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Modelling the incremental benefits of incorporating malaria screening strategies within antenatal care

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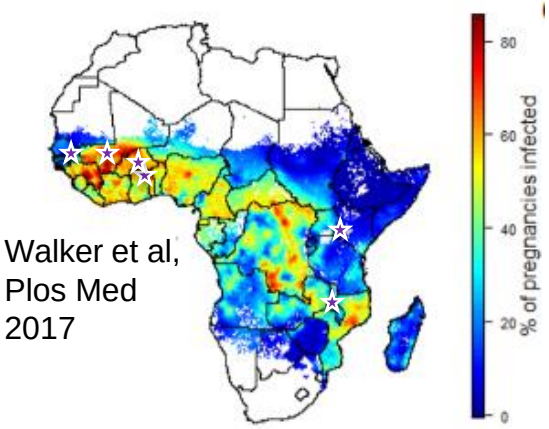
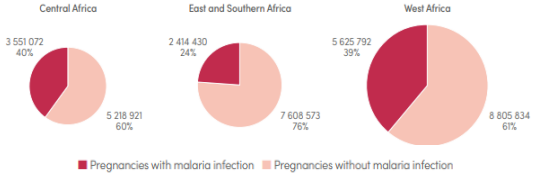
The risk of malaria during pregnancy remains very high

- Overall, across 33 highest transmission countries in Africa, risk ~ 1/3 in absence of prevention (e.g. IPTp)
- Of these most will be infected by the time they receive first IPTp dose
- Prevalence remains high throughout dry season in the Sahel (Berry et al, AJTHM, 2017)
- Both prevalence and density higher than outside of pregnancy – particularly in first-time mothers

