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Is perennial malaria chemoprevention cost-effective? Evidence from integrated delivery with routine immunisation in Nigeria

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Contents

- Background
- Method
- Results
- Conclusion

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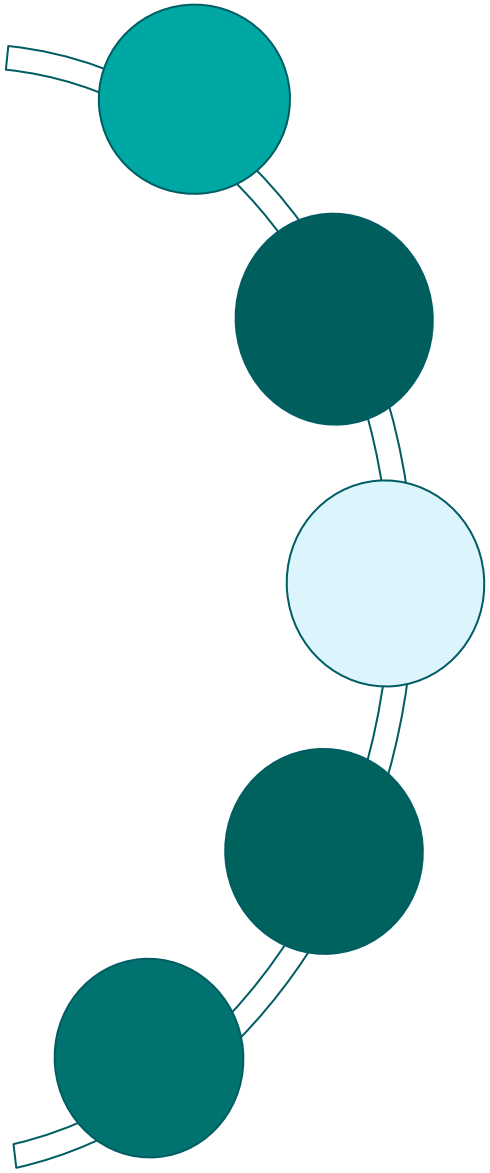
Background

Background



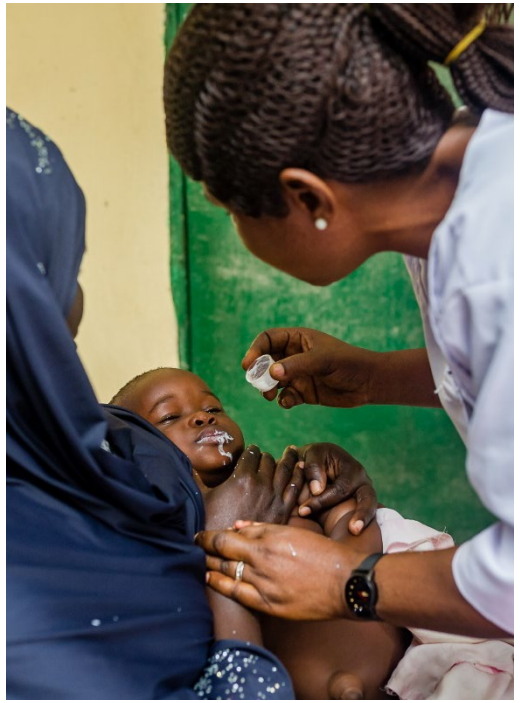
- Perennial malaria chemoprevention formerly known as intermittent preventive treatment in infants (IPTi) is a safe and effective intervention to reduce rates of malaria in young children.[1]

- Determining PMC delivery costs and cost-effectiveness in Nigeria, where delivery is integrated with routine immunisation, is important to inform PMC policy adoption and scale-up.

1. Manzi F, Hutton G, Schellenberg J, et al. From strategy development to routine implementation: The cost of intermittent preventive treatment in infants for malaria control. BMC Health Services Research, 2008; 8:165. doi:10.1186/1472-6963-8-165

Primary cost-effectiveness analysis questions

- Is scaling up PMC through Nigeria's routine immunisation cost-effective compared with existing malaria prevention strategies?
- Does it provide good value for money to inform national malaria policy adoption and scale-up?



