



REPÚBLICA DE MOÇAMBIQUE MINISTÉRIO DA SAÚDE DIRECÇÃO NACIONAL DE SAÚDE PÚBLICA PROGRAMA NACIONAL DE CONTROLO DA MALÁRIA

Mozambique

Decision-making and trade-offs for deployment of new ITN types aligned to resistance data

Dr. Baltazar Candrinho AMP Partners Meeting - May 2023

Presentation outline

Our approach to fitting stratification/sub-national tailoring within our strategic planning processes

- Why are we conducting stratification for the new MSP?
- Principles of decision-making, and process used in 2019/20, and 2022/23

Methods and results from 2020

- Objectives and desired end products
- Methods being used to achieve end product and how they can complement each other

Updated methods for 2022/23

- Spatial analysis of burden, intervention-specific targeting, and cost-effectiveness optimization modeling
- Final cost-prioritized layering and decision-making for the new MSP and resource mobilization

Given resource constraints and heterogeneity of transmission intensity, interventions can be targeted to maximize impact

By smartly targeting our human and financial resources, a data-driven stratification can help focus our intervention efforts and maximize value-for-money

NMCPs must consider a number of factors when deciding which interventions to place and where to place them:





Spatial and temporal distribution of malaria burden and receptivity to transmission potential



Impact of different factors on **effectiveness** of interventions (e.g. seasonality, insecticide and drug resistance)



Operational feasibility of implementing interventions



Mozambique makes these strategic decisions through a data-driven but collaborative and inclusive process





How do we approach decision-making trade offs for LLINs?

Principle #1 – A dollar is a dollar is a dollar is a dollar!



We don't <u>only</u> consider LLINs when optimizing our budgets, we work to optimize across the full spectrum of interventions by:

- 1. Developing <u>one strategic plan</u> that all partners and donors work to support
- 2. <u>Prioritizing</u> that strategic plan in a way that maximizes cost-effectiveness, while implementing in a way that builds a sustainable and strong health system

How do we approach decision-making trade offs for LLINs?

Principle #2 – Our goal is to maximize the reduction in malaria with available resources



This may sound obvious or simple – however in practice it means:

- We avoid "universalist" or "one size fits all" approaches such "everyone must receive an LLIN"
- Rather we construct data analysis in a way that attempts to tell us what mix of interventions will obtain the greatest reduction in malaria
- If "universal coverage" is part of this, that's ok if not, that's ok too!

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- Methods used for analysis
- Results and real-life impact

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In 2020, the NMCP and its partners collaborated to conduct a stratification following the MTR to prioritize resource allocation

Step-wise decision making was conducted by combining:

Burden of disease

(joint prevalence-incidence model)



Analysis of key variables influencing each intervention's effectiveness

(see examples below for IRS and SMC)



Predicted modelled impact on transmission



Variable	Source	Description/Justification
IRS		
Burden	Incidence exceedance probabilities (Malaria Atlas Project)	IRS should be targeted in highest burden areas
Seasonality	20-year rainfall averages (CHIRPS)	Given residual efficacy of IRS, it will be more effective in areas with higher seasonality
Insecticide resistance	NMCP	Must be considered to guide insecticide selection, as well as if IRS continues to be considered a resistance management tool
Vector species distribution	NMCP	IRS has shown to be more effective against An. funestus in Mozambique
SMC		
Seasonality	20-year rainfall averages	According to WHO guidelines, SMC should be implemented in areas with highly seasonal transmission
Mortality	HMIS data	Given that SMC is intended to decrease mortality, it should be targeted in areas with relatively high mortality
Access to care/ treatment seeking	MAP friction surface	SMC should be implemented in areas where access to care and treatment seeking is poor



Operational considerations

(E.g. existing provincial implementation capacity, geographic adjacency)

For LLINs in particular, key data included burden of disease <u>and</u> insecticide resistance data



In 2019 every province in the country observed confirmed pyrethroid resistance in at least one species In 2019 seven sites measured

resistance in at least one species In 2019 seven sites measured resistance mechanism data, with 5/7 confirming a mono-oxygenase resistance mechanism



