Operational Cost Analysis of Integrated and Standalone Measles-Rubella and Oral Polio Vaccine

MULTI-COUNTRY CASE STUDIES

by Lidia Kayembe, PhD
The Task Force for Global Health Consultant
taskforce.org

June 15, 2026

Table of Contents

EXECUTIVE SUMMARY 3
BACKGROUND 3
OBJECTIVES 4
COMMON ANALYTICAL FRAMEWORK 4
CROSS-COUNTRY SUMMARY OF METHODS 5
Chapter 1: Cost Threshold Analysis of Integrated Measles and OPV Campaign Delivery in Somalia 5
Chapter 2: Comparative Operational Cost Analysis of Integrated Measles and OPV Campaign Delivery In Madagascar 12
Chapter 3: Comparative Operational Cost Analysis of Integrated Measles and OPV Campaign Delivery In Pakistan 22
CROSS-COUNTRY FINDINGS 27
CROSS-COUNTRY METHODOLOGICAL LESSONS 28
CROSS-COUNTRY LIMITATIONS 29
RECOMMENDATIONS FOR FUTURE EVALUATION 29
CONCLUSION 29

EXECUTIVE SUMMARY

This report presents findings from three country case studies examining the operational and financial implications of integrated measles/measles-rubella (M/MR) and oral polio vaccine (OPV) campaign delivery.

Country analyses were conducted in Somalia, Madagascar and Pakistan using available campaign budgets, implementation documents, operational review materials and campaign monitoring data.

Because data availability differed substantially across countries, analytical approaches varied according to the completeness of financial documentation available in each setting.

Across countries, major operational cost drivers consistently included workforce deployment, transport and logistics, supervision, training, social mobilization and campaign coordination activities.

The analyses suggest that potential efficiencies associated with integrated campaign delivery are most likely to arise through shared operational systems rather than vaccine administration itself. At the same time, integrated delivery may introduce additional coordination requirements, transaction costs and implementation complexity.

Madagascar provided the strongest quantitative evidence because integrated operational expenditures and standalone comparator budgets were available simultaneously. Somalia relied primarily on threshold modeling, whereas Pakistan emphasized cost-driver analysis and operational interpretation because of limitations in available expenditure datasets.

The findings should be interpreted as exploratory operational assessments rather than formal economic evaluations. Stronger evidence regarding realized efficiencies will require improved expenditure reporting and prospective economic evaluation approaches.

BACKGROUND

Integrated immunization campaigns have increasingly been used to deliver multiple interventions simultaneously in settings characterized by repeated campaign requirements, operational constraints and extensive outreach needs. However, relatively little empirical evidence exists regarding the operational and financial implications of integrated campaign delivery.

This work examined integrated M/MR and OPV campaign delivery in three countries using available operational and financial documentation.

The primary question addressed across all analyses was: could integrated campaign delivery plausibly generate operational efficiencies relative to separate standalone implementation?

Because financial documentation and campaign reporting differed across countries, analytical approaches were adapted to local data availability.

OBJECTIVES

Overall Objective

To examine the operational and financial implications of integrated measles-rubella and oral polio vaccine campaign delivery through multi-country case studies.

Specific Objectives

1. Estimate and compare operational costs and cost-per-output metrics for integrated and standalone campaign delivery where available data permit.

2. Describe the operational characteristics of integrated measles-rubella and oral polio vaccine campaigns across selected countries.

3. Identify shared delivery systems and operational functions associated with integrated campaign implementation.

4. Examine mechanisms through which integration may plausibly reduce duplication and improve operational efficiency.

COMMON ANALYTICAL FRAMEWORK

Because data availability differed across countries, a single analytical approach was not feasible.

Country	Analytical approach
Somalia	Threshold analysis
Madagascar	Standalone-equivalent modeling
Pakistan	Cost-driver analysis

These approaches were selected according to the completeness of campaign financial documentation available in each setting.

CROSS-COUNTRY SUMMARY OF METHODS

The analyses focused on financial operational costs rather than full economic costs.

Where feasible campaign costs were standardized to constant USD values, vaccine procurement costs and injection supplies were excluded and standalone operational benchmarks were constructed from comparator campaigns.

Operational outputs differed across campaigns and included doses administered and children reached depending on data availability.

Because integrated campaigns represented shared delivery platforms supporting multiple interventions simultaneously, antigen-specific integrated expenditures could rarely be directly observed.

Accordingly, the analyses should not be interpreted as estimates of causal savings attributable to integration.

Chapter 1: Cost Threshold Analysis of Integrated Measles and OPV Campaign Delivery in Somalia

Introduction

This document presents a Somalia-specific operational cost-efficiency and threshold analysis of integrated versus standalone supplementary immunization activities (SIAs) involving measles and oral polio vaccine (OPV) delivery. The work forms part of a broader multi-country effort examining the operational and financial implications of integrated immunization campaigns, with a particular focus on understanding whether integrated delivery models may generate operational efficiencies and identify potential levers for operational cost savings compared with separate standalone implementation. The primary objective of the Somalia analysis was to estimate the operational cost threshold below which integrated measles + OPV campaign delivery would generate operational cost savings relative to separate standalone implementation of the same antigens. The Somalia analysis considered the following campaigns and campaign financial datasets:

Integrated campaign

- November 2022 national measles + tOPV campaign

Standalone comparator campaigns

- July 2024 national OPV campaign

- 2018 national measles SIA (phased Jan-Mar 2018)

These campaigns were selected based on national scale implementation, relative comparability of campaign objectives and delivery platforms, availability of financial and operational documentation and the feasibility of constructing operational cost benchmarks for standalone and integrated delivery scenarios.

Campaign selection and data review were conducted with extensive technical collaboration and support from US CDC, WHO Somalia Country Office and UNICEF Somalia Country Office. WHO and UNICEF country teams provided available campaign financial, operational and coverage documentation and supported clarification of campaign structures, implementation approaches and data availability constraints.

Although a phased national measles SIA was planned in 2018 (and likely implemented in 2019), detailed and sufficiently complete standalone operational budget documentation comparable to the later campaign financial datasets was not available for that campaign. In contrast, a substantially more complete standalone measles operational budget developed in 2022 before the decision to operationally integrate measles and tOPV delivery was available and provided a more robust basis for estimating standalone measles operational delivery costs under Somalia programmatic conditions. The analysis therefore used the 2022 pre-integration standalone measles budget as the primary measles comparator.

