

Evaluation of the Cold Chain Equipment Optimisation Platform (CCEOP) Country Led Deployment Modality

Gavi, the Vaccine Alliance

12 December 2025



FINAL REPORT

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ACRONYMS

Acronym	Definition
CCE	Cold Chain Equipment
CCEOP	Cold Chain Equipment Optimisation Platform
CHAI	Clinton Health Access Initiative
CO	Country Office (UNICEF)
COP	Costed Operational Plan
COVAX	COVID-19 Vaccines Global Access
CVM	Comprehensive Vaccine Management (team at Gavi)
DFAM	Department of Financial and Administrative Management (UNICEF)
EPI	Expanded Programme on Immunisation
EVM	Effective Vaccine Management
HACT	Harmonised Approach to Cash Transfers (UNICEF)
HCW	Health Care Worker
HDC	Health Data Centre
HR	Human Resources
HSIS	Health Systems and Immunisation Strengthening (Gavi team)
HSS	Health System Strengthening
ICT	Information and Communication Technology
ILR	Ice-Lined Refrigerator
IRC	Independent Review Committee (Gavi)
ISO	International Organisation for Standardisation
IRC	Independent Review Committee
KPI	Key Performance Indicator
MoH	Ministry of Health
M&E	Monitoring and Evaluation
NLWG	National Logistics Working Group
ODP	Operational Deployment Plan
O&M	Operations and Maintenance
PG	Programme Group (UNICEF)
PII	Post-Installation Inspection
PMT	Project Management Team
PQS	Performance, Quality and Safety (WHO prequalification standards)
PSC	Programme Support Costs (UNICEF)
RTMD	Remote Temperature Monitoring Device
SCM	Senior Country Manager (Gavi)
SD	Supply Division (UNICEF)

Acronym	Definition
SDD	Solar Direct Drive (refrigerator)
SDP	Service Delivery Point
TA	Technical Assistance
ToT	Training of Trainers
TPP	Target Product Profiles
UN	United Nations
UNICEF	United Nations International Children's Emergency Fund
USD	United States Dollar
WHO	World Health Organization

EXECUTIVE SUMMARY

This is an evaluation of Gavi's **Cold Chain Equipment Optimisation Platform (CCEOP) country-led deployment modality**, also referred to as the delinking modality. The results of this evaluation are intended to inform the Alliance's design of cold chain support under Gavi 6.0 (2026-2030).

In terms of **background**, before CCEOP's launch in 2015, around 90% of health facilities in 55 Gavi countries lacked functioning cold chain equipment (CCE) or relied on outdated technologies. CCEOP was established to address this constraint by accelerating rehabilitation, expansion and upgrading of CCE. UNICEF Supply Division manages the procurement and international shipment of eligible CCE which comprise of a subset of WHO PQS listed devices. The first phase, CCEOP1 (2016–2020), provided US\$250 million, followed by CCEOP2 (2021–2025) with US\$150 million, bringing total CCEOP funding to US\$400 million over 2016–2025.

Under CCEOP1, deployment was implemented through a supplier-led service bundle, with manufacturers responsible for warehousing, in-country distribution, installation, training and warranty. In some settings, this led to high deployment costs, limited government ownership and empowerment of local technicians, and access constraints in fragile and insecure areas. In response, Gavi and UNICEF introduced a country-led deployment modality in 2019, under which Ministries of Health manage service-bundle implementation, supported by UNICEF Country Offices, with deployment activities delinked from supplier contracts. Eligibility to switch was limited to countries with an approved supplier-led CCEOP1 application and operational deployment plan, and classified as fragile or security-affected, transitioning or preparatory transition. The COVID-19 pandemic increased the urgency of CCE expansion and therefore Gavi's COVAX CCE support also leveraged the country-led modality to fast-track deployment.

The **evaluation objectives** were to assess country-level delinking **processes** (application and review, legal agreements, funding flows and reporting) and implementation **outcomes** (cost-efficiency, quality, timeliness, government ownership and technical capacity) **under CCEOP1 and COVAX CCE**. It also aimed to inform the redesign of CCE support in Gavi 6.0 (2026–2030) by **recommending how to optimise the country-led modality** and by proposing eligibility criteria for future use.

All CCEOP1 pilot **countries** were in scope (Afghanistan, Kenya, Laos, Sudan, Syria (Damascus) and Yemen) and in addition Yemen and Syria were also reviewed for COVAX CCE. This presents a mixed list of countries with Kenya and Laos as high-capacity countries and the remaining countries having experiences severe complex emergencies over the past years. CCEOP2 and the supplier-led modality were outside the scope, though supplier-led experience was used for context and selected CCEOP2 changes are referenced where relevant for Gavi 6.0. The **evaluation methods** combine document and data review, 16 global and 51 country-level stakeholder interviews, site assessments in the six case study countries, and quantitative analysis of cost and deployment data. Key **limitations** included the absence of a direct comparison with the supplier-led modality, the lack of low-capacity but non-fragile countries in the sample, and incomplete and delayed datasets from Gavi, UNICEF headquarters and UNICEF Country Offices.

Specific evaluation findings by evaluation objective and focus area are presented below. Noting this is a review of CCEOP1, some process updates have been made under CCEOP2 and these are described in the full report. Further, several findings are not specific to the country-led deployment modality and also apply to the supplier-led deployment modality (specifically findings 1B, 7A, 7B, 11 and 12 on country-level issues with regards to training, monitoring and maintenance).

Key findings	
Processes	
Application & Review process	Finding 1A: The application and review process for the CCEOP1 country-led deployment programme was inefficient and cumbersome, and along with the fragile and conflict setting of many of the pilot countries, contributed to lengthy approval timelines for most countries.

