

Identifying cost efficiencies in malaria routine data quality audits in Zambia



Background

Malaria Routine Data Quality Audits (RDQA) are critical for ensuring accurate and reliable use of routine data for decision-making. Due to human and financial resources associated with RDQAs and limited budgets, National Malaria Control Programs face significant challenges in implementing wide-scale RDQAs. Variations in RDQA approaches, frequency, and scope create diverse implementation models and budget needs. However, no formal RDQA cost review has been conducted to guide optimization of resources. Therefore, there is a need to review and document RDQA-associated costs to establish possible benchmarks for expenses and identify potential RDQA solutions to save costs. PATH's Malaria Control and Elimination Partnership in Africa (MACEPA)¹ project, in close collaboration with the Zambia National Malaria Elimination Centre, conducted a costing analysis of RDQA practices to identify key cost drivers and make recommendations for possible cost efficiencies in the country.

Methods

A comprehensive RDQA costing analysis was implemented in 2025 across all programs implementing RDQAs in the country. The analysis utilized the MACEPA costing approach developed by PATH in 2014 that identifies all cost categories and item costs within each category for all activities. The product of unit costs and quantities are then summed up to estimate the total cost of implementing MACEPA-supported interventions². The following four stages were used in this analysis: (1) gathering RDQA implementation data, identifying main activities, cost categories, and cost items; (2) estimating unit cost database; (3) calculating activity-specific costs; and (4) combining these with implementation data to create a cost database for RDQA by different donors and implementers. Data was collected for nine RDQA-funded programs and implementing partners—MACEPA, funded by the Gates foundation;

Program for the Advancement of Malaria Outcomes (PAMO), funded by US President's Malaria Initiative (PMI); Churches Health Association of Zambia (CHAZ), funded by Global Fund; and the Global Fund—between November 2024 and January 2025. Data cleaning and analysis was performed in February–March 2025 (See table 1).

Costs incorporated incremental costs in categories including labor, transportation, equipment, supplies, meals, and accommodation. They include all expenses incurred (i.e. financial costs) and opportunity costs for individuals' working hours not receiving allowance, together forming economic costs. Costs in years of RDQAs (2022–2024) were converted to 2024 USD using the Zambia consumer price index and an exchange rate of 1 USD=25.39 ZMW. Costs of different RDQA implementation programs were described in total costs and costs per health facility catchment area (HFCA), along with characteristics of each program for identifying cost efficiency. We then characterized practice and conduct of RDQA implementation across supporting programs that had the lowest total cost or cost per HFCA. We used these characteristics to construct RDQA scenarios to estimate the impact on costs and provide recommendations on cost-efficiency. In these scenarios, we used the same allowance for staff with the same position and level across programs but used local price for unit costs of other items. Digital RDQA, the approach using digital tools and methods for assessing the quality of routine data, will likely be introduced in Zambia in late 2025 and was also assessed in the scenarios.