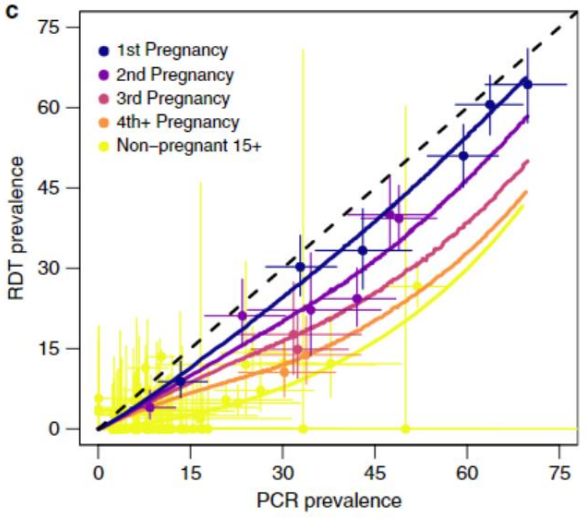


Walker et al, Plos Med 2017

World Malaria Report 2020



Prevalence at enrolment into trials of ISTp vs IPTp



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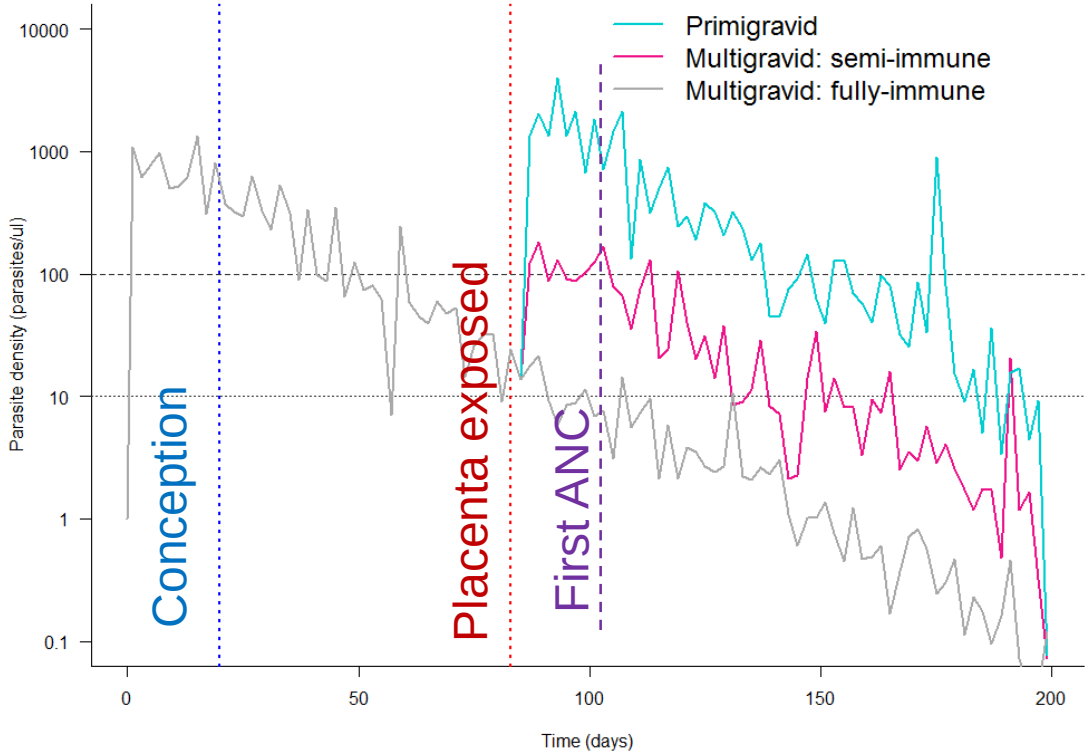
‘Pregnancy during Malaria’

- ‘Malaria during Pregnancy’ can make us think we need to concentrate on prophylaxis (as is the case with IPTi/SMC)
- Instead, for interventions delivered at ANC, priority is to get parasites out THEN keep them out…



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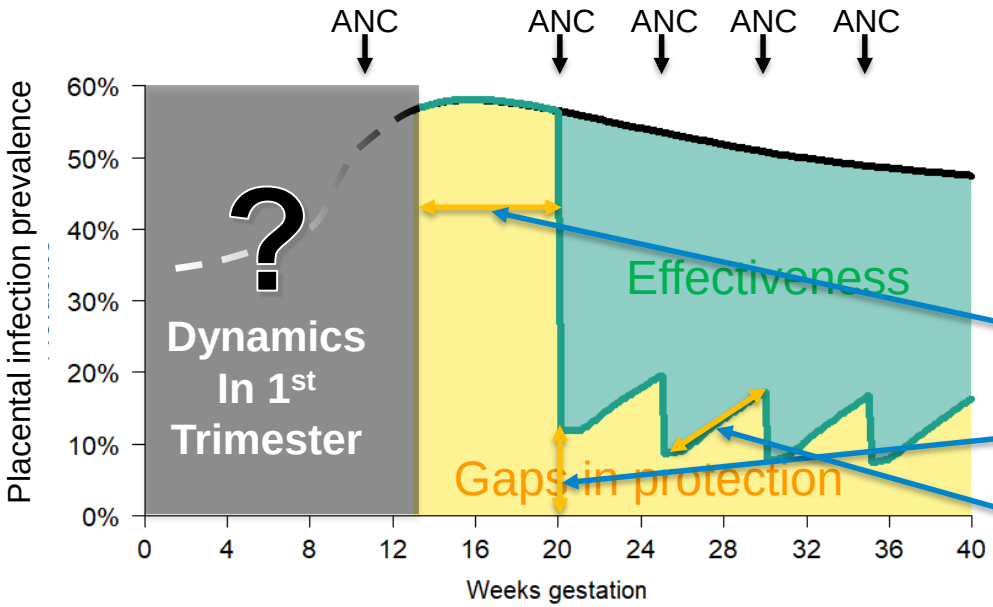
What does IPTp leave behind?