Key findings	
	Finding 1B: The review process for the CCEOP1 country-led deployment programme effectively identified key risks and appropriate mitigation measures, though maintenance-related risks were not emphasised.
Legal agreements	Finding 2: The legal agreements and accompanying accountability framework largely worked well in managing roles and responsibilities, risks and ensuring accountability. These could have benefitted from consolidating all relevant/ final documents as standard annexes.
Fund management	Finding 3: The funds transfer process between Gavi, UNICEF and the government largely worked well, on the back of sufficient financial management capacity of UNICEF CO and effective coordination with the Ministry of Health. However, the reprogramming of unspent funds was cumbersome and lengthy.
Reporting	Finding 4A: Programmatic reporting did not work well due to fragmented reporting requirements, non-standardised templates, involvement of multiple stakeholders, poor timeliness and inadequate monitoring capacity. The implication is that there are incomplete and inconsistent updates on the deployment status, limiting the ability for Gavi to exercise oversight. Finding 4B: Financial reporting was suboptimal as the standard UNICEF financial reporting limits tracking of expenditures against the key budget items of the country-led modality.
Outcomes	
Cost-efficiency & cost savings	Finding 5A: The country-led deployment modality offered significant cost savings, although the drivers of these cost-savings are context-specific and may not apply equally across all countries. Cost savings were contingent on being able to leverage existing country capital and operational expenditure and can be underestimated if these are not in place. Finding 5B: Cost savings from country-led deployment were used to purchase additional CCE. Finding 6: Actual delinking costs largely matched budget costs when there were no significant implementation delays. However, in countries with longer implementation delays budget revisions have been required mostly due to general price inflation and costs increases related to security concerns.
Quality of installation	Finding 7A: The quality of installations was acceptable and in line with specifications, but the reporting process remains a challenge in most countries. Finding 7B: Functionality of equipment largely worked well with some emerging challenges relating to weak monitoring, lack of spare parts and issues around warranty. Where CCE was fully functional, it led to significant improvements in vaccine availability.
Timeliness	Finding 8: Finding 8: Overall timelines were lengthy, within which timelines specifically for deployment were extended (but reasonable) for high-capacity countries and considerably longer (not unexpectedly) for fragile countries. Delays within and across multiple deployment rounds are especially on account of external factors (COVID-19, conflict and security issues) but also due to challenges related to the country-led modality (phased deployment, unavailability of technicians, logistical constraints, lower economic incentives, coordination across multiple stakeholders).
Country ownership	Finding 9: The country-led deployment modality has led to greater country ownership in high-capacity countries and less so in fragile countries where the deployment is considered as “UNICEF CO-led”. Finding 10: Minor synergies, such as applying learnings and improved capacities to manage other CCE deployments, have materialised in some settings through the delinking approach to-date but there remains potential for significant synergies especially in high-capacity countries.
Training, monitoring & maintenance	Finding 11: Training of technicians on installations and end-users on preventative maintenance was acceptable, although in some countries there were delays in the former. While a well-known challenge at the country level, a missed opportunity was that the modality design did not emphasise regular refresher trainings despite high technician and HCW turnover. Finding 12: While not specific to the deployment modality, CCE performance monitoring and maintenance remain as key challenges under the country-led deployment modality.

Key findings

Cross-cutting aspects

Enablers & barriers	Finding 13: The success of the country-led deployment modality is enabled by strong country interest to adopt this modality as well as leadership, good in-country coordination and CCE technician capacity, adequate financial resourcing across the cold chain system and good UNICEF CO capacity. Observed barriers were limited emphasis on curative maintenance, weak reporting systems and a range of external factors (COVID-19, conflict, etc.)
Areas for improvements for countries	Finding 14: Strengthening cold chain systems across countries requires improving in particular monitoring and maintenance.

In **summary**, this evaluation has a **positive conclusion** on the country-led deployment modality – both in terms of its rationale (lower costs, higher reach and access in fragile and conflict settings, increased country ownership) and implementation experience to date (cost savings, quality installations). However, the evaluation also highlights some issues (some aspects of processes although there have been improvements under CCEOP2, timeliness) and that a number of enabling factors need to be in place and risks need to be appropriately managed (good country leadership and engagement, a strong and well-capacitated UNICEF CO, and adequate technician capacity).

Beyond the direct deployment of CCE, the country-led deployment modality also presents an opportunity to progress countries on the sustainability pathway - very important in current times of reduced global health financing. However, this opportunity needs further enhancing through Gavi funding and clear reflection on the extent to which these aspects can be facilitated through the current design. Our **recommendations** are therefore structured around how Gavi can effectively scale-up the country-led deployment modality and support the achievement of wider benefits in terms of greater country ownership and sustainability. All recommendations are for Gavi 6.0 and hence an immediate priority. Recommendations 1-3 would support the design of the modality whereas 4-5 are focused on implementation.

Recommendations

Recommendation 1: Develop and apply clear, evidence based eligibility criteria for use of the country-led deployment modality in Gavi 6.0. An upfront principle that countries should demand this modality – i.e. it should not be imposed by Gavi, given the high level of country engagement that is required. Screening based on eligibility criteria should ensure that countries are selected that have capacity and other key enabling factors in place or require the country-led deployment due to conflict / fragility context. A comprehensive application review checklist should be used to guide technical review and approval of country applications.

Recommendation 2: Streamline, integrate and standardise Gavi CCE processes for the country-led modality. Key aspect to cover include (i) *application & review* (e.g., streamline and incorporate into Gavi-wide application & review process; provide clear country guidance), (ii) *legal agreements* (e.g., standardise legal agreements including appendices), (iii) *financial and programmatic reporting* (e.g., standardise reporting template, align standard financial reporting), and (iv) *documentation management* (e.g., introduce clear SOPs to aid document management and consider Gavi and UNICEF capacity increase to support scale-up).

Recommendation 3: Place greater emphasis on country level monitoring and maintenance. This should include improving (i) use of digital inventory databases and reporting of functionality of CCE: (ii) curative maintenance, including warranty processes by sharing key terms at health facility level; (iii) processes on preventive maintenance and (iv) expand coverage and use of TMDs, where feasible.

Recommendation 4: Expedite approval and deployment timelines. This can include a mix of interventions depending on country context such as: (i) use of clear benchmarks differentiated by high-capacity and conflict / fragile context, (ii) provide select technical assistance and, (iii) where appropriate, use private providers.

Recommendation 5: Support country transition and sustainability by progressively shifting responsibilities to governments while refocusing UNICEF on capacity strengthening and risk management

1. INTRODUCTION AND EVALUATION METHODOLOGY

This report presents an evaluation of Gavi, the Vaccine Alliance's (Gavi's) Cold Chain Equipment Optimisation Platform (CCEOP) Country-Led Deployment Modality. It has been prepared by Cambridge Economic Policy Associates (CEPA).

This first section presents background to the CCEOP country-led deployment modality (Section 1.1), a summary of the evaluation objectives and methodology (Section 1.2), and structure of the rest of the report (Section 1.3).

1.1. BACKGROUND TO THE CCEOP COUNTRY-LED MODALITY

CCEOP context and rationale for country-led deployment modality

Prior to the launch of Gavi's CCEOP in 2015, 90% of health facilities in 55 Gavi countries lacked cold chain equipment (CCE) or relied on outdated technologies for vaccine storage.¹ To address this, Gavi set up the CCEOP to accelerate the deployment of cold chain technologies and rehabilitate, expand, extend and upgrade cold chain technologies. The initial CCEOP programme (CCEOP1) was a US\$250 million funding scheme over the 2016-2020 Gavi strategic period (Gavi 4.0). The CCEOP platform was then continued in the 2021-2025 Gavi strategic period (Gavi 5.0), namely CCEOP2, with an additional US\$150 million bringing the total CCEOP contribution to US\$400M between 2016 and 2025. 57 countries were eligible to apply for CCEOP1, and 54 countries were eligible to apply for CCEOP2.²