Table 1: General characteristics of RDQA implementation programs in the analysis

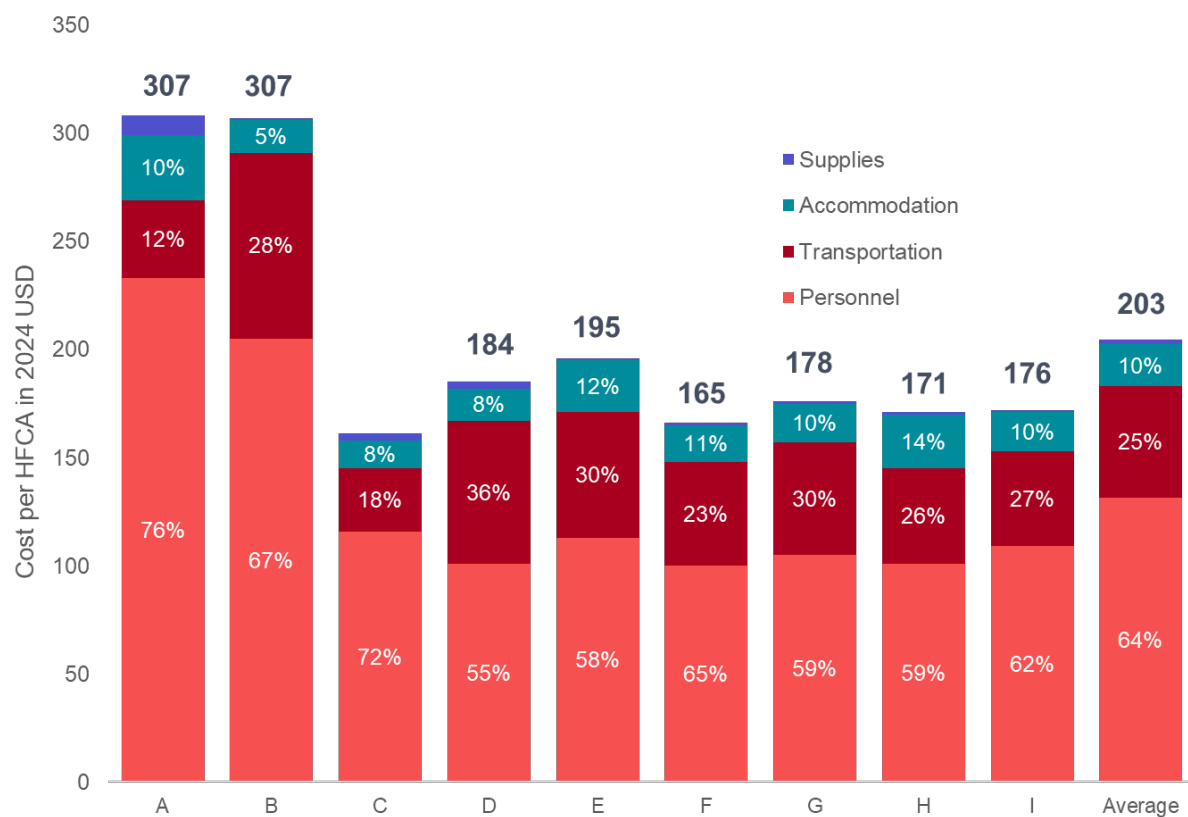
Program	Provinces	Number of districts/health facilities audit	Number of HF staff in audit	Orientation and feedback meetings format
CHAZ	North Western	3/42	126	Multiple meetings conducted at each district at the same time
Global Fund	Western & Central	8/80	102	One meeting for both provinces, virtually or in-person
MACEPA 1	Southern & Central	17/173	205	One meeting for both provinces, in-person
MACEPA 2	Western	16/160	183	Meeting at province
PAMO 1	Eastern Main	8/123	200	Meeting at province
PAMO 2	Eastern Pre elimination	7/162	415	Meeting at province
PAMO 3	Luapula	12/167	200	Meeting at province
PAMO 4	Muchinga	8/114	80	Meeting at province
PAMO 5	Northern	12/168	150	Meeting at province

Abbreviations: CHAZ, Churches Health Association of Zambia; HF, health facility; MACEPA, Malaria Control and Elimination Partnership in Africa; PAMO, Program for the Advancement of Malaria Outcomes.

Results

The analysis covered RDQAs conducted by 9 programs in 10 provinces with 91 districts, and 1,189 HFCA, representing the most recent RDQA visits by these programs that took place in Zambia from 2022 to 2024. There was substantial variation in RDQA costs across programs (Figure 1), with average economic costs of 24,938 USD per program (range: 12,893-29,654 USD) and 205 USD per HFCA (range: 161-307 USD). Financial costs, which excluded opportunity costs for staff time, averaged 23,293 USD per program and 190 USD per HFCA. Personnel costs emerged as the primary cost driver, comprising 64% of total costs on average (range: 55-76%), followed by transportation at 25% (range: 12-36%).

