

Introduction to the economics of malaria intervention choices

Dr. Catherine Pitt
Professor of Health Economics

Session: Maximizing impact with scarce resources

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SMC Alliance & Alliance for Malaria Prevention Joint Annual Meeting

Kampala – Uganda

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Objectives of this session

In 20 minutes, I cannot teach a course on health economic evaluation!

By the end of this session, I hope you will:

1. Approach difficult malaria intervention choices with an economic mindset:
 1. Clearly frame the choices (options): objectives and scope of costs
 2. Assess options incrementally
2. Critically consider economic evidence
3. Resolve to commission and use high quality economic evaluations to inform decisions

What is (health) economics?

- Economics is the science of **CHOICE**
 - Resources are limited – by definition, everywhere
 - Our “wants” are unlimited – e.g. health for all
 - Choices can be implicit (maintain the status quo) or explicit
 - Choices can be made by individuals or institutions
- Economists are concerned with . . .
 - **Efficiency** – maximising outcomes given scarce resources
 - **Equity** – fairness in the distribution of costs and benefits
 - **Preferences** – respecting individual and institutional values in decision-making
- **Not only** about money!



Asking economic questions

How can we cut our GC8 budget?

Perhaps, but some better questions would be:

How can we minimise the harms of reduced malaria investments?

How can we maximise health and equity with the resources available?

If the resource envelope changes, what interventions should we add, subtract, or change?

How can we advocate for more resources for malaria by demonstrating the efficiency and value of investments in malaria interventions (vs. other investments)?

What is health economic evaluation?

- A systematic comparison of two or more potential **future** courses of action in terms of their expected **costs** and **health effects** – informed by the best available evidence
- A highly developed, codified analytical framework
 - CHEERS reporting checklist (akin to CONSORT)
 - IDSI reference case – methodological specifications
- Widely used:
 - e.g. in Ethiopia and Malawi to support basic health benefits package design
 - In evaluating malaria interventions – but scope for wider use in decision-making

Effect measures determine type of econ evaluation

Incremental cost per . . .

. . . SMC or PMC course delivered, person-year of protection

- Process outcome – no indication of health impact

. . . malaria case averted, reduction in infection prevalence

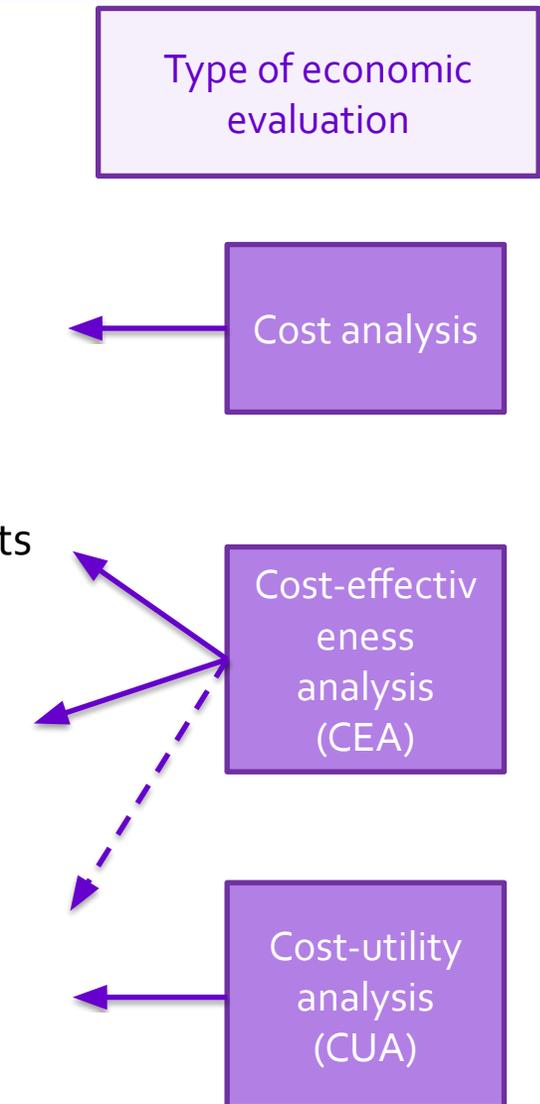
- Intermediate health outcome – disease-specific, not comparable with investments for other diseases

. . . death averted, life-year gained

- Final health outcome – but only addresses mortality

. . . disability-adjusted life-year (DALY) averted, QALY gained

- Combines morbidity and mortality into a single metric
- **Comparable across health conditions**



Key questions
to frame an
economic
evaluation

- 
- 1. Objectives**
 - 2. Options**
 - 3. Costs**

What are the objectives of our malaria intervention package?