Through CCEOP, Gavi and countries jointly invest in the purchase, deployment and installation of CCE. Products eligible for platform funding include a subset of WHO Performance, Quality and Safety (PQS) listed devices, primarily ice-lined refrigerators (ILR), solar direct drive (SDD) and remote temperature monitoring devices (RTMDs), which meet the WHO Target Product Profiles (TPP) requirements.³ UNICEF's Supply Division (SD) manages the CCE procurement and international shipment via logistic companies. The CCE manufacturer, referred to in this report as the "supplier", contracted by UNICEF's Supply Division (SD), provides the equipment and manages its deployment, and is responsible for the warranty as per WHO PQS minimum requirements.⁴ Deployment, defined as "service-bundle" implementation, includes warehousing, in-country distribution, installation, and end-user training of healthcare workers (HCWs) on preventive maintenance.⁵

In the initial CCEOP1 programme, the service-bundle implementation was assigned to and overseen by the supplier. However, during implementation, it was found that in some countries, supplier-led service-bundle costs were very high, private logistics service providers could not access sites due to challenging security contexts, government ownership was limited, and government and local technicians were not empowered by the supplier.⁶ To respond to these challenges, in June 2019, Gavi and UNICEF established a pilot country-led deployment approach which entails the Ministry of Health managing the service-bundle implementation with support from the UNICEF Country Office (CO). Figure 1.1 illustrates the differences between the supplier-led and the country-led deployment approach. The country-led deployment modality was implemented in participating countries by "delinking" the deployment services from the supplier and therefore also referred to as delinking modality.

¹ [Gavi and UNICEF \(2023\) Reflections from CCEOP and COVAX.](#)

² [Gavi and UNICEF \(2023\) Reflections from CCEOP and COVAX.](#)

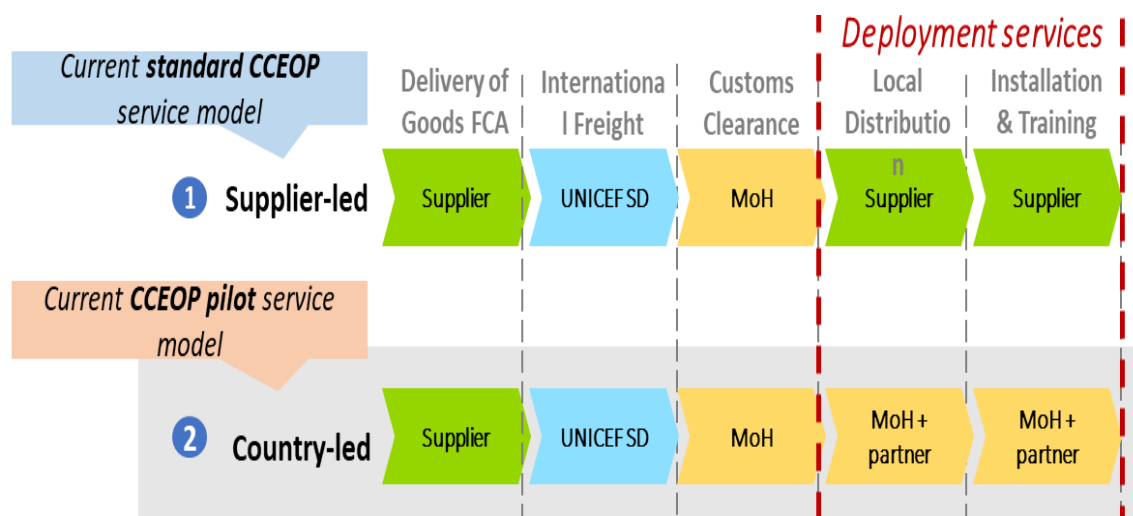
³ [WHO \(2022\) Target Product Profiles](#)

⁴ The WHO PQS mandated warranty period is of 3 years.

⁵ [Gavi, the Vaccine Alliance \(2023\) Cold chain equipment optimisation platform: Technology Guide.](#)

⁶ Gavi (2025) Request for Proposals for this evaluation

Figure 1.1: Allocation of roles under different CCEOP deployment modalities



Source: UNICEF, included in the Gavi (2025) Request for Proposals for this evaluation

Only countries that had an approved CCEOP supplier-led deployment application and an Operational Deployment Plan (ODP) were eligible to apply to switch to country-led deployment. Additionally, eligible countries were fragile/security affected areas, transitioning countries or preparatory transition countries. **The six countries that were piloted and included in this evaluation are: fragile states (Afghanistan, Yemen, Syria Damascus), transitioning countries (Laos) and preparatory transition countries (Kenya, Sudan⁷).**

Overview of COVAX CCE

The outbreak of the COVID-19 pandemic in 2020 further amplified the immediate need for countries to have CCE to ensure the delivery and storage of COVID-19 vaccines. As a result, the COVID-19 delivery support from Gavi leveraged the CCEOP1 country-led deployment approach to deliver CCE in countries during the pandemic ("COVAX CCE"). To adapt to the context of a global emergency response and fast-track product availability and deployment of CCE, the COVAX CCE used a lighter application process than CCEOP1.

Out of the pool of countries that deployed COVAX CCE under country-led modality, two fragile countries (Yemen, Syria Damascus) form part of this evaluation.⁸

Status of CCEOP1, CCEOP2 AND COVAX CCE country-led deployment

Table 1.1 below provides an overview of the implementation status of the country-led deployment for CCEOP1 and COVAX CCE in the focus countries for this evaluation. All COVAX CCE deployment has been completed. The implementation of CCEOP1 has not yet been completed in Sudan, Syria Damascus and Yemen.

Although this evaluation focuses on CCEOP1, Table 1.1. also shows that all countries, except Laos, have applied for the country-led modality under CCEOP2. Information on CCEOP2 is included for context (but is not in scope for this review (discussed further in Section 1.2 below).

⁷ Sudan is now a fragile country in the initial self-financing stage, rather than a preparatory transition country given the changing circumstances in the country. However, in 2019 when the CCEOP country-led programme was established, Sudan was classified as a preparatory transition country.

⁸ The RFP for this evaluation initially included also Papua New Guinea (PNG). Due to urgent and conflicting demands on the PNG EPI teams, Gavi advised the deprioritisation of the PNG country case study.