Think about two 'gaps' left by IPTp:

- **First trimester dynamics** including infection prevalent at conception
- **IPTp 'gaps'** from first ANC visit in 2nd trimester
  - Scheduling/acceptance etc.
  - Failure to clear infection at T2+ ANC visit
  - Failure to prevent reinfection between T2+ visit

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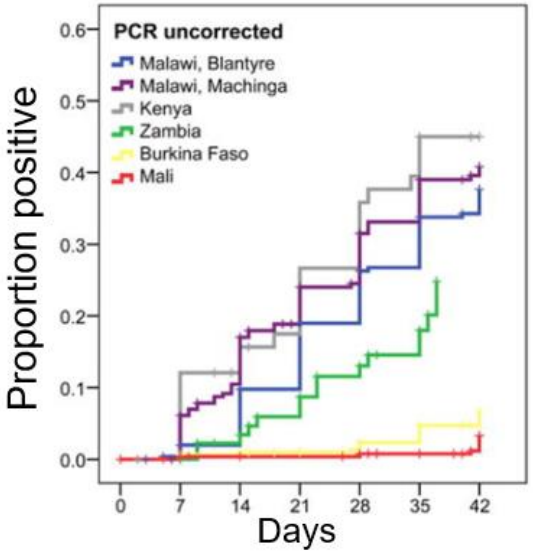
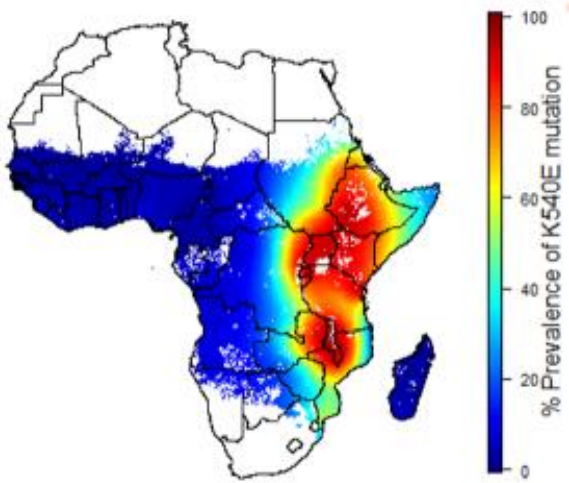
IPTp effectiveness modified by SP efficacy

- **Low quintuple areas (~ 50% of all pregnancies)**
  - SP clears infection reliably
  - Provides protection ~1 mth
- **Moderate to high quintuple (~45% of all pregnancies)**
  - Clears most infections (~80% even in high quintuple areas)
  - Much shorter prophylaxis
- **Sextuple mutation areas (~5% of all pregnancies)**
  - May provide very limited protection

SP efficacy (Desai et al, CID, 2016)



Quintuple mutation prevalence (Flegg et al, Mal J, 2013)



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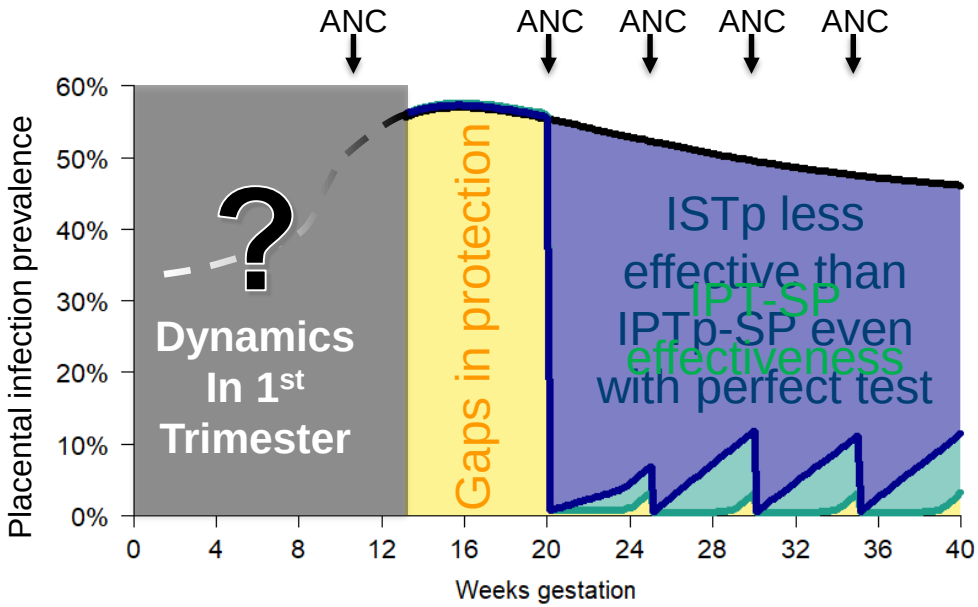
When resistance is low, SP is difficult to beat (when it is provided and taken)