Available integrated campaign financial files were not considered sufficiently complete or internally consistent to serve as the primary basis for direct cost comparison because they appeared incomplete and potentially underreported across several operational cost categories, limiting their suitability for direct retrospective estimation of realized cost savings attributable to integration.

Somalia represents a particularly relevant setting for examining integrated campaign delivery because of its repeated campaign requirements, extensive outreach dependence, insecurity-related operational constraints and high operational delivery costs.

The analysis therefore adopted a modeled threshold approach using:

- the standalone 2022 measles campaign budget prepared prior to operational integration,
- the standalone 2024 OPV campaign budget,
- inflation adjustment to constant 2024 USD using IMF CPI estimates,
- standardization to integrated campaign outputs using children reached.

Children reached were used as the primary output denominator rather than doses administered because administered-dose data were not consistently available or comparable across all campaigns and antigens. In contrast, reached-population and campaign coverage outputs were available in a more standardized format across campaigns, providing a more consistent basis for comparing operational outputs between standalone and integrated delivery models.

The analysis reflects financial operational costs derived from campaign budgets and planning documents and does not represent a full economic costing. Accordingly, the findings presented in this document should be interpreted as a modeled operational break-even threshold analysis rather

than a direct expenditure-based estimate of realized cost savings from integration.

Contextual evidence from Somalia immunization financing and operational documentation

An IFRC-supported 2020 assessment of Somalia's polio transition and immunization financing environment highlighted the heavy operational dependence of Somalia's immunization system on externally funded campaign infrastructure, outreach delivery, social mobilization, supervision and partner-supported implementation mechanisms. The report documented that operational delivery costs substantially exceeded vaccine procurement costs in Somalia campaign implementation and emphasized the high operational burden associated with outreach-based immunization delivery in fragile and hard-to-reach settings.

The assessment further noted that Somalia immunization delivery depended extensively on outreach and mobile delivery strategies, social mobilization, campaign coordination structures, community engagement and partner-supported operational personnel.

These findings are relevant to the present analysis because they support the plausibility that integrated campaign delivery may reduce duplication across key operational functions, particularly in fragile and high-outreach settings such as Somalia.

Additional operational context was provided by a recent MMWR assessment of persistent cVDPV transmission in Somalia, which documented the substantial operational challenges affecting campaign implementation. The report noted that nearly half of districts in South-Central Somalia remained partially or completely inaccessible because of insecurity, obstructing vaccination activities for approximately 17% of targeted children. The same report estimated that approximately 472,743 children under five years of age remained unreachable for vaccination activities because of security constraints.

The MMWR analysis further documented the very high operational intensity of supplementary immunization activity implementation in Somalia, with 28 cVDPV2- related SIAs conducted between January 2021 and March 2024. Such repeated operational mobilization requirements reinforce the potential importance of identifying opportunities for operational efficiencies through integrated delivery platforms. Importantly, the same report explicitly referenced implementation of "one measles-polio integrated campaign", confirming integrated delivery as an established operational strategy within Somalia outbreak response activities.

Campaigns and datasets included in the analysis

Dataset type	Campaign / dataset	Role in analysis	Period
Integrated campaign outputs	National measles + tOPV campaign	Source of integrated campaign reached-population outputs used for standardization	November 2022
Standalone operational comparator	Pre-integration measles campaign budget	Primary standalone measles operational	2022

		cost benchmark	
Standalone operational comparator	National OPV campaign budget	Primary standalone OPV operational cost benchmark	July 2024
Historical contextual campaign	National measles SIA (phased)	Historical implementation context	Jan–Mar 2018

Financial standardization approach

Standalone campaign budgets were:

- adjusted to constant 2024 USD using IMF CPI estimates,
- standardized to integrated campaign outputs using children reached,
- limited to operational delivery costs excluding vaccine procurement and injection supplies where possible.

The analysis focused on operational campaign delivery costs to maximize comparability across campaigns and delivery models. The analysis assumes that standalone campaigns would have achieved broadly comparable operational reach to the integrated campaign outputs used for standardization.

Analytical approach

The standalone-equivalent operational threshold was estimated by applying standalone operational cost-per-child benchmarks to the observed numbers of children reached during the integrated campaign.

The analytical approach can be summarized as:
Standalone-equivalent threshold cost = $(C_{measles\ /unit} \times N_{measles}) + (C_{OPV/unit} \times N_{OPV})$

Where:
• C_{unit}: standalone operational cost per child reached
•N: number of children reached in the integrated campaign

The resulting estimate represents the approximate operational expenditure threshold below which integrated delivery would generate operational savings relative to separate standalone campaign implementation. The analysis does not estimate realized savings from integration but rather estimates the operational expenditure level below which integration would theoretically become cost-saving relative to modeled standalone delivery.

Standalone operational benchmarks

Standalone 2022 measles campaign

Metric	Value
Operational budget (2024 USD)	$5,449,787
Children reached	2,442,447
Operational cost per child reached	$2.23

The measles operational budget was derived from a pre-integration campaign budget developed before operational integration with OPV delivery.

Because the standalone measles campaign was ultimately implemented as part of an integrated measles + tOPV campaign, standalone measles implementation outputs were not available separately. Accordingly, the number of children reached used in the present analysis was derived

from the measles component of the integrated campaign outcomes and applied as a proxy denominator for the standalone measles operational benchmark, whereas standalone OPV operational outputs were directly available from campaign reporting. This approach assumes broadly comparable operational performance between the originally planned standalone measles campaign and the subsequently implemented integrated delivery model.

Broader Somalia immunization financing documentation additionally referenced approximately $3.63 million in operational funding associated with the measles follow- up campaign. However, because these figures likely reflected only one financing component within a broader multi-partner campaign funding structure, they were not directly incorporated into the primary operational benchmark calculations.

Standalone 2024 OPV campaign

Metric	Value
Operational budget (2024 USD)	$4,918,693
Children reached	3,336,947
Operational cost per child reached	$1.47

Integrated 2022 Measles and OPV campaign outputs

Antigen	Children reached
Measles	2,311,076
OPV	2,609,791

Estimated standalone-equivalent operational threshold

Applying standalone operational unit costs to integrated campaign reached populations produced the following estimated standalone delivery equivalents:

Antigen	Estimated standalone-equivalent operational cost
Measles	$5.16M
OPV	$3.85M

Estimated combined standalone operational threshold (excluding vaccines and injection supplies): ~ $9.0 million (2024 USD). Integrated delivery would be operationally cost- saving relative to modeled standalone delivery if total integrated operational costs remained below approximately $9.0 million.