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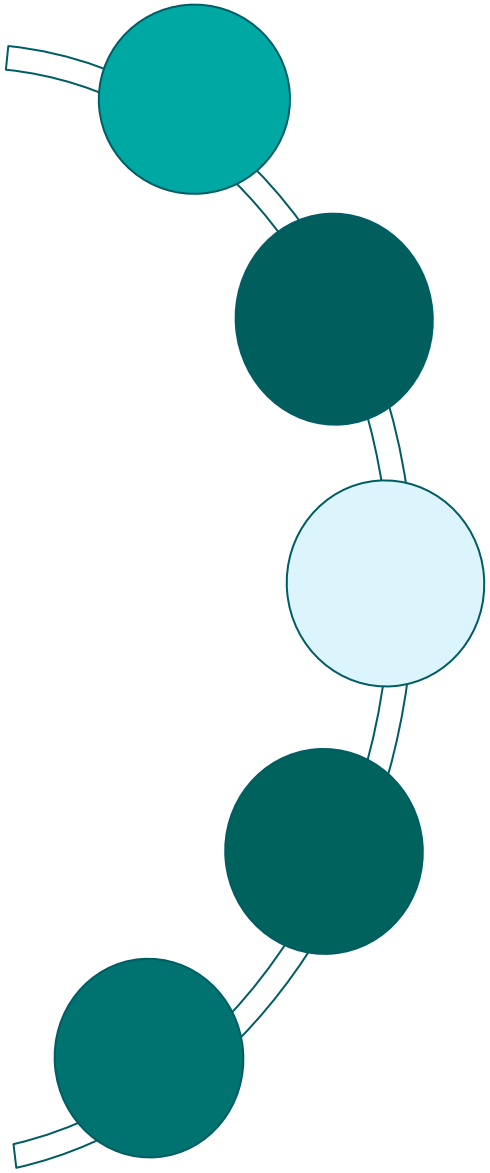
Methodology

Evaluation design



A type-2 hybrid implementation-effectiveness evaluation was used.

Effectiveness was estimated using programme-embedded analytics, including routine surveillance of confirmed clinical malaria cases, a case-control analysis of 28-day post-dose protective effectiveness and a cross-sectional household malariometric survey.

Implementation costs were quantified from financial records, time-motion observation and qualitative interviews.

A model-based incidence framework linked costs and effects to produce incremental cost-effectiveness ratios (ICERs).

Analytic stance

- For the evaluation, we quantified:
  - the cost of implementing PMC
  - health outcomes, including cases, deaths and disability adjusted life years (DALYs) averted
  - value for money, expressed as ICERs.
- The comparator was the status quo (no PMC).
- Cost-effectiveness was assessed from a health system/programme perspective.

Cost analysis: Perspective, horizon and currency

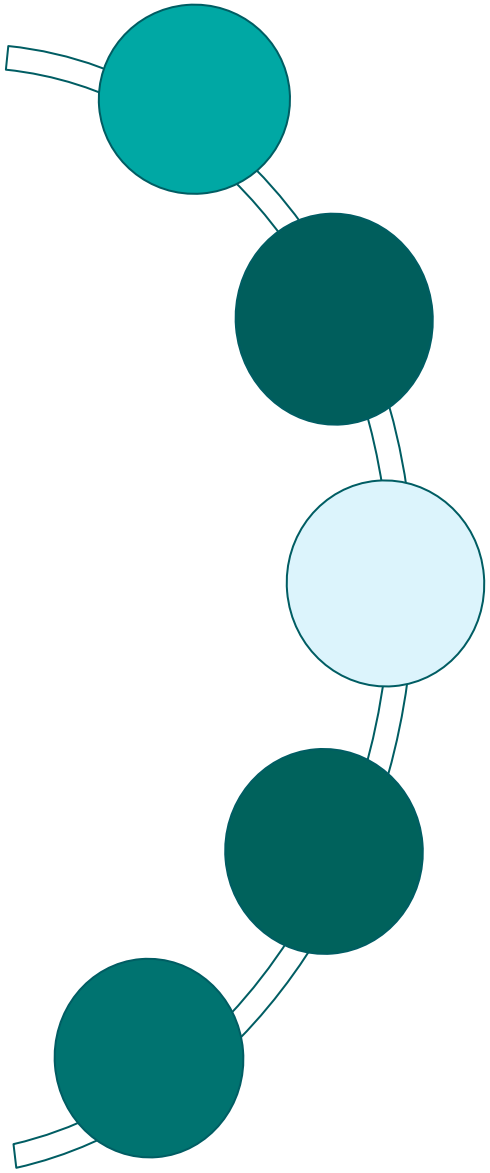
Perspective: Health system/programme

Time horizon: 2023–2025

Currency conversion: All costs were converted using an average exchange rate of ₦1,554.619 per US$.