Buying products?

Delivering products?

Malaria elimination?

Reducing malaria cases?

Reducing malaria infections?

Reducing malaria deaths?

Reducing malaria DALYs (a measure of cases, disability, and deaths)?

- Objectives indicate the appropriate measure of effect
- Economic evaluation guidelines call for DALYs or QALYs as standard

What are the options?

Define the **interventions – and packages of interventions**

- Who, what, where, when, why, for how long, how often, etc
- A product – a tablet, a bed net – is not an intervention!

Define the **geographical units** for intervention targeting

- What granularity is feasible and acceptable for targeting? Regions, districts, villages?
- Consider diseconomies and data demands in fine-grade targeting

□ An economic evaluation compares the costs and effects of options *incrementally* with each other

Whose costs and which costs count?

Perspective *Public provider Societal?
(donor+domestic gov't)? Local governments?
Donors? Health insurance?
Domestic governments? Households?

Type of cost

Financial costs = money □ important for budgeting

*Economic costs = value of resources □ important for guiding choices

Scope of cost

Preventive intervention only?

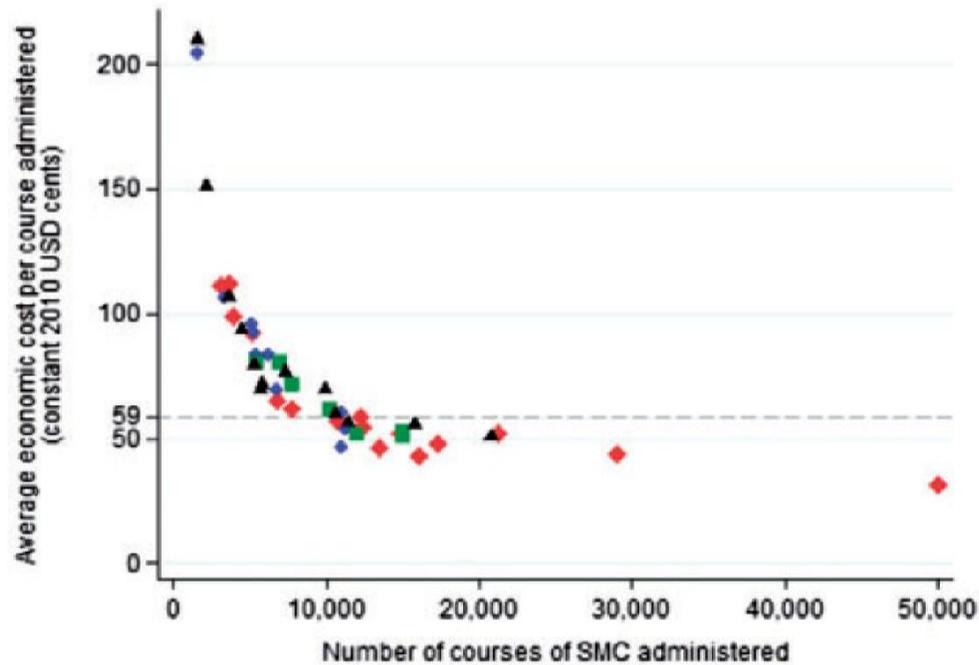
*Intervention + downstream costs of case management

□ Need to consider all costs that may be different between interventions

What are the signs of a good economic evaluation?

- Clarity about the intervention
- Transparency and appropriateness of scope of costs and effects
- Exploration of variation (heterogeneity) in costs and effects – ideally including cost functions
- Assessment of uncertainty of conclusions
- Adherence to reference case and reporting guidelines

Intervention cost analyses can generate useful insights for planning and innovation to increase efficiency – e.g. economies of scale



Health Policy and Planning, 32, 2017, 1256–1266
 doi: 10.1093/heapol/czx084
 Advance Access Publication Date: 24 July 2017
 Original Article



Large-scale delivery of seasonal malaria chemoprevention to children under 10 in Senegal: an economic analysis

Catherine Pitt,^{1,*} Mouhamed Ndiaye,² Lesong Conteh,³ Ousmane Sy,² El Hadj Ba,^{4,5} Badara Cissé,^{2,5} Jules F Gomis⁴, Oumar Gaye,² Jean-Louis Ndiaye² and Paul J Milligan⁵