Table 1.1: Status of CCEOP1, CCEOP2 and COVAX CCE country-led implementation

Item	Afghanistan	Kenya	Laos	Sudan	Syria Damascus	Yemen
Gavi country classification status	<i>Initial self-financing, Fragile</i>	<i>Accelerated transition, High-capacity</i>	<i>Accelerated transition, High-capacity</i>	<i>Preparatory transition (until 2019) Initial self-financing, Fragile (now)</i>	<i>Initial self-financing, Fragile</i>	<i>Initial self-financing, Fragile</i>
CCEOP1 - Gavi 4.0 support						
Budget years⁹	2019	2018, 2019	2020, 2021	2019, 2020	2021	2020, 2021, 2022
Total # of units¹⁰	1,300	2,061	539	1,139	186	638
Actual deployment years and units deployed¹¹	First phase (2020-21): 406 Second phase (2022-2023): 816 Reprogramming (2023-2024): 78	First phase (2023): 200 Second phase (2023-2024): 1,861	First phase (2021-22): 340 Second phase (2023): 199	First phase (2022-23): 193 Second phase (2025-ongoing): 946	First phase (2024-25): 79 Second Phase (2025-ongoing): 107	First and Second Phase (2021-22): 501 Third Phase (2024-ongoing): 137
Total funding value (in USD) and % of country joint investment¹²	8.6 M 20% (1.7 M)	7 M 50% (3.5 M)	1.4 M 50% (693k)	6.1 M 50% (3 M)	1.3 M 20% (250k)	5.3 M 20% (1M)
CCEOP2 - Gavi 5.0 support						
Budget years	2023	2025		2025	2022, 2023	2025
Actual deployment years	2025 - ongoing	Procurement expected in 2026		Procurement stage	Procurement stage	Procurement stage

⁹ As per the Gavi Decision Letters.

¹⁰ Data sources include: Afghanistan CCEOP and reprogramming Operational Deployment Plan, Kenya Operational Deployment Plan Years 2 and 3, Laos CCEOP Operational Deployment Plan (340 CCE procured through the HSS top up have been subtracted from Operational Deployment Plan), Sudan Operational Deployment Plan (received August 2025), Syria Operational Deployment Plan 2022, Yemen CCEOP1 Operational Deployment Plan Year 1 and 2 Q1 2025

¹¹ Deployment was put on hold due to government change in Afghanistan in August 2021 and was resumed in January 2022, Conflict outbreak in Sudan in 2023 impacted the pre-P11 timeline, Deployment was completely put on hold due to the government change in Syria in December 2024.

¹² Data sources include: Afghanistan Gavi Decision Letter 2019, Kenya Gavi Decision Letter 2017-2019 (Funding only reflects 2018 and 2019 allocations, as 2017 was implemented through the supplier-led approach), Laos Gavi Decision Letter 2019, Sudan Gavi Decision Letter 2019-2020, Syria Gavi CCEOP1 Decision Letter 2021-2023, Yemen Gavi Decision Letter 2020-2022

Item	Afghanistan	Kenya	Laos	Sudan	Syria Damascus	Yemen
COVAX CCE						
Budgets years					2021	2021
Actual deployment years					2022-2024	2022
Total # of units ¹³					93	86
Total funding value (in USD) and % of country joint investment ¹⁴					340k 0%	738k 0%

Legend: Grey = did not apply

1.2. EVALUATION OBJECTIVES AND METHODOLOGY

The **evaluation objectives** were to assess the country-led deployment **processes** (application and review, legal agreement, funding flows, and reporting) and implementation **outcomes** (cost-efficiency, quality, timeliness, government ownership and technical capacity) under CCEOP1 and COVAX CCE implementation in pilot countries, and provide **recommendations** for improvement, including defining criteria for countries to be eligible to apply for this modality in Gavi 6.0 (2026-30) under the consolidated cash grant.

The following aspects were not in **scope**: CCEOP2, the supplier-led deployment and assessing CCEOP global level objectives (e.g. market shaping). CCEOP2 implementation was delayed, and hence it was not possible for Gavi to include it in this evaluation. However, this evaluation took note of the changes that were implemented in CCEOP2, and these were highlighted (but not assessed) in this report. The evaluation drew on previous evaluation findings on the supplier-led deployment modality to assess outcomes of the country-led modality, but it was outside of the scope of this evaluation to provide a direct comparison between the two modalities.¹⁵

The evaluation applied a **theory-based approach** based on a retrospective Theory of Change (ToC) developed by CEPA for this evaluation (included in Appendix B.1, see Figure B.2). The **evaluation framework, questions and methodology** are presented in Figure 1.2. The evaluation questions were structured around the OECD DAC evaluation criteria focusing on efficiency, effectiveness and sustainability. A mixed methods approach was employed to conduct the evaluation (comprising document review (bibliography included in Appendix A), 16 global and 51 country stakeholder interviews (consultee list included Appendix B), site assessments across the 6 case study countries (included as part of the country case study reports), and quantitative data analysis. Full details on the evaluation methods are provided in Appendix B.2 to B.4. Evidence was collated across methods, and the strength of evidence was assessed through the robustness assessment framework based on the quality and quantity of the evidence (high, medium, low and insufficient – Appendix B.3 provides more details).¹⁶

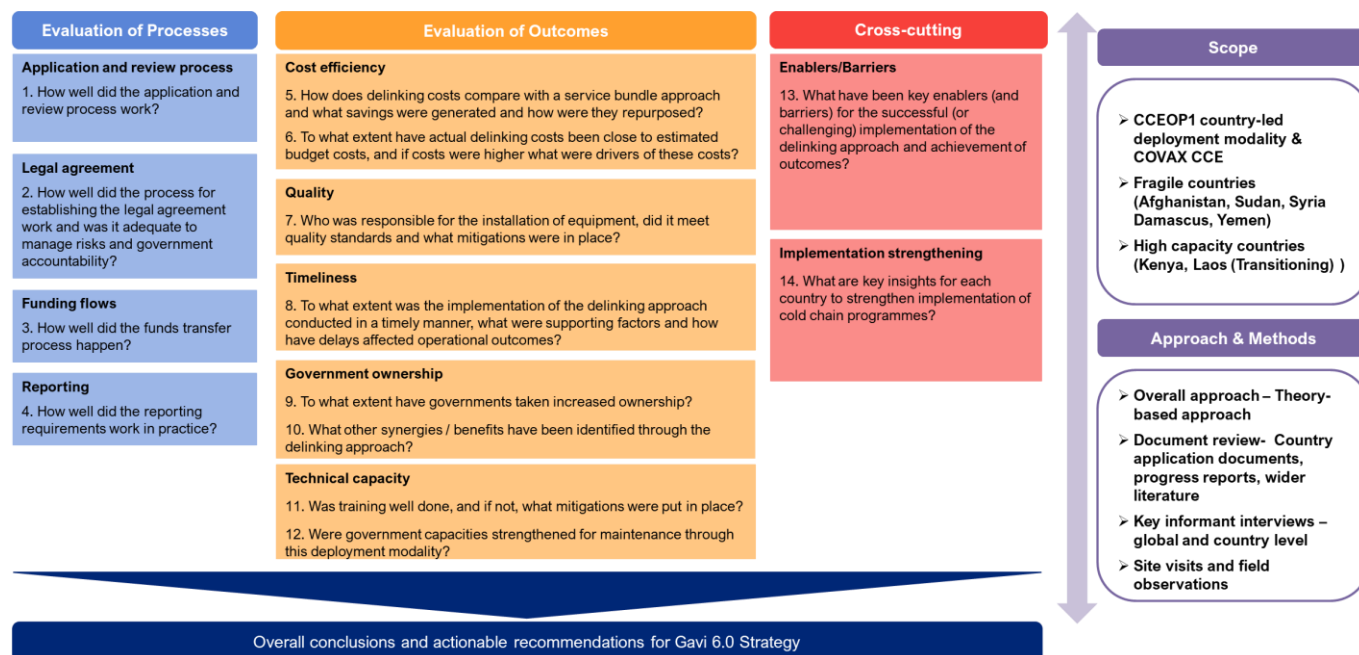
¹³ Data sources include: Syria COVAX CCE Operational Deployment Plan, Yemen COVAX CCE Operational Deployment Plan

¹⁴ Data sources include: Syria Gavi COVAX CCE Decision Letter 2021, Yemen Gavi COVAX CCE Decision Letter 2021

¹⁵ JSI (2022) Gavi CCEOP Evaluation 2022

¹⁶ Country case studies for Laos, Sudan, Syria and Yemen were carried out with the help of Global Health South Visions.