Historical USD: All costs presented in 2025 US$ using the US GDP deflator.

Cost boundary, exclusions and classification



Inclusions (delivery-critical): Training linked to service delivery, supervision, social and behaviour change (SBC); commodities (sulfadoxine-pyrimethamine [SP] and consumables), logistics and transport, health worker dosing time, administrative overheads for operations and in-country technical support.

Exclusions: Research, including surveys, modelling, ethical approval and research uptake.

Cost classes: Direct intervention costs (variable with dose volume) and operating costs (fixed or mixed, including supervision and management, administration, utilities, transport and SBC).

Cost allocation: Shared costs apportioned by defensible drivers (e.g. share of PMC sessions, relevant staff time or doses).

Measurement: Ingredient costing when quantities and unit prices are available.

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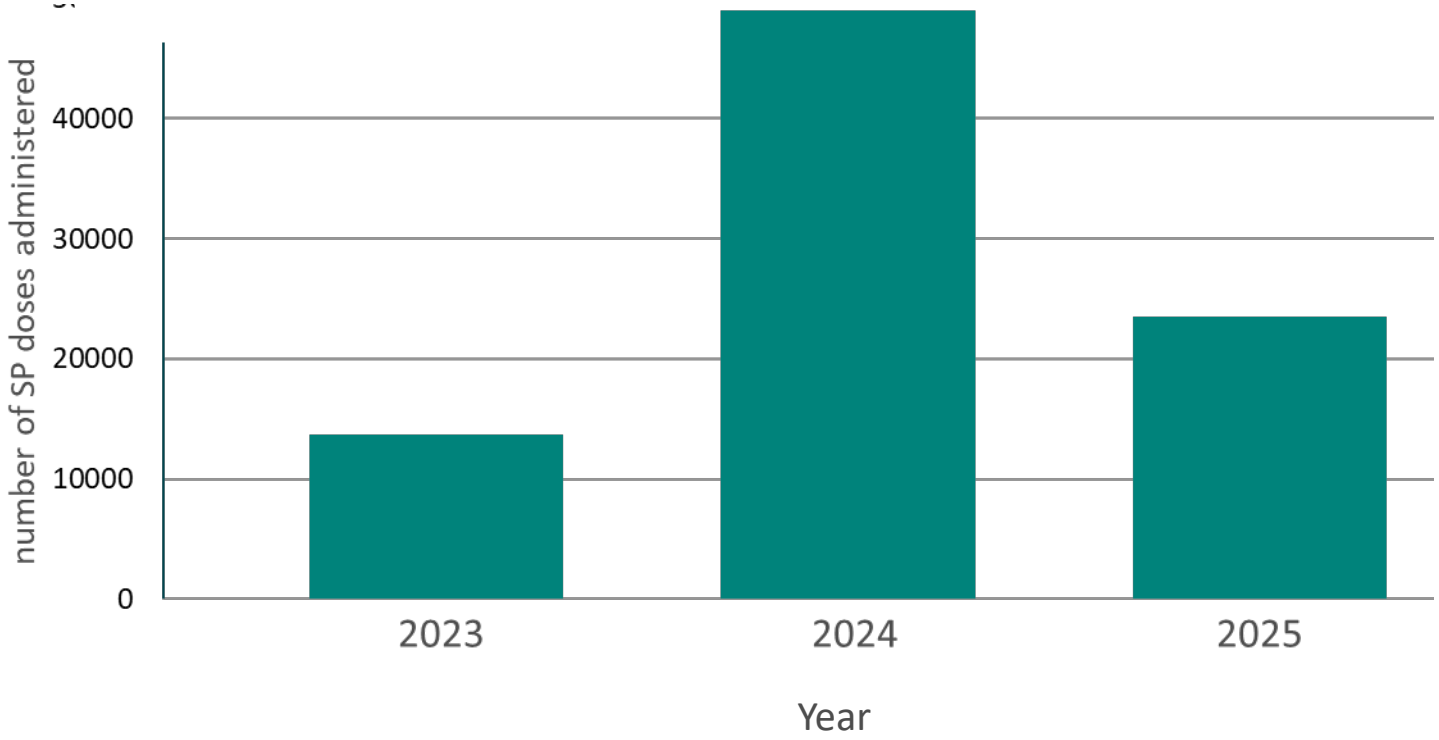
Preliminary results