- If resistance is low SP provides substantial (4-5 weeks) prophylaxis
- Compares favourably to AL (1-2 weeks) and similarly to DP (also 4-5 weeks) and only requires one dose
- Even with a perfect screening strategy, not providing SP to those who test negative means those women will lose prophylactic benefit
- Could provide treatment (ideally with long-lasting drug such as DP or SP) regardless of test result but then why screen?



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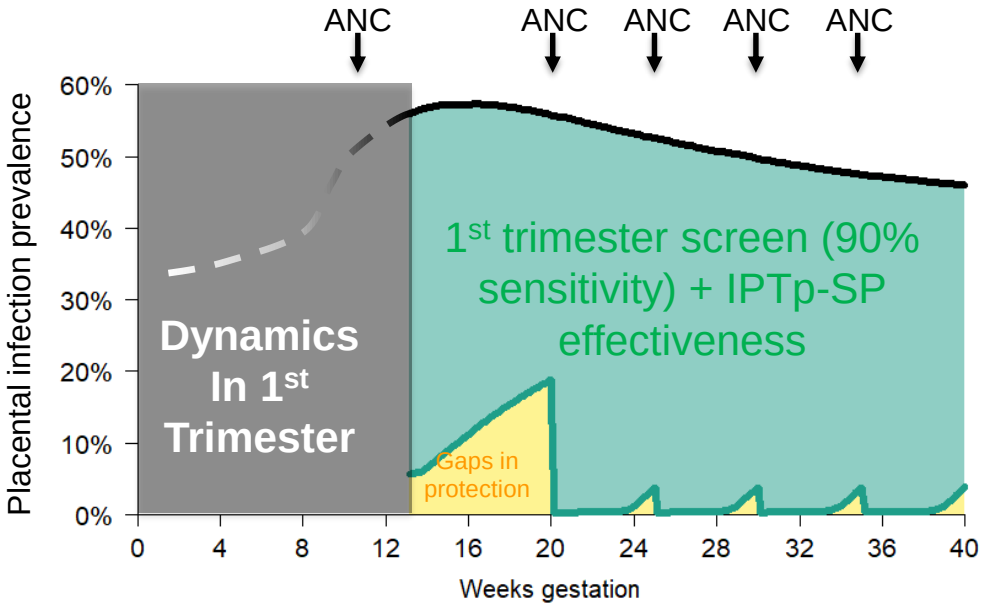
Why screen pregnant women?

- M&E and surveillance purposes?
- As a tool to promote either provider or recipient adherence of uptake of malaria prevention?
- A marker for heightened risk of anaemia/LBW/SGA and better integrated care?
- To improve first trimester protection?