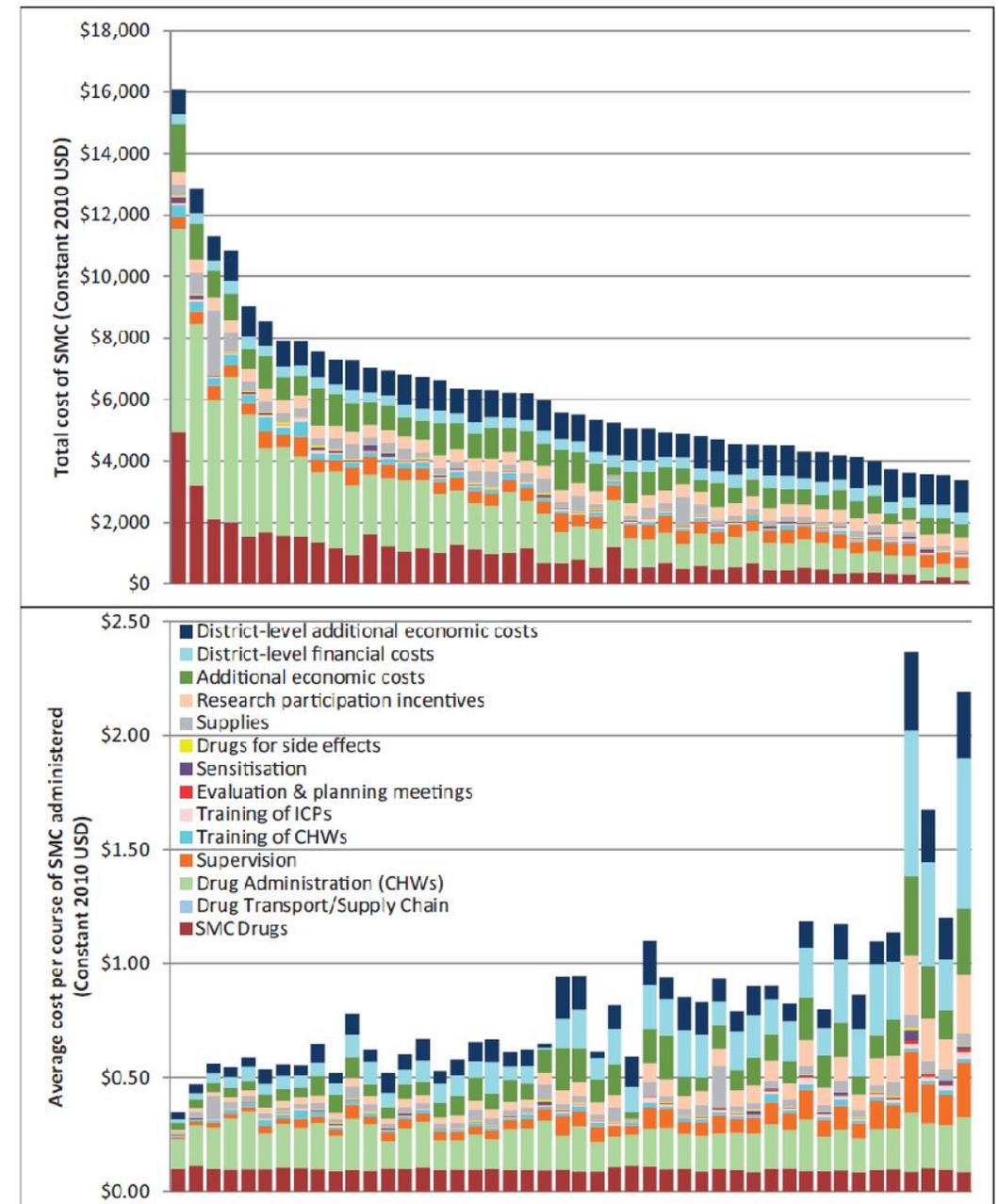


Figure 1. Total and average costs by health post with cost drivers. Health posts are ordered (left to right) in both graphs from largest to smallest total economic costs, including research participation incentives. District-level costs have been divided evenly across the health posts within each district. As total costs decrease, the average cost per course administered tends to increase, although there is some variation in this trend.