PMC effect coverage

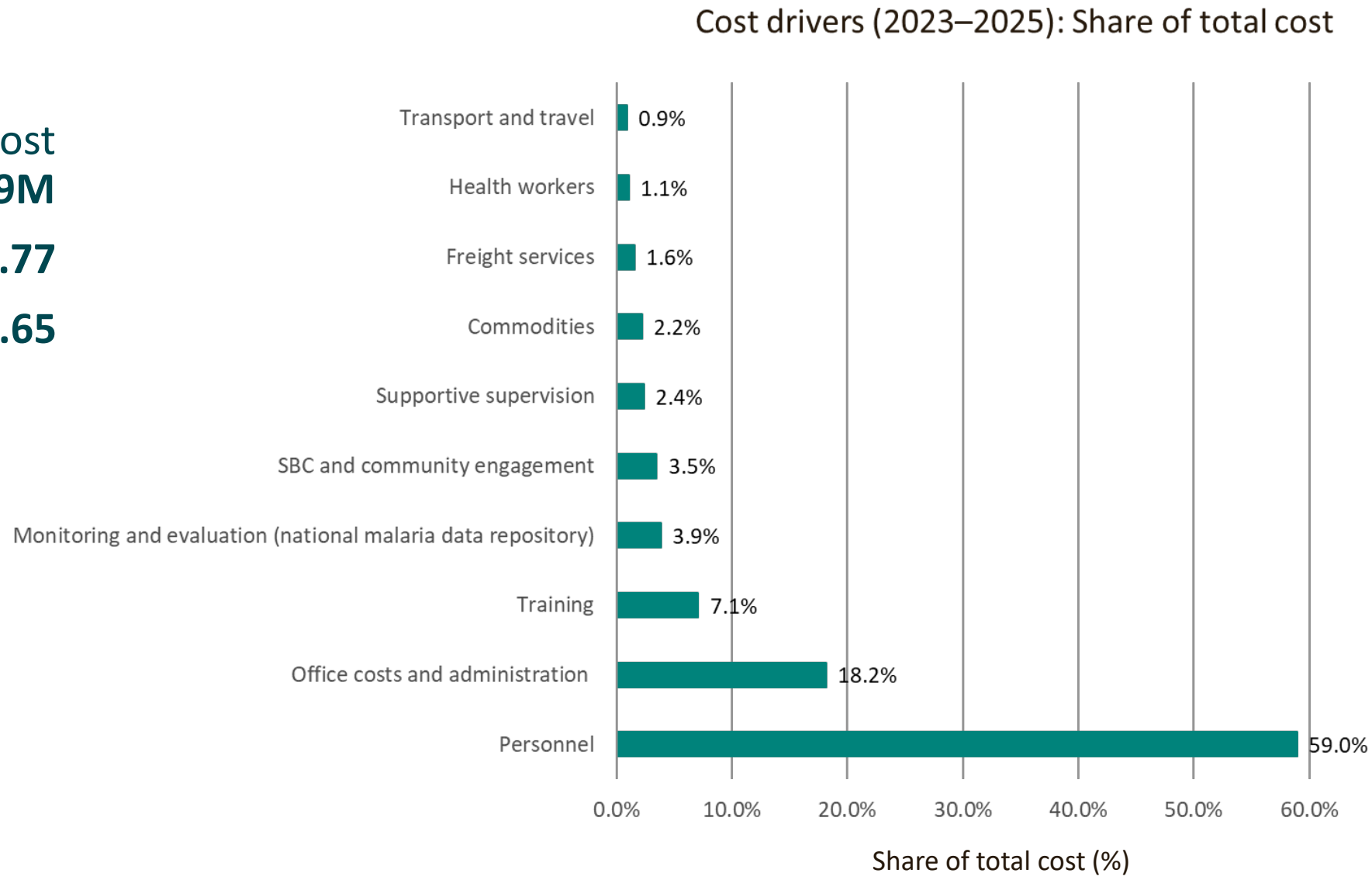
- Children reached: **27,935**
- Total doses: **83,375**
- Tablets used: **122,910**