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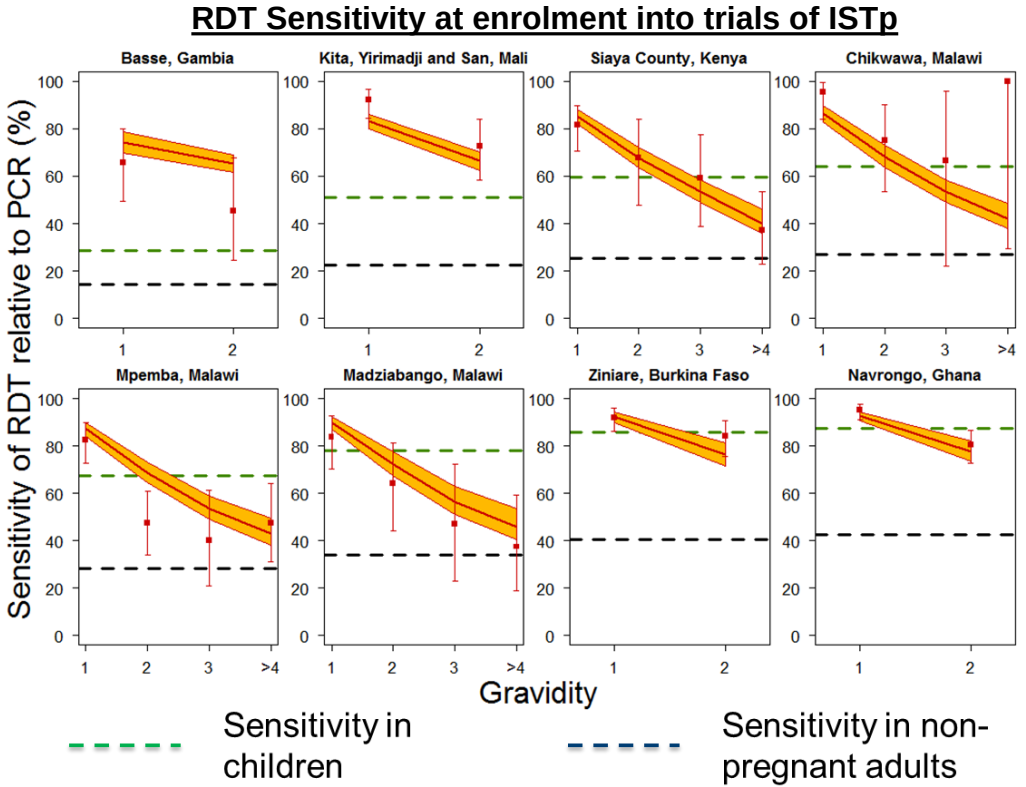
What do we detect at first IPTp visit?

- Sensitivity of RDTs at first IPTp visit is very high in Primigravidae
- Much higher than would be expected if not pregnant
- Declines progressively as women acquire immunity to placental parasites
- Declines substantially for subsequent screening