Different cost perspectives may produce different conclusions

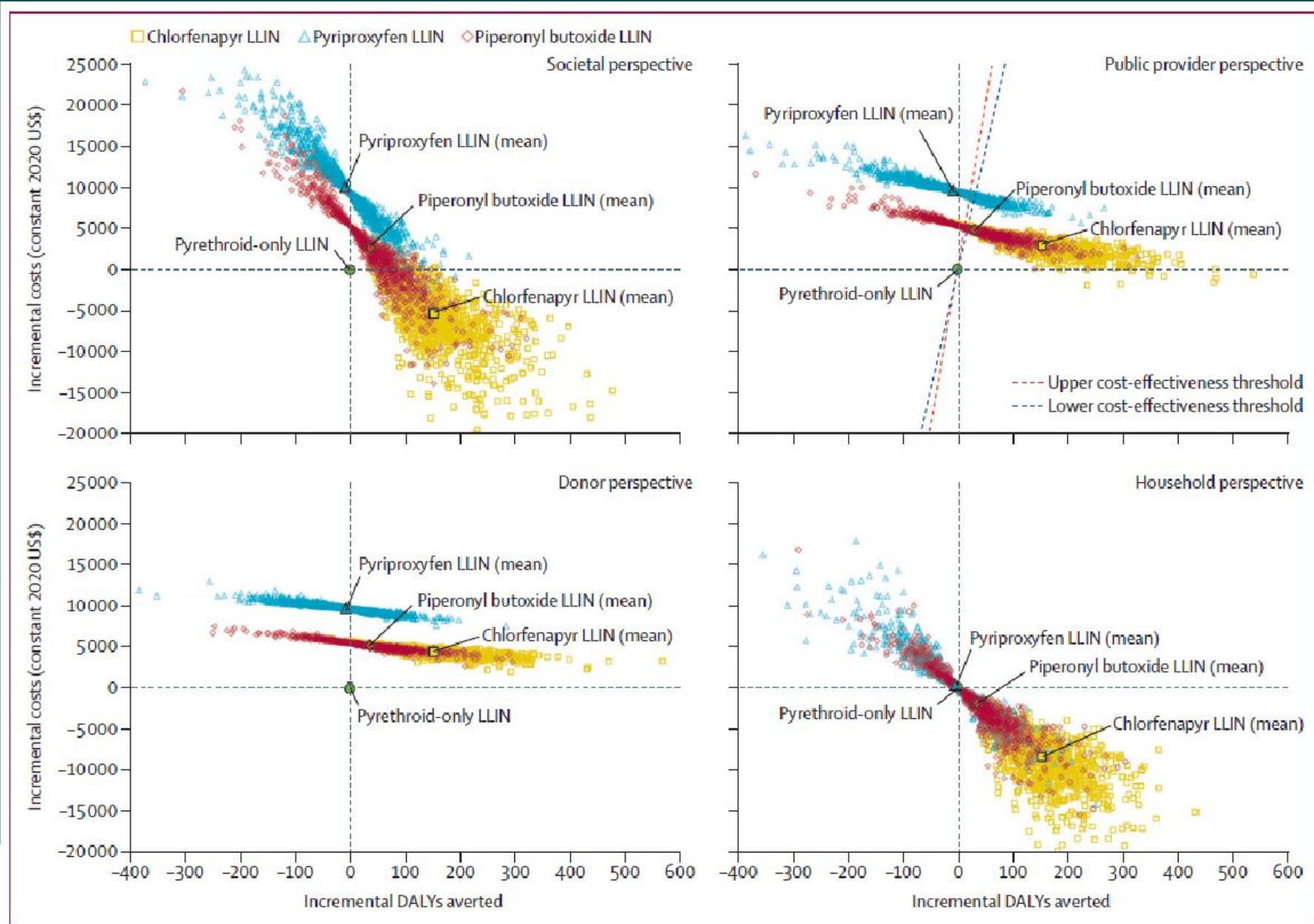


Figure 2: Cost-effectiveness of dual-active-ingredient LLINs relative to pyrethroid-only LLINs over a 2-year period
 Cost-effectiveness planes are shown separately for societal, donor, public provider, and household perspectives. The public provider perspective combines costs borne by donors with costs borne by the public health service in providing LLINs and malaria diagnoses and treatments. Each data point reflects a single iteration in the Monte Carlo simulation; 1000 iterations were conducted. LLIN=long-lasting insecticidal net. DALYs=disability-adjusted life-years.