Interpretation of findings

The analysis suggests that integrated delivery would likely remain operationally advantageous if the total operational cost of the integrated campaign remained below approximately $9.0 million in 2024 USD.

Given Somalia’s highly resource-intensive outreach environment, repeated campaign implementation requirements, widespread insecurity-related access constraints and extensive reliance on shared operational systems, the findings support the plausibility that integrated delivery models may reduce duplication across key operational functions.

Potential operational efficiencies are particularly plausible in areas such as transport and logistics, outreach deployment, supervision, social mobilization, campaign coordination and training activities.

Review of the standalone measles operational budget further suggested that several high-cost operational components - including transport, field implementation support, supervision, training and social mobilization - represented major expenditure categories, reinforcing the potential importance of reducing duplication across these shared campaign functions.

Sensitivity analysis

Because campaign-specific empirical estimates of economies of scale were unavailable for Somalia SIAs, a +/- 20% variation in standalone unit costs was applied as a pragmatic sensitivity range to assess the robustness of threshold estimates under plausible operational scaling assumptions.

Scenario	Estimated break-even threshold
Economies of scale (-20%)	~$7.2M
Base case	~$9.0M
Higher operational complexity (+20%)	~$10.8M

These findings suggest that the estimated operational break-even threshold remains within a relatively consistent range under plausible operational assumptions.

Potential operational efficiency levers associated with integration

Although complete integrated campaign expenditure data were unavailable to directly quantify realized category-specific savings, review of campaign operational structures, standalone campaign budgets and broader Somalia immunization system documentation suggests several operational functions where integrated delivery may reduce duplication.

Operational area	Potential efficiency mechanism
Logistics and transport	Shared vaccine distribution, transport routes, fuel and vehicle deployment
Supervision and coordination	Combined supervisory structures, coordination meetings and reporting systems
Social mobilization and communication	Joint community sensitization, mobilization and communication activities
Training	Combined vaccinator and supervisor training sessions
Campaign staffing	Shared operational teams and support personnel
Outreach delivery	Shared fixed, outreach and mobile delivery platforms

Review of the standalone 2022 measles campaign operational budget indicated that major operational expenditure categories included transport and logistics activities, training, supervision, campaign staffing and field

implementation costs, social mobilization, outreach deployment, cold-chain operations and monitoring activities.

These findings are important because they correspond closely to operational functions that may potentially benefit from shared implementation platforms during integrated campaign delivery. The budget structure therefore provides additional operational support for the plausibility that integration may reduce duplication across several major campaign cost drivers in Somalia's outreach-intensive implementation environment.

Conclusion

Despite important limitations in integrated campaign expenditure data, the analysis suggests that integrated measles + OPV delivery in Somalia likely offers opportunities to improve operational efficiency if implemented below the estimated standalone- equivalent threshold of approximately $9.0 million in operational costs excluding vaccines and injection supplies. Given Somalia's outreach-intensive operational environment and repeated campaign implementation requirements, integration may help reduce duplication across logistics, supervision, mobilization, coordination and delivery systems. However, more complete expenditure reporting would be required to directly quantify realized savings attributable to integration.

Key limitations

This analysis has several important limitations.

- Complete integrated campaign financial data were unavailable and the available budget and financial planning files appeared to contain important gaps and possible underreporting across several operational cost categories.
- The absence of finalized integrated campaign expenditures prevented direct estimation of realized incremental cost savings attributable to integration and limited the analysis to modeled operational threshold comparisons.
- All cost data used in the analysis were based on campaign budgets and planning documents rather than finalized expenditures and may therefore differ from actual implementation costs.
- The analysis reflects financial operational costs and does not represent a full economic costing analysis.
- The standalone measles financial data were derived from a pre-integration campaign budget developed before the campaign was operationally integrated with OPV delivery.
- The standalone measles comparator relied on a pre-integration campaign budget, while the corresponding children reached denominator was derived from the subsequently implemented integrated measles + tOPV campaign because separate standalone implementation outputs were unavailable. The analysis therefore assumes that operational performance and reach would have been broadly comparable under standalone implementation conditions.
- Differences in implementation intensity, geographic access constraints, insecurity, delivery modalities, partner support, reporting practices and operational scope may also have influenced campaign cost structures and comparability.

- The analysis assumes that standalone unit costs would remain broadly stable when applied to the integrated campaign reached populations, although economies or diseconomies of scale may occur in practice.
- Population denominator uncertainty remains an important limitation in Somalia because no recent national census has been conducted, affecting the precision of target population and reached-population estimates used in campaign analyses.
- Broader Somalia immunization financing documentation reviewed as part of the analysis included campaign financing references that represented only partial funding contributions within broader multi-partner campaign financing structures.
- Somalia's fragile operational context, insecurity profile and outreach-heavy delivery model may limit generalizability of findings to lower-complexity immunization settings.

References

1. WHO Somalia Country Office & UNICEF Somalia Country Office. Campaign operational and financial planning documents.
2. IFRC. Somalia Polio Transition and Immunization Financing Assessment (2020).
3. CDC MMWR. Persistent Transmission of Circulating Vaccine-Derived Poliovirus - Somalia, January 2017-March 2024.
4. Somalia Polio Action Plan Development Meeting materials and operational analyses.
5. IMF World Economic Outlook Consumer Price Index (CPI) database.

Chapter 2: Comparative Operational Cost Analysis of Integrated Measles and OPV Campaign Delivery In Madagascar

Introduction

This document presents a Madagascar-specific comparative operational cost analysis of integrated versus standalone supplementary immunization activities (SIAs) involving measles and oral polio vaccine (OPV) delivery. The work forms part of a broader multi- country effort examining the operational and financial implications of integrated immunization campaigns, with particular focus on understanding whether integrated delivery models may generate operational efficiencies relative to separate standalone implementation.

The primary objective of the Madagascar analysis was to estimate standalone operational cost-per-output benchmarks for measles and OPV campaigns and assess whether observed integrated campaign operational expenditures remained below modeled standalone-equivalent operational costs.

Madagascar represents a particularly relevant setting for examining integrated campaign delivery because of its repeated campaign requirements,

geographically dispersed populations, extensive reliance on outreach strategies, difficult-to-access operational environments and substantial operational delivery requirements.