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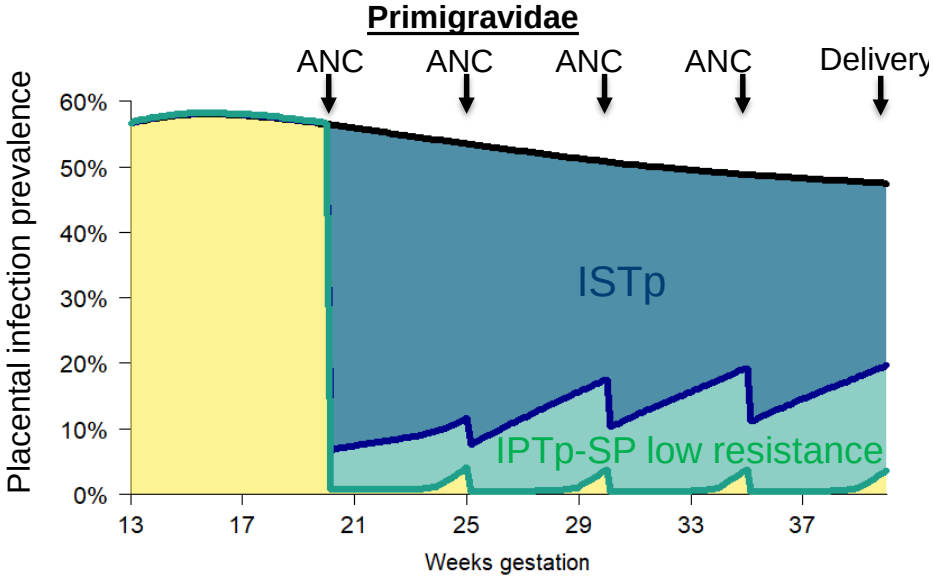
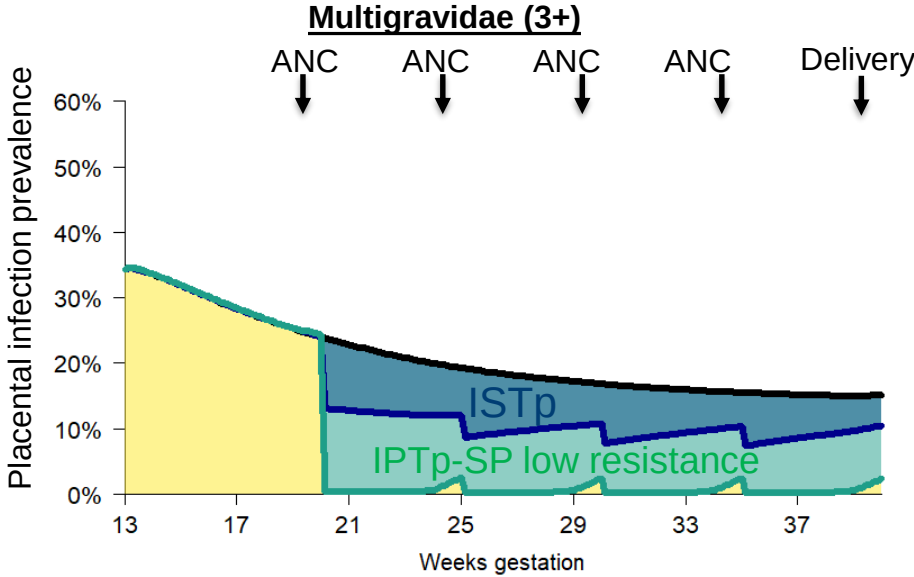
Effectiveness of ISTp using standard RDTs





Big impact relative to no intervention particularly in at risk primigravidae but not able to compete with IPTp in areas where SP remains highly effective…

….what about areas with quintuple mutation?