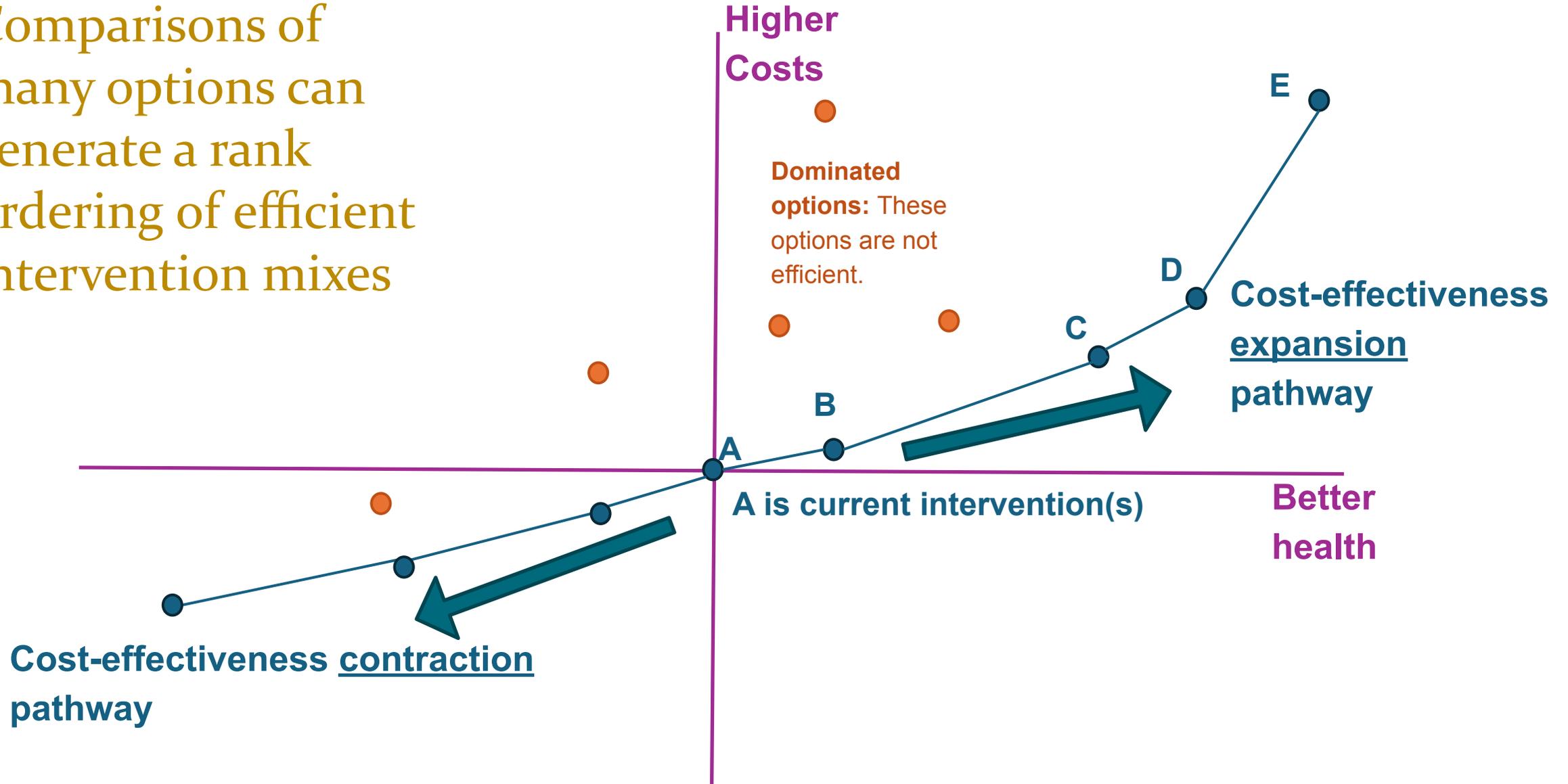
Effectiveness and cost-effectiveness against malaria of three types of dual-active-ingredient long-lasting insecticidal nets (LLINs) compared with pyrethroid-only LLINs in Tanzania: a four-arm, cluster-randomised trial

Jacklin F Masha*, Manisha A Kulkarni*, Eliud Lukole, Nancy S Matowo, Catherine Pitt, Louisa A Messenger, Elizabeth Mallya, Mohamed Jumana, Tatu Aziz, Robert Kaaya, Boniface A Shirima, Gladness Isaya, Monica Taljaard, Jacklin Martin, Ramadhan Hashim, Charles Thickstun, Alphaxard Manjurano, Immo Kleinschmidt, Franklin W Masha, Mark Rowland, Natacha Protopotoff

