scaled up.
- The greatest benefit of IPTi is best achieved when delivered at peak malaria incidence in the target population.
- Optimising doses within infancy can potentially maximise effectiveness of the intervention.
- Answering policy/decision makers' unanswered questions will remove bottlenecks and accelerate IPTi scale-up.

malaria consortium
disease control, better health

Acknowledgements

Northwestern University team: Manuela Runge, Ifeoma Doreen Ozodiegwu and Jaline Gerardin

Jane Achan (Malaria Consortium)

LONDON SCHOOL of HYGIENE &TROPICAL MEDICINE

NPHCDA
National Primary Health Care Development Agency

NIMR

NORTHWESTERN UNIVERSITY

malaria
consortium
disease control, better health

THANK YOU

www.malariaconsortium.org