The Madagascar analysis considered the following campaign datasets:

Integrated campaign:

- October 2024 Integrated measles and OPV campaign operational costs and outputs

Standalone comparator campaigns

- 2022 updated standalone measles follow-up campaign budget (based on 2018 budget)
- 2023 Round 1 standalone OPV campaign operational budget

Campaign selection and data review were conducted with support from US CDC.

For Madagascar, the standalone measles comparator was based on the measles follow- up campaign approval pathway that originated with the 2018 GAVI application. Although the campaign was approved for implementation in 2019, it was not implemented as originally planned, partly in the context of extensive outbreak response vaccination activities conducted during 2019. A subsequent 2020 application for measles-rubella (MR) introduction with implementation planned for 2022 underwent prolonged review because of concerns regarding prior campaign coverage and routine immunization performance thresholds. For the measles campaign conducted in 2022, Gavi recommended use of the 2018 measles follow-up campaign approval pathway together with a request for additional measles vaccine doses to account for population growth. The analysis therefore treated the updated measles follow-up campaign budget as the standalone measles comparator.

National campaign technical guidance additionally demonstrated that campaign integration extended beyond simple co-delivery of vaccines and formally incorporated measles vaccination, polio vaccination and routine immunization catch-up activities within a shared operational delivery framework.

The analysis combined operational cost-per-output benchmarking with comparative operational expenditure analysis. While the analysis does not constitute a full economic evaluation, the availability of integrated operational expenditure data together with standalone comparator budgets permitted indicative assessment of potential operational efficiencies associated with integrated delivery.

Contextual evidence from Madagascar immunization campaign implementation

Madagascar has experienced repeated large-scale measles outbreak response activities, polio outbreak response campaigns and supplementary immunization activities over recent years, requiring substantial operational mobilization across geographically dispersed populations and difficult operational environments. Technical implementation guidance and campaign reports documented extensive operational complexity associated with nationwide campaign implementation across all 114 districts and 23 regions of the country. Campaign implementation

relied heavily on fixed, outreach and mobile vaccination strategies, particularly for populations living in remote, insecure, mining, or geographically isolated areas.

Integrated campaign guidance explicitly incorporated:

- shared vaccination posts,
- integrated vaccination teams,
- coordinated supervision systems,
- integrated monitoring activities,
- combined registration processes,
- shared logistics systems,
- integrated social mobilization activities.

Campaign operational guidance additionally emphasized continuation of routine immunization services and zero-dose catch-up activities during campaign implementation.

Operational implementation reports demonstrated the substantial scale of campaign deployment. During nationwide OPV response implementation in 2023, more than 22,600 vaccination teams, 22,500 mobilizers, 4,600 proximity supervisors and hundreds of monitors and investigators were deployed nationwide.

Campaign implementation also relied on extensive coordination structures at national, regional, district and health facility levels, together with dashboard-based monitoring systems, repeated coordination meetings and integrated supervision arrangements. These operational characteristics are directly relevant to the present analysis because they demonstrate the substantial scale of shared operational systems potentially amenable to integration-related efficiencies.

At the same time, implementation reports also documented that integration itself introduced additional coordination requirements and operational complexity, particularly when integration decisions occurred late within campaign planning cycles.

Campaigns and datasets included in the analysis

Dataset type	Campaign / dataset	Role in analysis
Integrated campaign	2024 Integrated measles + OPV campaign	Source of integrated operational costs and outputs
Standalone operational comparator	2022 Updated measles follow-up campaign budget	Standalone measles operational benchmark
Standalone operational comparator	2023 Standalone OPV campaign budget	Standalone OPV operational benchmark
Historical contextual documentation	2018 measles application / 2021 additional dose request	Contextual documentation supporting measles comparator
Operational implementation documentation	National campaign technical guides and implementation reports	Operational context and integration mechanisms

Financial standardization approach

Campaign operational costs were standardized to constant 2024 USD values. The analysis focused on operational delivery costs and excluded vaccine procurement and injection supplies in order to maximize comparability across delivery platforms.

Operational outputs were standardized using doses administered for measles campaigns and children reached for OPV campaigns, based on the most consistently available operational indicators across datasets.

The analysis assumes broadly comparable operational delivery intensity between standalone and integrated implementation models.

The analysis reflects financial operational costs derived from campaign budgets and operational financial documentation and does not represent a full economic costing analysis.

Cost-per-output benchmarking approach

Standalone operational cost-per-output ratios were estimated separately for measles and OPV using standalone campaign operational costs divided by their respective campaign outputs.

These standalone ratios were then applied to the corresponding measles and OPV outputs achieved during the integrated campaign to estimate the modeled standalone- equivalent operational cost of delivering the same outputs through separate standalone campaigns.

Because the integrated campaign represented a shared delivery platform supporting multiple antigens and operational activities simultaneously, antigen-specific integrated operational expenditures could not be directly observed. Directly dividing the total integrated operational budget separately by measles and OPV outputs would incorrectly assign the full shared platform cost to each antigen-specific denominator and generate misleading cost-per-output ratios.

The primary comparative analysis therefore assessed the integrated campaign by comparing integrated operational budget against modeled combined standalone- equivalent operational budgets derived from standalone cost-per-output benchmarks. In addition, exploratory allocation scenarios were developed to examine how shared integrated operational expenditures might plausibly distribute across antigens under different allocation assumptions, including proportional allocation by operational outputs, weighted operational complexity allocation and dominant-driver allocation scenarios.

These allocation exercises were intended as illustrative sensitivity analyses rather than definitive antigen-specific financial estimates.

Analytical Approach

The analysis combined:
1. standalone operational cost-per-output benchmarking,
2. comparative operational expenditure analysis,
3. standalone-equivalent operational modeling,
4. sensitivity analysis. Standalone operational unit costs were first calculated using standalone campaign budgets and operational outputs.

Standalone-equivalent operational costs were then estimated by applying standalone operational cost

benchmarks to the operational outputs achieved during the integrated campaign.

The analytical approach can be summarized as:
Standalone-equivalent operational cost ($C_{measles/unit} \times N_{measles}$) + ($C_{OPV/unit} \times N_{OPV}$)

Where:
C_{unit} is the standalone operational cost per operational output
N are the integrated campaign operational outputs

Integrated operational budgets were subsequently compared with modeled standalone- equivalent operational costs.