Figure 1.2: Evaluation framework, criteria and questions



Key **limitations** for the evaluation include: (i) the comparison with the supplier-led modality was not in scope, implying that some conclusions are not made with adequate context/comparisons; (ii) country case studies have not included countries with low capacity but without conflict, limiting the full consideration of countries to inform recommendations; (iii) the dataset provided to the evaluators by Gavi, UNICEF HQ and UNICEF CO has been incomplete and at times mistimed with evaluation data collection periods. Details on all limitations and mitigating actions can be found in Appendix B.4.

1.3. REPORT STRUCTURE

Following this introduction, the report has been organised in the following sections:

- Section 2 provides the evaluation findings, including findings on process (Section 2.1), outcomes (Section 2.2) and cross-cutting questions (Section 2.3).
- Section 3 presents overall conclusions.
- Section 4 provides recommendations for Gavi CCEOP investments in 6.0 through the country-led deployment modality.

The main report is supported by the following appendices: Appendix A includes the bibliography; Appendix B provides the detailed methodology; Appendix C provides the list of global level consultations; Appendix D provides the interview guides; Appendix E provides the site assessment tool; Appendix F provides a comparative analysis of the application and review process across CCEOP1, CCEOP2 and COVAX CCE; Appendix G provides an analysis of the risks identified during the review process; Appendix H includes the costing analysis; Appendix I provides an overview of the CCEOP1 reporting status; Appendix J provides country-specific barriers and enablers; Appendix K provides quantitative criteria for the eligibility criteria; and Appendix L maps the evaluation findings against the six country case studies.

In addition, the six country case study reports are included as separate documents.

2. EVALUATION FINDINGS

Evaluation findings are presented on the process (Section 2.1), outcomes (Section 2.2) and cross-cutting questions, as per the evaluation framework presented in Section 1.2. Appendix M provides a mapping of key findings by country.

2.1. PROCESS

2.1.1. Application & review process

EQ1. How well did the application and review process work?

Finding 1A: The application and review process for the CCEOP1 country-led deployment programme was inefficient and cumbersome, and along with the fragile and conflict setting of many of the pilot countries, contributed to lengthy approval timelines for most countries.

Strength of evidence rating	Rationale
High (4) 	Confirmed through documentation and data, and validated by global and country stakeholders.

Several application and review processes for CCEOP1 country-led deployment were run in parallel to other Gavi processes (in part due to its nature as pilot programme and the timing of its launch) and application materials were cumbersome. This compounded the already challenging circumstances in many fragile and conflict countries, extending the overall timelines for this process.

We describe the overall timelines first and then discuss the factors driving these timelines.

Across all six case study countries, the process from application submission to clearance and approval by Gavi lasted between 8 months and over 2 years as presented in Table 2.1. For COVAX CCE, as this was an emergency response, the application and review process was simplified and streamlined (e.g. there was no technical peer review) and concluded within less than six months (also presented in Table 2.1).

Table 2.1: Application and review timelines (timelines are based on information made available to evaluators)

CCEOP1				
Country	Application Submission	Peer Review Group report	Clearance and Approval	Total length (from submission to Grant Agreement)
Afghanistan	Early 2019	10 July 2019	August 2019	~ 8 months
Kenya	Early 2020	August 2020	N/A	~ 2 years ¹⁷
Laos	January 2020	March 2020	August 2020	~8 months
Sudan	Early 2020	15 May 2020	February 2021	~1 year
Syria Damascus	Sept 2022	N/A	NA	>1 year ¹⁸
Yemen	January 2020	27 July 2020	August 2020	~8 months

¹⁷ As the clearance and approval date is not available, the timeline is based on the Grant Agreement date and assuming 3 months for Grant Agreement process.

¹⁸ Application submission date based on consultation. As the clearance and approval date is not available, the timeline is based on the Grant Agreement date and assuming 3 months for Grant Agreement process.

COVAX CCE			
Country	Application Submission (no Peer Review Group process due to emergency program)	Clearance and Approval	Total length (from submission to clearance & approval)
Syria Damascus	August 2021	October 21	~ 3 months
Yemen	August 2021	November 2021	~ 4 months

There were four main factors regarding the design of the application and review process for CCEOP1 country-led deployment modality that contributed to protracted timelines:

1. **Additional processes to country CCEOP1 supplier-led deployment application:**¹⁹ Countries had previously submitted their (extensive) CCEOP1 application under the standard supplier-led modality, and were now required to submit an additional set of documents for the country-led deployment modality (e.g. a risk matrix, accountability framework, Gantt chart, budget, align on the phasing of implementation in the submitted ODP) and undergo a separate review process through the Peer Group Review.²⁰ This was due to the fact that CCEOP1 was a pilot which started after the completion of the standard CCEOP application. COVAX CCE and CCEOP2 consolidated this process in that countries could apply directly for the country-led modality and the standard Gavi IRC review replaced the Peer Group Review.²¹ We understand that in Gavi 6.0 this will be further consolidated through one cash grant application from countries.
2. **Cumbersome application process.** The application process included a detailed narrative proposal and a number of separate supporting materials (including Gantt charts, country risk assessment and accountability framework, and budget). The material also used different templates to the standard CCEOP application that some countries (e.g., Kenya and Sudan) completed previously for the supplier-led modality. For example, stakeholders in Sudan mentioned that the application was cumbersome, requiring new templates and separate budgets to the standard CCEOP application. However, it is noted that the evolution of tools across countries was also to align with specific country needs and based on learning over time – something that can be expected in a pilot program that sought to effectively manage key risks and issues. For example, COVAX CCE introduced simplified delinking application tools (e.g. the delinking toolkit). These improvements were built on during CCEOP2 (see Appendix F for further detail on introduced changes over time), and further consolidation is expected under the Gavi 6.0 approach of consolidating all cash grants.
3. **Insufficient upfront guidance to countries:** Some country stakeholders mentioned that there were no detailed guidelines for the country-led deployment modality and asked for additional upfront guidance to countries on the key requirements and tools to submit the application. More guidance in the application material to countries was introduced within the CCEOP2.
4. **Constrained country resources in relation to requirements:** Stakeholders across all countries flagged that the application and review process required heavy administrative workload and coordination between the different stakeholders involved (the Ministry of Health, UNICEF and Gavi) to put together the application and address Peer Group Review feedback.²²

¹⁹ Appendix F.1 provides more details on this process.