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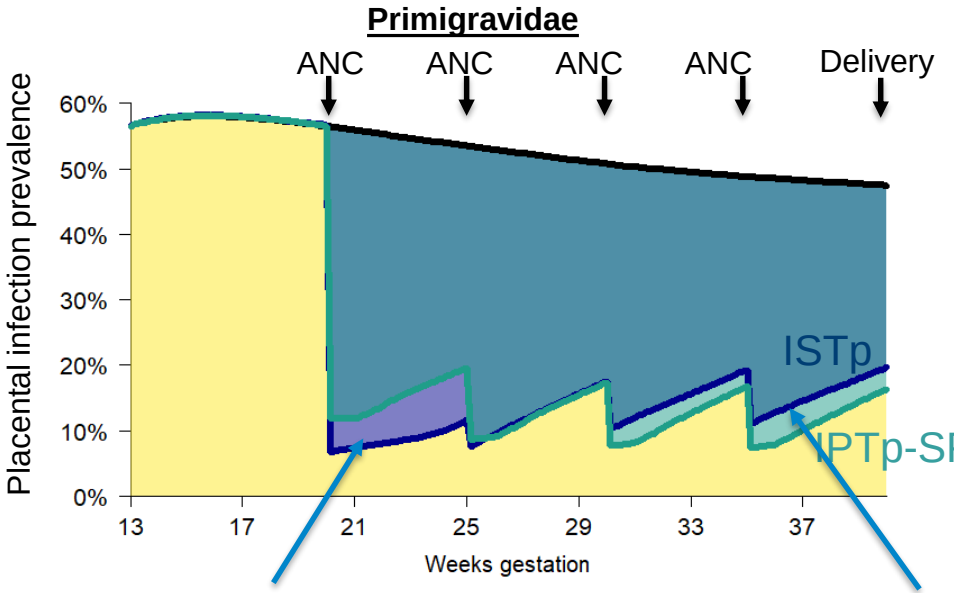
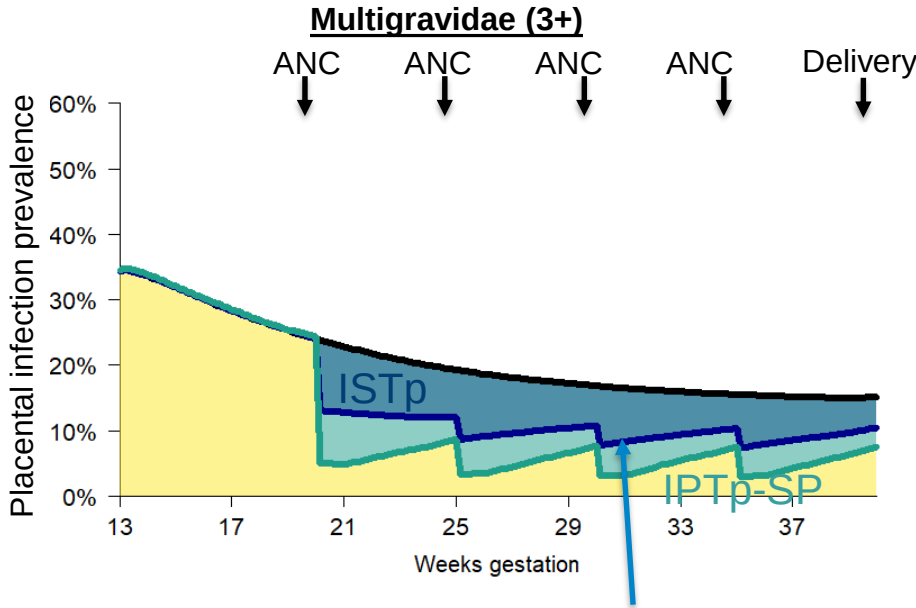
Comparison in areas of quintuple resistance





In PG, ISTp better at clearing early infection due to high sensitivity of RDT

…but provides less protection later in pregnancy as only those who test positive receive any prophylactic benefit