Although the analysis permits indicative comparison of integrated and standalone-equivalent operational expenditures, it does not directly estimate causal savings attributable to integration and should not be interpreted as a formal economic evaluation.

Standalone operational benchmarks

Standalone measles campaign

Metric	Value
Operational cost (2024 USD)	$3,954,145
Doses administered	4,142,296
Operational cost per dose administered	$0.95

The standalone measles operational benchmark was derived from the updated measles follow-up campaign budget pathway originating from the earlier 2018 campaign approval process.

Standalone OPV campaign

Metric	Value
Operational cost (2024 USD)	$2,976,466
Children reached	5,376,346
Operational cost per child reached	$0.55

Integrated campaign operational costs and outputs

Metric	Value
Integrated operational cost	$4,334,106
Measles outputs	4,446,644
OPV outputs	2,609,791

Based on reported campaign outputs, the integrated campaign delivered approximately 7.1 million measles and OPV doses combined, corresponding to an overall operational cost of approximately $0.61 per combined output delivered.

Because the integrated platform supported shared operational systems and multiple campaign activities simultaneously, this aggregate metric should be interpreted cautiously and does not represent an antigen-specific cost estimate. Because campaign costs were shared across antigens and operational functions, antigen-specific integrated cost-per-output estimates could not be directly observed.

Standalone-equivalent operational benchmarking results

Applying standalone operational cost-per-output benchmarks to integrated campaign outputs

produced the following modeled standalone-equivalent operational costs:

Component	Result
Standalone measles cost per output	$0.95
Standalone OPV cost per output	$0.55
Modeled standalone-equivalent cost for integrated measles outputs	$4.25M
Modeled standalone-equivalent cost for integrated OPV outputs	$1.45M
Combined modeled standalone-equivalent operational cost	$5.70M
Observed integrated operational cost	$4.33M
Difference	$1.37M lower than modeled standalone equivalent

Under the assumptions applied in the present analysis, observed integrated operational expenditures remained below modeled standalone-equivalent operational costs.

Exploratory shared cost allocation scenarios

Because integrated campaign operational expenditures supported multiple antigens and shared operational systems simultaneously, antigen-specific integrated operational expenditures could not be directly observed. Exploratory allocation scenarios were therefore developed to examine how integrated operational expenditures might plausibly distribute across antigens under different allocation assumptions.

These scenarios are illustrative and sensitivity-oriented rather than definitive expenditure estimates.

The allocation scenarios focused primarily on shared operational delivery functions, including:

- transport and logistics,
- supervision,
- social mobilization,
- training,
- outreach delivery,
- monitoring,
- campaign coordination.

Scenario 1: Proportional allocation by operational outputs

Under this scenario, integrated operational budget was allocated proportionally according to campaign operational outputs.

Using combined outputs (measles outputs: 4,446,644; OPV outputs: 2,609,791), approximate allocation shares were 63% for measles and 37% for OPV.

Estimated integrated operational budget

Antigen	Estimated allocated cost
Measles	$2.73M
OPV	$1.60M

Estimated integrated cost-per-output

Antigen	Estimated integrated cost-per-output	Standalone comparator
Measles	$0.61	$0.95
OPV	$0.61	$0.55

Under proportional allocation assumptions, integrated measles delivery appeared operationally less costly per output than standalone measles

delivery, while integrated OPV delivery remained broadly comparable to standalone OPV operational benchmarks.

Scenario 2: Weighted operational complexity allocation

This scenario assumed that measles delivery accounted for a larger share of integrated operational complexity because measles vaccination:

- required injectable delivery,
- imposed greater cold chain and injection safety requirements,
- likely required longer administration time per child,
- incorporated routine immunization catch-up activities.

Under this scenario, shared operational expenditures were allocated 65% to measles and 35% to OPV.

Estimated integrated operational expenditures

Antigen	Estimated allocated cost
Measles	$2.82M
OPV	$1.52M

Estimated integrated operational cost-per-output

Antigen	Estimated integrated cost-per-output	Standalone comparator
Measles	$0.63	$0.95
OPV	$0.58	$0.55

Under weighted operational complexity assumptions, integrated measles delivery continued to appear operationally less costly per output than standalone measles delivery, while OPV operational costs remained broadly similar to standalone delivery benchmarks.

Scenario 3: Dominant driver allocation

This scenario assumed that measles delivery represented the dominant operational driver of the integrated campaign because of injectable delivery requirements and broader operational complexity.

Shared operational expenditures were therefore allocated 75% to measles and 25% to OPV.

Estimated integrated operational budget

Antigen	Estimated allocated cost
Measles	$3.25M
OPV	$1.08M

Antigen	Estimated integrated cost-per-output	Standalone comparator
Measles	~$0.73	$0.95
OPV	~$0.42	$0.55

Under this scenario, integrated operational cost-per-output estimates remained below standalone comparator benchmarks for both measles and OPV.

Interpretation of allocation scenarios

Across all exploratory allocation scenarios, modeled integrated operational cost-per- output estimates for measles remained below standalone measles operational benchmarks.

For OPV, integrated operational cost-per-output estimates remained either comparable to or below

standalone operational benchmarks depending on allocation assumptions.

These findings suggest that the integrated delivery platform may plausibly have generated operational efficiencies relative to separate standalone implementation under a range of reasonable allocation assumptions.

However, because integrated operational expenditures could not be directly disaggregated by antigen or operational function, the allocation scenarios should be interpreted as illustrative sensitivity analyses rather than definitive antigen-specific expenditure estimates.

Sensitivity analysis

Because campaign-specific empirical estimates of economies of scale were unavailable, a +/-20% variation in standalone unit costs was applied as a pragmatic sensitivity range to assess robustness of findings under plausible operational scaling assumptions.

Scenario	Estimated standalone-equivalent operational cost
Economies of scale (-20%)	$4.6M
Base case	$5.7M
Higher operational complexity (+20%)	$6.8M

Under all modeled scenarios, observed integrated operational costs remained below standalone-equivalent operational estimates.

Interpretation of findings

The analysis suggests that integrated measles and OPV delivery in Madagascar may plausibly have generated operational efficiencies relative to modeled standalone implementation under the assumptions applied in the present analysis. Importantly, the Madagascar analysis is methodologically stronger than analyses relying solely on modeled threshold approaches because observed integrated operational expenditure data were available alongside standalone comparator budgets and extensive operational implementation documentation.