²⁰ For example, Laos had already submitted its standard supplier-led CCEOP proposal in September 2018, with formal approval granted through a decision letter in September 2019. Following Laos' strong desire to switch to the country-led deployment modality, a delinking proposal was submitted in January 2020 and approved in November 2020.

²¹ Appendix F.2 provides more details about these changes. It is not in scope for this evaluation to review the changes made under CCEOP2, however general comments on changes have been provided.

²² This is often a challenge with donor funding processes for countries and we note that Gavi has made several changes over time to simplify application processes over the years.

In addition to these design-specific factors, **a critical aspect driving delayed timelines was the conflict and fragile setting in many of these pilot CCEOP1 country-led modality countries** (Afghanistan, Syria, Sudan and Yemen). In addition, these processes took place during the COVID-19 pandemic which also impacted response times between stakeholders. There are also further country-specific factors impacting the timelines. For example, Kenya's process was also protracted because of considerable back and forth between Gavi/ UNICEF and the country on the appropriate delinking approach, along with delays due to political elections and working through the country's devolved structure. Syria also took longer to align on the delinking process with Gavi (due to ongoing UN sanction policy and lack of local technicians) and mistiming on templates of the grant agreement as the delays coincided with Gavi's revision of templates for 5.0.

Finding 1B: The review process for the CCEOP1 country-led deployment programme effectively identified key risks and appropriate mitigation measures, though maintenance-related risks were not emphasised.

Strength of evidence rating	Rationale
High (4) 	Confirmed through documentation on review reports and supported by most global and country stakeholders.

The Peer Group Review process was effective in assessing the key risks associated with the country-led deployment and ensuring that a number of risk mitigation measures were introduced (alongside broader quality reviews of country applications). Table 2.2 provides an overview of risks identified and mitigation measures recommended. Appendix G provides further analysis on the range of risks identified and mitigation measures proposed across the case study countries.

One of the main risk mitigation approaches introduced in the country-led deployment approach was the requirement to conduct a pre-post-installation inspection (pre-PIL). This included the deployment of a first batch of CCE (approximately 200 CCE units in most instances) and then the completion of a PIL on this sub-set to identify key bottlenecks and provide learnings for the country. This worked well in ensuring that any issues/ risks were identified early on and course corrections were introduced. The pre-PIL report provided assurance on country capacity and provided further recommendations to ensure quality installations such as on installation requirements, monitoring devices, and equipment and training documents required on site. However, the pre-PIL step inevitably led to longer timelines (discussed in Section 2.2.3).

Table 2.2: Key risks identified and examples of mitigation measures suggested

Risks	Mitigation measures
Limited country experience	- Establish PMT and sub-national PMTs - Advocate with sub-national leaders on high-priority of CCEOP - Ensure sufficient UNICEF support - Use local contractors (where required)
Unrealistic timelines	- Adopt a phased deployment approach - Revise timelines by allocating more time to installations/customs clearance and account for potential delays
Insufficient human resources	- Allocate more resources or more staff time - Expand the role of the PMT - Explain further who will be responsible exactly for which activity (between MoH, UNICEF, local contractors, partners)

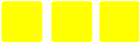
Risks	Mitigation measures
Site unreadiness	- Plan for deviation management - Plan for pre-installation validation for site readiness - Ensure installation is done in the dry season
Budget inconsistencies	- Revise budget to address the inconsistencies - Provide sources for specific costs (e.g. transport costs, training costs etc) - Add spare parts and RTMDs costs

However, key risks related to maintenance and spare parts deployment were not sufficiently identified. The PRG review process did not accord adequate emphasis to maintenance – both preventive and curative. While not part of the country-led deployment approach (including no budget lines for these aspects being included in the project budgets), it is viewed as an important limitation of the design. We understand maintenance is also not factored into the supplier-led deployment modality, however it is an aspect included in the main CCEOP application reviewed by the Gavi Independent Review Committee (IRC) through country submissions of a maintenance and decommissioning plan.

2.1.2. Legal agreements

EQ2. How well did the process for establishing the legal agreement work and was it adequate to manage risks and government accountability?

Finding 2: The legal agreements and accompanying accountability framework largely worked well in managing roles and responsibilities, risks and ensuring accountability. These could have benefitted from consolidating all relevant/ final documents as standard annexes.

Strength of evidence rating	Rationale
Medium (3) 	Confirmed through document review and mostly agreed by global stakeholders.

Mostly bilateral agreements were signed with countries under CCEOP1 country-led deployment modality. Gavi and UNICEF signed either tripartite (i.e. also including countries) or bilateral agreements for CCEOP1, with annexes containing the approved budget and an accountability framework on stakeholder roles and responsibilities. Table 2.3 provides an overview across the six countries. Tripartite agreements were established as the standard legal agreement template. However, under specific country circumstances, country request for bilateral agreements were approved with adequate justification presented by the requesting country. For example, for Yemen and Syria, bilateral agreements were signed due to the United Nations (UN) sanction policy which does not allow UN bodies to sign agreements with governments under sanction. For non-conflict countries, stakeholders emphasised that further effort should be undertaken to ensure that tripartite agreements are used (e.g. for Kenya, where tripartite agreements with Gavi have been signed previously).

Table 2.3: Overview of Grant Agreements per country

Country	Grant Agreement
Afghanistan	Tripartite
Kenya	Bilateral + country commitment letter with Accountability Framework
Laos	Tripartite
Sudan	Bilateral + country commitment letter with Accountability Framework
Syria Damascus	Bilateral + country commitment letter with Accountability Framework
Yemen	Bilateral + country commitment letter from South government ²³ with Accountability Framework

For COVAX CCE, instead of a grant agreement, a commitment letter by the UNICEF CO Representative was issued (instead of from Gavi) to accelerate timelines given the emergency situation. Stakeholders generally agreed that this was appropriate given the need to accelerate the process, but that this approach should be applied in an emergency context only.

Overall, all stakeholders agreed that the accountability framework was effective in securing stakeholder buy-in and establishing clear roles and responsibilities across programme activities, according to the unique country context. Table 2.4 presents a simplified summary of which stakeholder had key roles across different programme activities across countries (more details are included in each country case study report) and highlights that UNICEF CO had a greater role in fragile and conflict countries.