Lancet 2022; 399: 1227-41

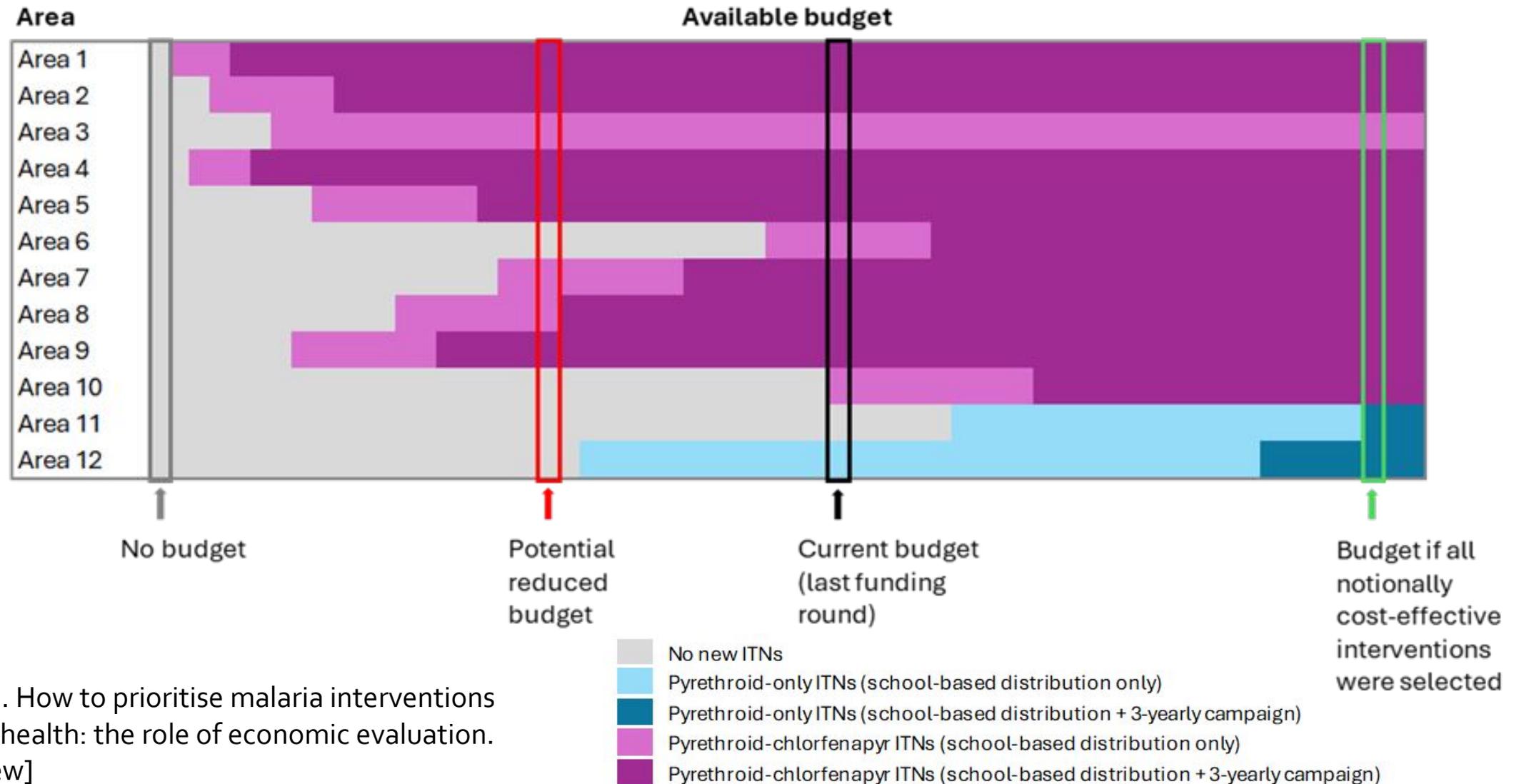
The cost-effectiveness plane

Comparisons of many options can generate a rank ordering of efficient intervention mixes



Expansion pathways for each geography can support sub-national tailoring (SNT)

Figure 2. Optimal intervention sets that maximise health benefits at different budgets: a stylised example of ITN distribution



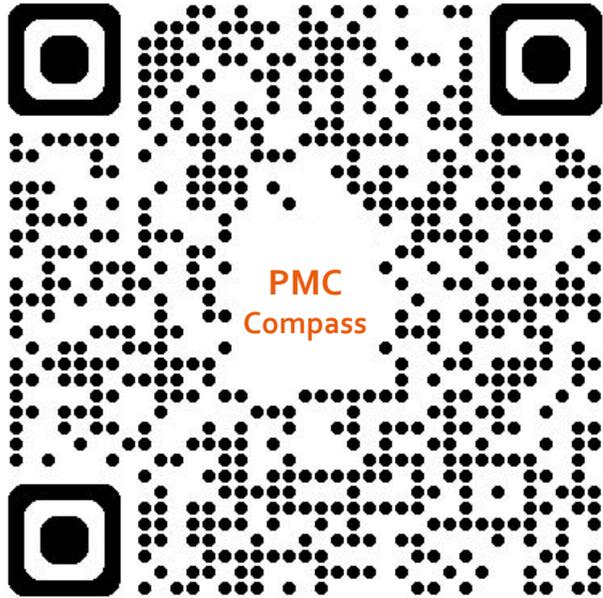
Select PMC-eligible country

Cameroon

Model whole country or a specific admin-1 unit?