Observed integrated operational expenditures remained below modeled standalone- equivalent operational costs under all modeled sensitivity scenarios.

Operational implementation documentation additionally demonstrated that integration extended beyond simultaneous vaccine delivery alone and incorporated:

- integrated coordination systems,
- shared outreach delivery platforms,
- combined supervision systems,
- integrated monitoring processes,
- shared logistics arrangements,
- integrated registration systems,
- coordinated social mobilization activities.

Across both standalone and integrated campaign documentation, major operational activities repeatedly involved large-scale deployment of vaccination teams, social mobilization systems, supervision structures, outreach delivery mechanisms, data monitoring platforms and logistics coordination processes, suggesting that substantial portions of campaign operational expenditures were associated with shared delivery infrastructure potentially amenable to integration-related efficiencies.

Potential operational efficiencies are particularly plausible in:

- transport and logistics,
- outreach deployment,
- supervision,
- training,
- social mobilization,
- monitoring systems,
- campaign coordination structures.

At the same time, implementation reports also suggested that integration itself may generate additional coordination burdens and transaction costs. Technical reports noted that late operational integration decisions required additional resource mobilization, revision of operational tools and guidance and operational coordination adjustments. The findings therefore suggest that integrated delivery may plausibly generate operational efficiencies while simultaneously requiring substantial coordination and implementation capacity.

Potential operational efficiency levers associated with integration

Review of campaign operational structures, technical implementation guidance and implementation reports suggests several operational domains where integrated delivery may plausibly reduce duplication and improve efficiency.

Operational area	Potential efficiency mechanism
Logistics and transport	Shared vaccine distribution and transport systems
Supervision	Combined supervision structures and field oversight
Social mobilization	Joint communication and community mobilization
Training	Shared vaccinator and supervisor training
Monitoring and reporting	Integrated dashboards and reporting systems
Outreach delivery	Shared outreach and mobile vaccination platforms
Coordination	Shared national, regional, district and CSB coordination structures

Operational implementation guidance additionally documented:

- integrated team structures,
- shared vaccination sites,
- combined registration systems,
- joint routine immunization catch-up activities,
- integrated monitoring arrangements.

These operational functions are typically among the major cost drivers within large- scale campaign implementation and therefore represent plausible areas where integrated delivery may reduce operational duplication.

Conclusion

The Madagascar analysis suggests that integrated measles and OPV campaign delivery may plausibly improve operational efficiency relative to modeled standalone implementation under the assumptions used in the present analysis. Integrated operational

budgets remained below modeled standalone-equivalent operational costs generated from standalone comparator campaigns under all modeled sensitivity scenarios.

The Madagascar case additionally provides relatively strong operational evidence supporting the plausibility of integration-related efficiencies because integrated operational budgets data were available, standalone comparator budgets were available and implementation documentation demonstrated extensive sharing of operational systems, supervision structures, outreach activities, logistics arrangements, monitoring systems and campaign coordination processes.

At the same time, implementation reports suggest that integration itself may introduce operational coordination burdens and transaction costs, particularly when integration decisions occur late within campaign planning cycles.

Future analyses would benefit from:

- prospective integrated campaign expenditure tracking,
- standardized attribution of shared operational expenditures,
- improved campaign expenditure reporting systems,
- more detailed operational microcosting approaches capable of distinguishing integration-related efficiencies from broader campaign implementation effects.

Key limitations

This analysis has several important limitations.

- The analysis relied on campaign budgets and operational financial documentation rather than finalized audited expenditures.
- Operational outputs were standardized using different indicators across campaigns, including doses administered for measles and children reached for OPV.
- Because integrated operational expenditures supported multiple antigens and campaign activities simultaneously, antigen-specific integrated operational cost- per-output ratios could not be validly isolated.
- The analysis assumes broadly comparable operational intensity between standalone and integrated delivery models.
- Differences in campaign scope, implementation modalities, operational complexity, geographic coverage and partner support may have influenced comparability across campaigns.
- Economies or diseconomies of scale may influence operational cost structures in practice.
- Integrated expenditure attribution across specific operational functions remained difficult because operational systems and implementation structures were highly interdependent across antigens and routine immunization activities.
- Administrative coverage estimates may not fully capture variability in implementation quality across districts.
- The analysis reflects operational budgets and does not represent a full economic costing analysis.

- Campaign approval and financing pathways evolved over multiple years, requiring interpretation of linked planning and financing documentation across multiple campaign cycles.

References

1. Madagascar integrated campaign operational and financial documentation.

2. Madagascar campaign planning, technical guidance, and implementation materials.

3. Madagascar oral polio vaccine outbreak response reports and monitoring documentation.

4. Measles follow-up campaign application and supporting budget materials.

5. Madagascar measles and measles-rubella campaign budget documentation (2018-2021).

6. International Monetary Fund World Economic Outlook Consumer Price Index database.

Chapter 3: Comparative Operational Cost Analysis of Integrated Measles and OPV Campaign Delivery In Pakistan

Introduction

This document presents a Pakistan-specific comparative operational expenditure analysis of integrated versus standalone supplementary immunization activities (SIAs) involving measles-rubella (MR) and oral polio vaccine (OPV) delivery. The work forms part of a broader multi-country effort examining the operational and financial implications of integrated immunization campaigns, with particular focus on understanding whether integrated delivery models may plausibly generate operational efficiencies relative to separate standalone implementation.

The primary objective of the Pakistan analysis was to estimate standalone operational cost-per-output benchmarks for MR and OPV campaigns and assess whether integrated campaign operational delivery models may plausibly reduce duplication across major operational expenditure domains under Pakistan implementation conditions.

Pakistan represents a particularly important setting for examining integrated campaign delivery because of repeated large-scale supplementary immunization activities, persistent polio transmission, extensive outreach and mobile vaccination requirements, complex operational environments and substantial campaign operational expenditure requirements.

The Pakistan analysis considered the following campaigns:

Integrated campaign

- November 2021 integrated MR + OPV campaign

Standalone comparator campaigns

- January 2024 national OPV campaign

- October 2018 national measles follow-up campaign

These campaigns were selected based on national scale implementation, relative comparability of campaign objectives and delivery platforms, operational data availability and feasibility of constructing standalone operational expenditure benchmarks.

The 2018 measles campaign was selected as the most recent well-documented standalone measles supplementary immunization activity available for analysis.