Figure 1: Cost per HFCA and cost drivers of RDQA implementation programs

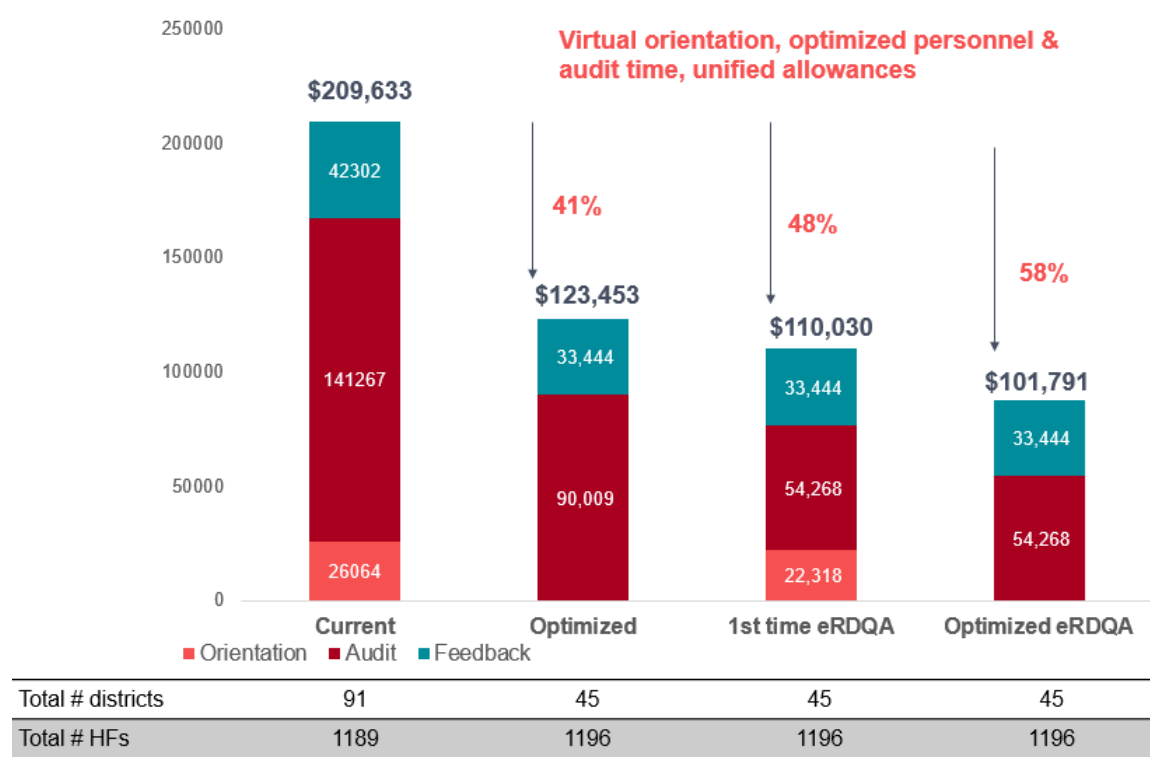


Abbreviations: HFCA, health facility catchment area.

Key cost efficiency findings demonstrated that conducting orientation meetings virtually was the most economical approach at only \$1 per HFCA as compared to \$51 per HFCA for organizing district-level orientation meetings. Programs that organized orientation and feedback meetings centrally at the provincial level rather than separately by district achieved significant cost savings. While meetings should be centralized, the audit team should be decentralized to involve more district staff (local district and external district) for more cost-efficiency. The analysis also revealed that reducing the number of districts while increasing HFCA per district was more cost-efficient than maintaining many districts with fewer HFCA each.

Scenario modeling showed that optimizing current implementation through virtual orientation meetings, streamlined personnel deployment, and unified allowances could reduce total costs of 9 RDQA programs by 41% (from 209,633 to 123,453 USD) while maintaining annual RDQA coverage of 1,196 HFCAs. The scenario of digitalized and integrated DHIS2 RDQAs tools into the Health Management Information System as opposed to the traditional more labor intensive RDQA approach, projected even greater potential savings of 52% compared to current implementation, primarily through the expected reduction of audit time by 50% despite requiring initial training investments.

Figure 1: Total financial costs of 9 RDQA implementation programs with current practice vs more cost-efficient practice



Abbreviations: eRDQA, electronic routine data quality audit; HF, health facility.

Key recommendations

Based on the findings, we recommend the following strategies to maximize RDQA cost efficiency while maintaining quality:

1. **Optimize meeting structures:** Implement virtual orientation meetings and organize feedback meetings centrally at the provincial level rather than conducting separate district-level meetings.
2. **Strategic resource allocation:** When facing budget constraints, reduce the number of districts covered while increasing the number of HFCAs audited per district.
3. **Standardize audit teams:** For medium-volume HFCAs, deploy teams comprising two program staff, two national officers, two provincial officers, four local district staff per district, and two community health workers per HFCA. While meetings should be centralized, audit teams should remain decentralized to maximize local participation and cost efficiency.

4. **Harmonize allowances:** Unify allowance rates across different RDQA programs and consider eliminating transport allowances for local staff during the audit phase to achieve additional cost savings without compromising audit quality.
5. **Invest in digitalization:** Prioritize the transition to digital RDQA systems, which can reduce costs by reduction in audit time. Consider piloting self-RDQA models and remote auditing options for external auditors to further reduce costs while maintaining data quality standards.

Conclusions

This costing analysis provides insights into optimizing resource utilization for maintaining high-quality malaria routine data, demonstrating substantial potential for cost savings through strategic efficiencies such as virtual meetings, centralized planning, and digital transitions. While these findings are rooted in Zambia's context, they offer transferable lessons for other countries facing similar resource constraints in health data management. The approach can extend to other disease-specific interventions or analogous activities, such as supportive supervision visits, enabling more sustainable implementation without compromising quality or coverage.

References

1. PATH Malaria Control and Elimination Partnership in Africa (MACEPA). <https://www.path.org/who-we-are/programs/malaria/malaria-control-and-elimination-partnership-in-africa-macepa/>
2. Larson, B.A., Ngoma, T., Silumbe, K. *et al.* A framework for evaluating the costs of malaria elimination interventions: an application to reactive case detection in Southern Province of Zambia, 2014. *Malaria Journal* 15, 408 (2016). <https://doi.org/10.1186/s12936-016-1457-5>