Reduced impact in MG due to lower RDT sensitivity

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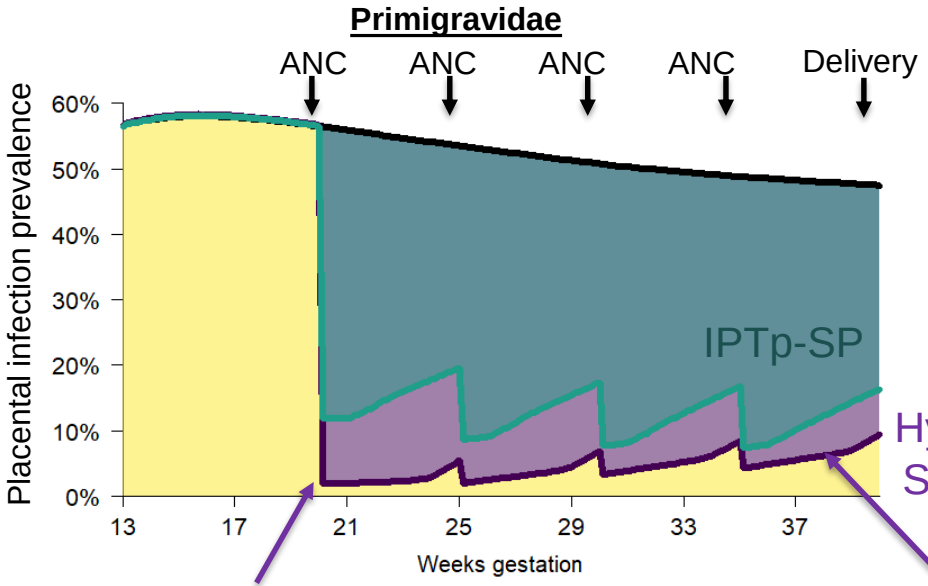
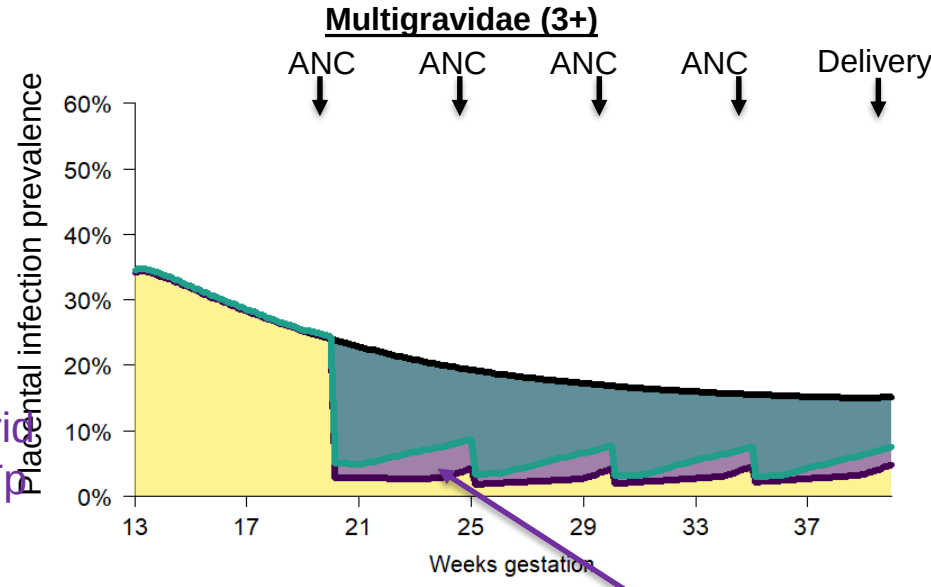
Hybrid strategies like SSTp can offset gaps left by b th IPTp and ISTp





Maintains good clearance of ISTp

... and level of protection of IPTp-SP in those who test negative

More limited improvement in MG

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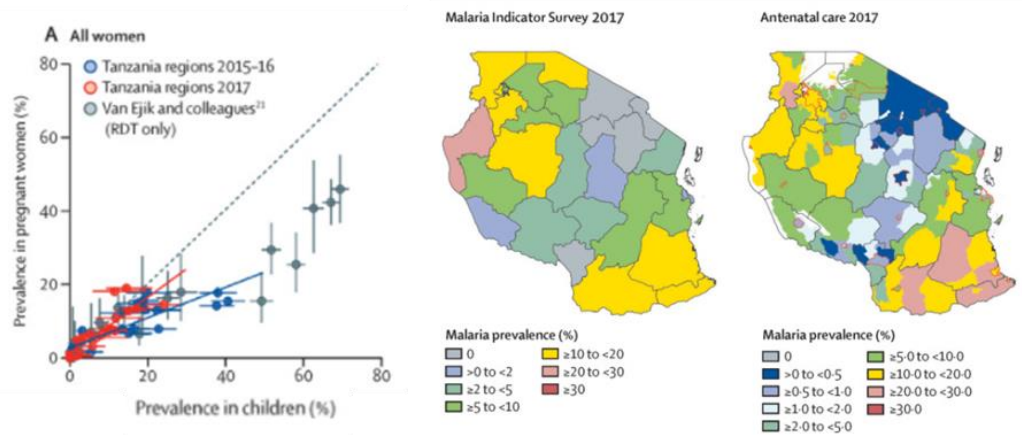
Conclusions

- Screening at ANC is not a replacement for IPTp which remains one of most cost-effective malaria prevention tools
- Big impact if can be used to clear infections in first trimester
- Hybrid approach (e.g. SST in Tanzania) can provide an effective ‘safety net’ for concerns about SP resistance



Kitojo et al, Lancet GH, 2019

- What are the true value/potential of the information for pregnant woman, healthcare professional and national programme?