Annual number of SP doses administered (2023-2025)



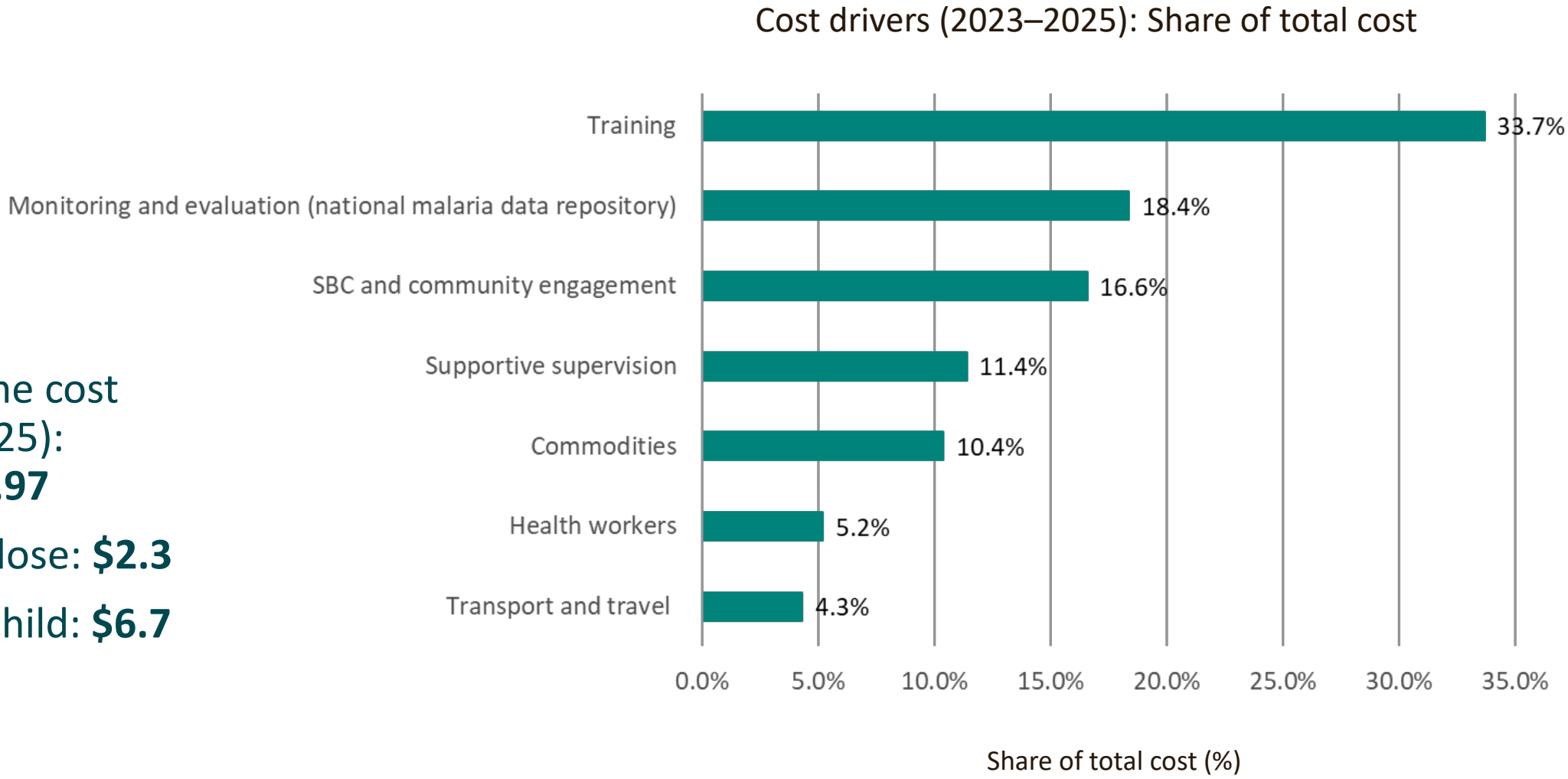
Total costs, unit costs and cost drivers