Table 2.4: Key roles according to the Accountability Framework

Responsibilities	Afghanistan	Kenya	Laos	Sudan	Syria	Yemen
Project Management	Gov/UNICEF	Gov/UNICEF	Gov/UNICEF	Gov/UNICEF	Gov/UNICEF	Gov/UNICEF
Procurement & Shipment	UNICEF	UNICEF	UNICEF	UNICEF	UNICEF	UNICEF
Customs clearance	UNICEF	Gov	Gov	Gov	UNICEF	UNICEF
Transport In-Country	Gov/UNICEF	UNICEF	Gov	Gov	UNICEF	UNICEF
Warehousing/Storage	Gov/UNICEF	UNICEF	Gov	Gov	UNICEF	UNICEF
ToT Technicians	Supplier/ Gov/UNICEF	Supplier/ Gov/UNICEF	UNICEF ²⁴ / Gov	UNICEF/Supplier/ Gov	Supplier/ Gov/UNICEF	Supplier/ Gov/UNICEF
Installation & Training	Gov/UNICEF	Gov/UNICEF	Gov/UNICEF	Gov/UNICEF	Gov/UNICEF	Gov/UNICEF
Post Installation Inspection²⁵	UNICEF	UNICEF	Gov/UNICEF	UNICEF	UNICEF	UNICEF
Monitoring & Reporting	UNICEF	Gov/UNICEF	Gov/UNICEF	Gov/UNICEF	Gov/UNICEF	Gov/UNICEF
Insurance	Gov	Gov/UNICEF	Gov/UNICEF	Gov/UNICEF	Gov/UNICEF	UNICEF

A review of the frameworks highlights a few areas of improvement:

- **Multiple stakeholders accorded responsibility for some activities.** As can be seen from the table, a number of activities accorded government and UNICEF with joint responsibility. While generally okay, given the hand-in-hand role of government and UNICEF CO, it would be helpful to identify leads and demarcate responsibility and accountability between different stakeholders.

²³ The letter specifies that “In the absence of a Commitment Letter from the Ministry of Health in the North Yemen, the project will proceed based on the Commitment Letter received through the Ministry of Health in the South Yemen of the Internationally Recognised Government”.

²⁴ ToT of technicians was outsourced to a local contractor contracted by UNICEF.

²⁵ PIs were conducted by third party contractors contracted by UNICEF through LTAs or when this was not possible due to fragile state context, a local third-party contractor was contracted. In Table 2.2., the role of UNICEF and the government refers to their responsibility in identifying and contracting the third party contractor and ensuring that the PI was conducted.

- **Lack of standardised approach to monitoring and reporting and inconsistencies between documents:** Monitoring and reporting requirements were not standardised across documents (e.g. Grant Agreement, accountability frameworks) and countries which led to inefficient reporting, as further explained in Section 2.1.4.
- **Lack of reference to in-country government coordination:** Given a number of government departments are involved in deployment, it would be helpful to identify the role of specific departments against different activities to encourage coordination, buy-in and better accountability (as for example was done in the Sudan accountability framework).

In addition, maintenance related roles and responsibilities were not flagged in the accountability framework – noting these were not explicitly included in the design of the country-led (and supplier-led) deployment modality.

Finally, stakeholders noted that the legal agreement could have been improved by including standardised annexes. For example, consolidating all the standardised documents in the annexes – including the risk matrix, the agreed deployment timelines from the Gantt charts, and the monitoring requirements – would have made the legal agreement a more effective reference for deployment arrangements, thereby strengthening accountability. Based on the CCEOP1 grant agreement experience, CCEOP2 incorporated the risk matrix, the Gantt charts with the deployment timelines and the monitoring requirements (in addition to the accountability framework), as annexes to the grant agreement, and further efforts are ongoing to further improve standardisation.

2.1.3. Fund management

EQ3. How well did the funds transfer process happen?

Finding 3: The funds transfer process between Gavi, UNICEF and the government largely worked well, on the back of sufficient financial management capacity of UNICEF CO and effective coordination with the Ministry of Health. However, the reprogramming of unspent funds was cumbersome and lengthy.

Strength of evidence rating	Rationale
Medium (3) 	Confirmed through documentation and global and country stakeholder interviews. Limited evidence is available in the narrative progress reports and the financial reports on any issues with funds transfers limiting triangulation of findings.

The country-led deployment modality involved two distinct fund transfers: (i) at the global level, funds were transferred from Gavi to UNICEF CO for the overall sum of the service-bundle deployment; (ii) at the country level, funds were transferred from UNICEF CO to the Ministry of Health or local service providers for activities within the service-bundle implementation.²⁶

The fund transfers between Gavi and UNICEF CO worked well. Stakeholders did not raise any issues with the fund disbursement, suggesting that things generally worked smoothly.

Fund management of the service-bundle implementation at the country level from UNICEF CO to the Ministry of Health and local service providers worked under UNICEF's Financial Rules & Regulations (FRR) and Harmonised Approach to Cash Transfers (HACT) policy, and entailed UNICEF CO as the fiduciary manager. UNICEF CO are using and applying the HACT modality across country typologies. The CCEOP delinking project was set up with the intent that only funds that are needed for the service-bundle implementation by the Government will be routed via the Government on a reimbursement basis. Any service-bundle implementation activity to be carried

²⁶ Additionally, fund transfers between Gavi and UNICEF SD for CCE procurement worked well. This fund transfer process is the same for country and supplier-led CCEOP. Stakeholders did not highlight any delays or issues in this process related to the country-led deployment.

out by service providers would be done directly through UNICEF contracts, rather than routed via the Government. This follows UNICEF's internal processes for settling invoices against POs or Service Contracts that may be through tendering or LTA holders. Stakeholders largely commented that the process worked well and there were no significant delays or issues.

The efficiency of the fund management of the service-bundle implementation was dependent on the financial management capacity and coordination between UNICEF CO and the Ministry of Health. As highlighted in Section 2.1.1, the review process was effective in assessing and mitigating risks in financial management capacity at the country level, by requesting allocation of extra human and financial resources for financial management. For example, during the Laos application review process, the country was requested to clarify the resources allocated to financial management at UNICEF CO and the Ministry of Health. Similarly, in Sudan and Yemen, the review process also requested clarifications on the resources for financial management at UNICEF CO. Good financial management capacity at the UNICEF CO and good coordination with the Ministry of Health ensured effective fund transfers as overall no red flags were raised.

Reprogramming of unused funds was more complicated and delayed. With regards to the reprogramming of unused funds, country stakeholders highlighted that the fund management arrangements in place ensured good financial risk management in conflict settings, but complicated reprogramming²⁷ of unused funds, leading to deployment delays.