Whole country

Generate results



Cost-effectiveness analyses
can be used to create
a rank ordering of options
for intervention mixes
across geographies

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Download outputs

Ranked prioritisation of PMC delivery options by admin-1 unit

This table shows the ranked prioritisation of PMC options. The first option is the most cost-effective choice. For a given investment, the first option will avert the most deaths. The second option is less efficient than the first option. We compare different delivery schedules to the currently implemented package of interventions in the selected country, and to each other. We then rank the interventions in order in which they should be added to existing malaria control activities in the selected country. This ranking is based on its cost-effectiveness which incorporates health impact and implementation costs. All costs are presented in 2024 USD.

ICERs include economic costs of implementation, with start-up costs annualised at 3% over 7 years. The costs of co-designing a PMC implementation approach specific to country context has not been included.

Interpreting ICERs: If implementation in the first region in a country is shown as not cost-effective, but other regions in the same country are shown as cost-effective lower in the ranking, then it would not be cost effective to implement only in the first region in the country, but it would be cost-effective to implement in the first and second (and potentially more regions) simultaneously.

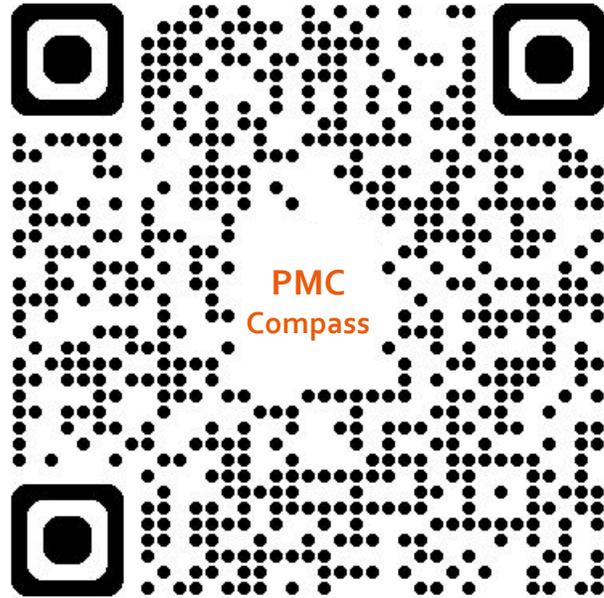
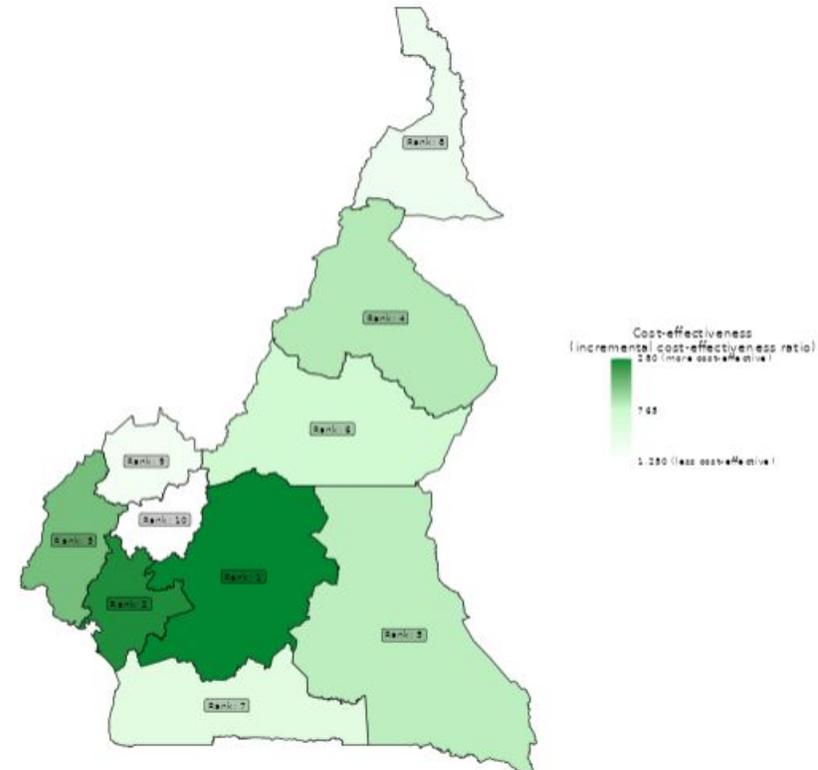