- Total programme cost (2023–2025): **$0.89M**
- Cost per child**: $31.77**
- Cost per dose: **$10.65**



Total costs, unit costs and cost drivers (excluding personnel, administration and freight cost)

- Programme cost (2023–2025): **$187,913.97**
- Cost per dose: **$2.3**
- Cost per child: **$6.7**



Health outcomes and DALYs averted

- Cases averted: **7,467**
- Deaths averted: **10**
- DALYs averted: **589.4**

Assumption: Children received at least four doses of SP in a year period

Doses per year (n)	Percentage of year protected	DALYs averted per 1,000 child-years
1	7.7	5.3
2	15.3	10.5
3	23	15.8
4	30.7	21.1
6	46	31.6
8	61.3	42.1

Cost-effectiveness (ICERs)

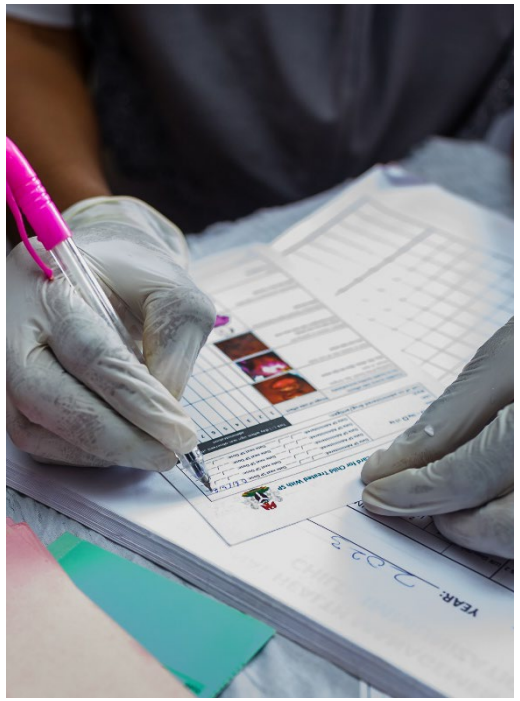
- Cost per malaria case averted: **$23.9**
- Cost per death averted: **$17,633**
- Cost per DALY averted: **$302**

Notes:

- Effects standardised per 1,000 child-years; ICERs are invariant to the scaling.
- DALYs dominated by years of life lost (YLL) due to early-life mortality prevention.

Conclusion

- Implementation of PMC through the routine immunisation platform substantially reduced the malaria burden among children under two years.
- The economic evaluation demonstrated that PMC provides good value for money relative to common cost-effectiveness thresholds for Nigeria.
- Overall, PMC was found to be a cost-effective intervention for reducing malaria morbidity and mortality among children under two years in Nigeria and supports policy consideration for national scale-up.



Limitations

- **Data limitations**
  - Only aggregate programme data were available. There was no individual follow-up to track exposure or adherence.
  - Total child-years were estimated from coverage proxies.
- **Modelling assumptions**
  - DALYs and deaths averted were modelled using literature-based incidence, case fatality rates and disability weights.
  - Severe malaria incidence and case fatality rates were assumed constant; no probabilistic uncertainty propagation.
- **Context and generalisability**
  - Results are specific to Osun state (which has moderate transmission levels and a strong Essential Programme on Immunisation platform).
  - Cost-effectiveness may differ in higher-burden or lower-capacity regions.

Next steps

- **Evidence strengthening**
  - Expand sensitivity and scenario analyses to include alternate dosing strategies and life-year valuations.
- **Policy engagement**
  - Translate results into a policy brief highlighting fiscal implications and cost-saving potential of PMC.
- **Implementation and scale-up**
  - Pursue local SP procurement and integration with routine immunisation supply chains to reduce import dependency.

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- Dr Chinazo Ujuju Senior, Project Manager
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- Dr James Tibenderana, Principal investigator

Other stakeholders

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- Dr Rufai-Ahmed Garba, Director, National Primary Health Care Development Agency
- Dr Olufemi Oroge, Manager, State Malaria Elimination Programme
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