The analysis additionally incorporated IRC review reports, campaign planning and budgeting documentation, operational costing spreadsheets and campaign implementation guidance.

Importantly, Pakistan also represented a distinctive operational financing case because integrated campaign budgeting underwent extensive external review and revision processes. Review materials documented repeated concerns regarding operational assumptions, staffing structures, transport costs and budget realism, alongside active discussions regarding opportunities to reduce duplication through operational integration and leveraging existing polio infrastructure.

The analysis combined standalone operational benchmarking, budget composition analysis and operational interpretation of implementation and financing documentation.

The analysis does not constitute a formal economic evaluation and does not directly estimate realized savings attributable to integration.

Contextual evidence from Pakistan immunization campaign implementation

Pakistan continues to experience substantial operational immunization challenges despite extensive immunization infrastructure and repeated supplementary immunization activities.

IRC review documentation described uneven health workforce distribution, operational staffing challenges, weak fixed-site immunization functionality, operational access constraints and persistent gaps in routine immunization performance.

Operational implementation also occurs in the context of persistent wild poliovirus transmission, repeated outbreak response campaigns, hard-to-reach populations, insecurity, migrant populations and extensive outreach delivery requirements.

Review documentation further highlighted security-related barriers, gender-related operational barriers, mobile and nomadic populations and operational challenges in densely populated urban settings.

Integrated campaign planning documents additionally demonstrated efforts to reduce duplication across transport systems, microplanning, social mobilization, campaign rounds and operational deployment structures through leveraging existing polio infrastructure and co-delivery arrangements.

At the same time, review materials documented substantial concern regarding operational budgeting assumptions, staffing structures, outreach team volumes, transport and fuel costs and operational feasibility under budget ceilings.

These operational and financing dynamics are directly relevant to interpretation of integrated campaign implementation and operational expenditure patterns.

Campaigns and datasets included in the analysis

Dataset type	Campaign / dataset	Role in analysis
Integrated campaign	November 2021 MR + OPV campaign	Integrated operational platform and outputs
Standalone operational comparator	January 2024 national OPV campaign	Standalone OPV operational benchmark
Standalone operational comparator	October 2018 measles follow-up SIA	Standalone measles operational benchmark
Operational costing documentation	National OPV operational budget spreadsheets	Budget composition and cost driver analysis
Operational financing documentation	IRC review reports and briefing materials	Operational financing context and integration interpretation

Financial standardization approach

Campaign operational costs were standardized to constant 2024 USD values where feasible. The analysis focused on operational delivery expenditures and excluded vaccine procurement and injection supplies where possible in order to maximize comparability across delivery platforms.

Operational outputs were standardized using doses administered for measles campaigns and children reached for OPV campaigns.

Standalone operational cost-per-output benchmarks were estimated separately for measles and OPV campaigns.

Because integrated campaign operational expenditures supported shared operational systems across multiple antigens and activities simultaneously, antigen-specific integrated operational expenditures could not be directly observed.

The analysis therefore primarily assessed operational expenditure patterns and plausible operational efficiency mechanisms.

Cost-per-output benchmarking approach

Standalone operational cost-per-output ratios were estimated using standalone campaign operational expenditures divided by campaign operational outputs. Standalone operational benchmarks were then used to inform interpretation of integrated campaign expenditure patterns and operational delivery structures.

Because the integrated campaign represented a shared operational delivery platform supporting MR vaccination, OPV delivery, supervision, logistics, social mobilization, transport and campaign coordination activities simultaneously, the integrated operational platform could not be directly disaggregated into definitive antigen-specific operational expenditures.

Because detailed integrated operational expenditure reporting was unavailable, the analysis focused on standalone operational benchmarks

and qualitative interpretation of shared delivery systems rather than estimation of antigen-specific integrated costs.

Analytical approach

The analysis combined:
1. standalone operational benchmarking,
2. budget composition analysis,
3. operational interpretation.

The analytical approach focused particularly on identifying major operational cost drivers, potential areas of shared operational expenditure and operational mechanisms through which integration might plausibly reduce duplication.

Because detailed integrated operational expenditure reporting was unavailable, the analysis emphasized operational expenditure structures, campaign implementation mechanisms and comparative operational benchmarking rather than direct estimation of realized savings attributable to integration.

Standalone Operational Benchmarks Standalone OPV campaign (January 2024)

Metric	Value
Operational expenditure	$19.5M
Children reached	43.6M
Operational cost per child reached	$0.45

The standalone OPV campaign involved nationwide implementation targeting approximately 44.3 million children.

Standalone measles campaign (October 2018)

Metric	Value
Children reached	37.1M
Administrative coverage	105%
Survey coverage	93%

Detailed finalized operational cost information for the 2018 measles campaign was not fully available at the time of analysis.

Integrated campaign operational costs and outputs

November 2021 Integrated MR + OPV Campaign

Metric	Value
MR outputs	94.8M
OPV outputs	32.4M
MR administrative coverage	105%
MR survey coverage	94%

Importantly, OPV delivery within the integrated campaign was geographically restricted to selected priority districts rather than implemented nationally, limiting direct comparability with nationally implemented standalone OPV campaigns. Detailed integrated operational expenditure reporting was unavailable.

Budget composition findings

Review of the January 2024 standalone OPV operational budget demonstrated that operational expenditures were heavily concentrated within human resources and incentives, transport and POL and training activities.

Approximate expenditure composition included:

Operational category	Share of operational expenditure
Human resources and incentives	~67%
Transport and fuel	~28%
Training	~4%

Operational costing documentation additionally demonstrated extensive reliance on mobile vaccination teams, transit vaccination teams, supervisory personnel, transport allowances, hard-to-reach allowances and geographically differentiated operational deployment models.

IRC review materials further documented repeated concern regarding staffing assumptions, outreach team volumes, transport expenditures and opportunities to reduce duplication across campaign structures.

These findings suggest that major operational cost drivers in Pakistan are concentrated within expenditure categories where integrated delivery models may plausibly reduce duplication through shared deployment, shared transport systems, merged supervision, integrated microplanning and coordinated campaign implementation.

Interpretation of findings

The Pakistan analysis suggests that integrated campaign delivery may plausibly reduce duplication across several major operational cost domains under Pakistan implementation conditions.