Table: ranked prioritisation of PMC delivery options

Map: cost-effectiveness by admin-1 unit



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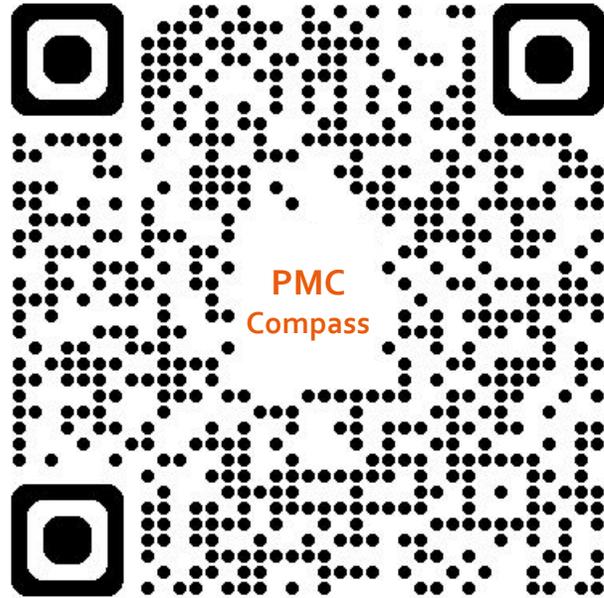
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PMC
Compass

Table: ranked prioritisation of PMC delivery options

[Map: cost-effectiveness by admin-1 unit](#)

Search:

Country	Region (admin-1)	PMC delivery strategy (vs. comparator)	Additional clinical malaria cases averted	Additional hospitalisations averted	Additional deaths averted	Additional DALYs averted	Financial (budget) cost of SP+consumables	Cumulative financial (budget) cost of SP+consumables	Additional economic cost savings to public providers from reduced treatment	Cumulative economic cost savings to public providers from reduced treatment	Ad co impl ant
Cameroon	Centre	PMC co-delivery with EPI only vs No PMC	23648	1496	322	1727	132598	132598	-168508	-168508	
Cameroon	Littoral	PMC co-delivery with EPI only vs No PMC	10213	751	162	783	101229	233827	-78601	-247109	
Cameroon	Sud_Ouest	PMC co-delivery with EPI only vs No PMC	7135	432	93	514	51446	285273	-49762	-296871	
Cameroon	Nord	PMC co-delivery with	4626	295	62	320	51001	227004	22120	220001	

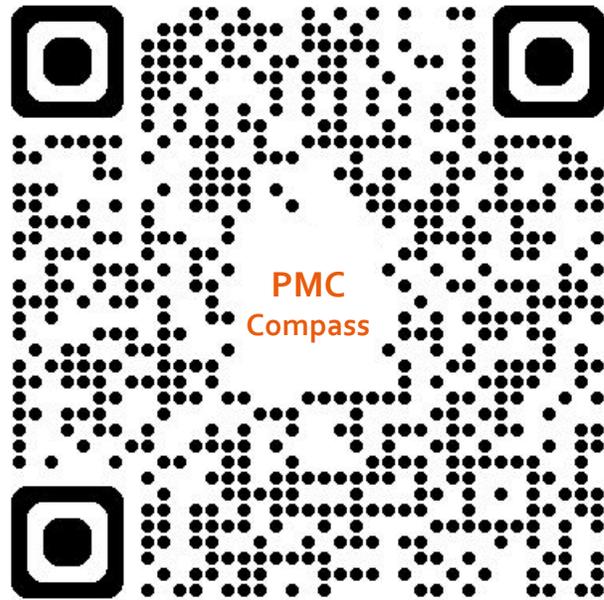
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Learn more about PMC Compass

Plus Project Results
Interactive discussions + dinner
7pm Wednesday
Speke Ballroom

PMC Innovations panel
9am Friday
Victoria Ballroom



Objectives of this session (recap)

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A few final words . . .

- Economic thinking can help decision-makers maximise achievement of their objectives with the resources available to them
- NMPs have access to donor, domestic government, household, and other resources - all should factor into strategic planning and advocacy
- Chemoprevention and vector control can save lives, reduce resource use for case management, and increase productivity – important to consider all these health and economic gains in choosing interventions and advocating for investment
- Greater donor flexibility could allow scarce resources to be used more efficiently – allowing for innovation and adaptation in meeting programme objectives – and to support countries in pursuing their objectives.

Webale nnyo
Merci
Thank you
Obrigada

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