In immediate response to this data, through support of New Nets Project and GF, resources were re-allocated for targeted deployment of PBO and dual-AI ITNs

2019-20 LLIN distribution by type, with pyrethroid resistance detected



65% of the population will receive vector control that seeks to manage pyrethroid resistance Next-gen • 60 districts nets • 31% of pop. • 32 districts **PBO** nets •18% of pop. • 28 districts Combo nets •13% of pop. **Districts** with • 102 districts •65% of pop. IR mgmt. •15 districts IRS only •13% of pop. IRS + • 27 districts standard nets • 22% of pop. Standard nets • 59 districts • 59 districts No IR mgmt. • 35% of pop. only • 35% of pop.

In 2020 - In the absence of empirical data on next-gen ITN impact, future decisions were made using stratification analysis and mathematical modeling



STRATEGY RESULTS:

Exclusion of some areas from ITN distribution (urban and very low burden districts) resulted in **savings of \$26.3M** that allowed for scale up of PBO or dual-AI ITNs in all targeted areas

... modeling showed that this would still provide an 8-14% decreased in burden compared to the counterfactual of standard ITN universally across the country



... but what happened in real life?

Empirical data from the New Nets evaluation + routine data showed these **results** <u>did</u> **translate to reality**, however ITN durability is a continuing threat







Internal

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Updated methods for 2022/23 and lessons

- 2022/23 updated methodologies in response to 2020 experience
- Lessons learned



For the new 2023-2030 MSP a similar approach was proposed to 2020 – incorporating lessons about ITN durability and promising new local data on chemoprevention

Measure burden

Spatial analysis of malaria burden helps categorize operational units for burden of disease to ensure highest-burden areas have highest priority for interventions





Mathematical models can use rigorous methods, historical data, and assumptions on transmission to help answer questions such as "Where are interventions most effective?"; "What impact would different intervention packages have on malaria burden?"; or "Which package gives us optimal impact for money given fixed resources?"



Pr vs Base Scenario





Cost-effectiveness analysis

This analysis helps optimize interventions within a fixed envelope

Allocation of additional interventions optimizing the number of averted cases in the under 5s, compared to base scenario and considering a fixed budget

Operational feasibility adjustments

Additional adjustments are made to ensure implementation of intervention packages is feasible by considering timing of interventions, proximity of districts receiving interventions, and other operational factors The promise of chemoprevention (SMC + PMC) being impactful in the Mozambique context of high SP resistance meant that we had **more intervention** options – and thus **even more financial trade offs!** Given this, the use of **cost-effectiveness analysis** was used to support prioritization (example output)



PMC and SMC are mutually exclusive. Additional IRS is considered only in districts that do not receive IRS as part of the base scenario. No other constraints than budget are considered at the moment Increased budget from base scenario, incrementally by 20%

Internal

In 2022/23 - The results are a prioritized mix of all interventions designed to maximize impact at different cost levels



Emergencies

• LLIN supplemental distributions and/or IRS as indicated by conditions, and supplemental community case mgmt. and/or MDA where access to care has been compromised

3-year cost = USD 368 million 8-year cost = USD 1.068 billion 3-year cost = USD 433 million 8-year cost = USD 1.247 billion

Impact = 43% reduction in U5 prevalence

3-year cost = USD 572 million 8-year cost = USD 1.635 billion

Impact = 49% reduction in U5 prevalence

What have we learned?

- Advocacy for increased resources and financing for certain interventions is invaluable globally, but <u>locally we must lead with evidence</u> to maximize impact
 - With (a) an increasing suite of interventions available (e.g. chemoprevention and vaccine), and (b) flat or decreasing resources, we must use analytical approaches available to us to make rational decisions about resource allocation
- Managing the local politics of moving from a one-size-fits-all strategy is challenging but it can be done through persistence, strong evidence, and educating local leaders
- Strong analysis for a data-driven strategic planning process takes time and iteration:
 - It cannot be started 1, 2, or 3 months before it is needed for use. It must be started very early (6 months or 1 year preferably) to ensure it can be discussed and interpreted by decision makers, and iterated upon by analytical partners
 - 2. It must be **integrated within broader planning processes** at MOH, not done as a standalone academic exercise