Importantly, operational budgeting and IRC review materials demonstrated that staffing structures, transport expenditures, operational deployment models and supervisory systems represented dominant operational expenditure drivers and central areas of operational review and negotiation. Review and planning materials additionally documented active efforts to leverage existing polio infrastructure, integrate microplanning, reduce duplicate social mobilization, merge transport arrangements and coordinate campaign rounds.

These findings support the plausibility that integrated delivery models may reduce operational duplication across major campaign delivery systems. At the same time, the Pakistan case also demonstrated that integrated campaign implementation may increase planning complexity, generate operational coordination burdens, complicate budgeting processes and create tensions regarding operational feasibility under constrained financing ceilings.

The Pakistan analysis therefore suggests that integrated campaign delivery may simultaneously create opportunities for operational efficiencies, while also increasing coordination and operational management complexity.

Conclusion

The Pakistan analysis demonstrates that integrated MR and OPV campaign delivery occurred within a highly complex operational and financing environment characterized by repeated supplementary immunization activities, persistent poliovirus transmission, extensive outreach requirements, difficult operational environments and substantial campaign operational expenditures.

Review of operational costing documentation demonstrated that major operational expenditure drivers were concentrated within workforce deployment, transport, supervision and operational implementation systems.

Operational planning and review documentation additionally demonstrated extensive discussion regarding opportunities to reduce duplication through shared delivery systems, integrated

operational deployment, coordinated microplanning, shared transport and leveraging existing polio infrastructure.

Although detailed integrated operational expenditure reporting was unavailable and direct estimation of realized savings attributable to integration was not possible, the Pakistan case provides important evidence regarding operational financing structures, budgeting dynamics, shared operational expenditure domains and the operational complexity associated with integrated campaign delivery.

Future analyses would benefit from prospective integrated expenditure tracking, standardized shared-cost attribution methodologies, integrated operational expenditure reporting and more detailed campaign microcosting approaches.

Key limitations

This analysis has several important limitations.

- Detailed integrated operational expenditure reporting was unavailable.
- The analysis relied heavily on operational planning and budgeting documentation rather than finalized audited expenditures.
- OPV delivery within the integrated campaign was geographically limited to selected priority districts, limiting direct comparability with nationally implemented standalone OPV campaigns.
- Detailed finalized operational expenditure information for the 2018 measles campaign was not fully available.
- Shared integrated operational expenditures could not be definitively attributed across antigens.
- Differences in campaign scope, operational intensity, implementation geography and delivery strategies may influence comparability across campaigns.
- The analysis reflects financial operational expenditures and does not represent a full economic costing analysis.
- No causal attribution of realized operational savings attributable to integration was possible.

References

1. Pakistan MR follow-up campaign IRC review reports and briefing materials.
2. Pakistan national OPV operational costing spreadsheets.
3. Pakistan campaign operational documentation.
4. Pakistan campaign implementation materials.
5. WHO SIA database and campaign operational reporting.
6. IMF World Economic Outlook Consumer Price Index (CPI) database.

CROSS-COUNTRY FINDINGS

Despite important differences in analytical approaches and data availability, several common themes emerged across countries.

Major operational cost drivers consistently included:

- workforce deployment;
- transport and logistics;
- supervision and monitoring;
- training activities;
- social mobilization;
- campaign coordination.

Operational documentation across countries demonstrated extensive sharing of:

- transport systems;
- supervision structures;
- outreach delivery mechanisms;
- monitoring platforms;
- social mobilization activities;
- campaign coordination processes.

These findings suggest that potential efficiencies associated with integration are most likely to arise through shared operational systems rather than vaccine administration itself.

At the same time, integrated delivery may increase planning complexity, coordination requirements and transaction costs.

Madagascar provided the strongest quantitative evidence because integrated operational expenditures and standalone comparator budgets were available simultaneously. Somalia relied primarily on threshold modeling, whereas Pakistan emphasized cost-driver analysis and operational interpretation because of limitations in available expenditure datasets.

CROSS-COUNTRY METHODOLOGICAL LESSONS

The country analyses highlighted important methodological challenges associated with retrospective campaign costing and evaluation of integrated delivery platforms.

Across countries, expenditure information was frequently fragmented across multiple partners, operational budgets, planning documents and reporting systems. In several settings, finalized expenditure datasets were unavailable, incomplete, or not organized in ways that permitted direct comparison across campaigns.

Integrated campaigns relied heavily on shared operational systems, making attribution of expenditures to individual antigens inherently difficult. Costs associated with supervision, transport, monitoring, social mobilization, outreach activities and campaign coordination often supported multiple interventions simultaneously and could not be directly disaggregated.

Additional challenges included:

- reliance on budgets rather than audited expenditures;
- differences in output indicators across campaigns;
- changes in campaign scope and delivery strategies over time;
- varying financing arrangements across partners;
- limited documentation of shared operational expenditures.

These findings suggest that measuring efficiencies associated with integrated campaigns may be as challenging as achieving the efficiencies themselves. Future evaluations would benefit from prospective expenditure tracking, standardized cost categories, improved reporting of shared costs and common approaches for cost attribution across integrated delivery platforms.

CROSS-COUNTRY LIMITATIONS

Several limitations were common across country analyses:

- incomplete costing datasets;
- reliance on budgets rather than audited expenditures;
- inability to directly attribute shared costs across antigens;
- differences in campaign scope and implementation intensity;
- absence of prospective expenditure tracking systems.
-

None of the analyses represented full economic evaluations or permitted direct causal attribution of realized savings attributable to integration.

RECOMMENDATIONS FOR FUTURE EVALUATION

In addition to generating country-specific findings, the analyses identified several methodological challenges associated with retrospective campaign costing.

Future integrated campaign evaluations would benefit from:
1. prospective expenditure tracking;
2. standardized operational cost categories;
3. improved reporting of shared operational expenditures;
4. documentation of campaign outputs and delivery modalities;
5. standardized cost-attribution approaches; and
6. more detailed operational microcosting methodologies.

CONCLUSION

Across three country case studies, the greatest opportunities for efficiency appeared to arise from shared operational systems rather than vaccine administration itself.

Transport, workforce deployment, supervision, monitoring, outreach and social mobilization consistently emerged as major operational domains potentially amenable to integration.

However, stronger evidence regarding realized efficiencies will require improved expenditure reporting and prospective economic evaluation approaches.

Importantly, one of the principal findings across countries was methodological. The analyses demonstrated that the absence of integrated costing systems may represent a greater barrier to evaluating efficiencies than the absence of integrated delivery platforms themselves.