Country joint investment requirements were addressed through Gavi Health Systems Strengthening (HSS) funding.²⁸ However, this may become a challenge under Gavi 6.0. As shown in Table 2.5, Afghanistan, Kenya, Laos, Sudan Syria and Yemen, all used HSS funds to cover their country joint investment financing budget for CCEOP1. Global stakeholders mentioned that in Gavi 6.0 this will no longer be feasible given the introduction of the consolidated grant.²⁹ As the country joint investment needs to be paid upfront, if countries are unable to pay their portion, they would need to prove that other CCE financing is available from other donors. Another issue could be if the Gavi budget timeline is misaligned to the country's financial years, which may lead to delays in procurement and the process more generally. Stakeholders suggested that delaying the country joint investment payment to align with the country financial years or allowing for country payment to be paid in tranches could be viable alternatives. However, other stakeholders highlighted the risk that this could lead countries to defaulting their payment. This issue does not apply uniquely to the country-led modality but represents a broader issue across Gavi projects.

Table 2.5: Overview of joint investment requirements and payments

Country	Joint investment split (country – Gavi)	Country joint investment payment
Afghanistan	20%-80%	HSS funding
Kenya	50%-50%	HSS funding
Laos	50%-50%	HSS funding (for toolkits)
Sudan	50%-50%	HSS funding
Syria Damascus	20%-80%	HSS funding
Yemen	20%-80%	HSS funding

²⁷ The reprogramming of funds relates to reprogramming for additional bundled activities, which entails both additional CCE and associated service-bundle implementation. This requires as per Gavi rules and procedures a new costed operational plan (COP), and related approval processes.

²⁸ This is not delinking specific. This issue of HSS funded country joint investments applies to all projects irrespective of deployment modality. Gavi revised their policy for 5.0 that conflict/fragile state countries could still avail of HSS for the country joint investment portion. Hence given the overweight of fragile states, the majority of country joint investment was sourced via HSS.

²⁹ Countries can use also proof of other CCE procurement eligible under Gavi support as opposed to the traditional cash contribution to satisfy co-financing requirements.

2.1.4. Reporting

EQ4. How well did the reporting requirements work in practice?

Finding 4A: Programmatic reporting did not work well due to fragmented reporting requirements, non-standardised templates, involvement of multiple stakeholders, poor timeliness and inadequate monitoring capacity. The implication is that there are incomplete and inconsistent updates on the deployment status, limiting the ability for Gavi to exercise oversight.

Strength of evidence rating	Rationale
High (4) 	Confirmed through documentation and data, and global stakeholder interviews.

Documentation management across CCEOP1 country-led deployment modality has been weak. This evaluation has found it very challenging to access country-level documentation for the CCEOP1 country-led deployment modality (across application documents, review reports, progress reports, ODPs, etc.). Documentation has been incomplete, often with multiple versions of the same document being shared with the evaluation team and different versions of documents marked “final”. For example, based on the reporting documents provided to the evaluators, annual Financial Statements for Syria and Yemen, as well as progress reports for Sudan, Syria and Yemen are missing (refer Appendix I). Further, there is no systematic process of document management or document ownership with different stakeholders across countries holding key and final documents. Often draft documents are available with different stakeholders, who are unaware of updated final documents.

Programmatic reporting did not work well due to multiple interrelated challenges resulting in inconsistencies and limited usefulness. In particular:

Reporting requirements were ad-hoc and non-standardised, resulting in fragmented, inconsistent and incomplete documentation across countries. A review of the CCEOP1 documentation revealed that the reporting requirements were dispersed across several instruments, rather than being consolidated in one framework. For example, the legal agreement described reporting requirements as per the standard Gavi requirements however the accountability framework required bespoke reporting for the country-led deployment modality.³⁰ This created confusion amongst stakeholders as to the exact reporting requirements. In addition, there were no standardised templates or requirements for reporting and thus reporting was done in an ad-hoc manner across countries. For example:

- The bi-annual and annual progress reports by UNICEF were sometimes provided in a narrative word document, excel spreadsheet or PPT. For instance, the progress reports from Sudan are both in PPT and word format. In contrast, the progress reports from Laos are only in excel spreadsheets.
- The content and level of detail in the progress reports is inconsistent across countries. For instance, the Sudan progress report does not include a six-month timeline showing the status of the service-bundle deployment, whereas the Afghanistan report provides this information. Similarly, the Sudan report does not include details on technician training, which are included in the Afghanistan report.

³⁰ The legal agreement required: (i) UNICEF and the government to jointly report on activities on 30 June and 31 December to the in-country Interagency Coordinating Committee or Health Sector Coordinating Committee; (ii) reporting on activities to be included into the standard reporting of the government to Gavi; (iii) a UNICEF annual financial statement of the calendar year expenditure. The Accountability Framework required: (i) an installation report after every installation and training; (ii) a pre-P11; (iii) a technicians training report; (iv) the registration of the received CCE in the national property database

- The technician training reports across the six country case studies, and sometimes within countries, were all in different formats. For example, the training reports from Laos provide an overview of the positions and responsibilities of the trained technicians, the details of the syllabus covered as well as the participants feedback on the training. In comparison, the training reports done in Afghanistan do not provide the same information.

Several changes have been introduced during CCEOP2 which have streamlined and standardised reporting, including increasing frequency. In particular: (i) Monthly implementation status reports are to be submitted after the first test batch which is subject to the pre-PIL; (ii) Quarterly implementation status reports to be submitted for the deployment of the subsequent batches. These requirements have been added as an Annex D to the legal CCEOP2 Grant Agreement. Moreover, the template for this reporting is contained in the Delinking toolkit to ensure streamlining of the documents. Global stakeholders commented that this has improved reporting and oversight, although it is beyond the scope of this evaluation to assess whether the changes made in CCEOP2 has led to more effective reporting in practice.

Multiple stakeholders were involved in reporting, leading to inconsistencies in programmatic status updates.

- As per the accountability framework, **different stakeholders were responsible for different aspects of the programmatic reporting chain**. Firstly, local technicians were responsible for compiling the installation checklists. These would then need to be recorded at the subnational level and then compiled by the PMT at the national level to get a status of the country-led deployment status. UNICEF CO then engaged with the PMT to get deployment updates and submitted progress reports to UNICEF SD and PD, and Gavi.
- Since reporting was not streamlined and non-standardised across different documents, this meant that **the flow of information across the different stakeholders was not smooth and timely**. As a result, stakeholders often held different versions of the deployment status at any given time. This affected the programmatic information on the CCE deployment. The document review corroborated this finding.
- Several stakeholders commented that, when status updates were requested, **information had to be compiled manually from various sources, causing delays and limiting UNICEF HQ and Gavi's ability to exercise timely oversight**. This challenge was also faced by the evaluators when requesting documents for this evaluation and it was incredibly challenging to piece together a coherent programmatic progress review through the various documents received.
- **In contrast, in the supplier-led modality, stakeholders noted that reporting was more streamlined**. Apart from procurement reporting managed by UNICEF SD, the supplier was responsible for preparing and submitting all deployment reports. Stakeholders commented that suppliers have more consolidated lines of reporting and charge high project management fees which include monitoring and reporting costs. Moreover, as further described in Section 2.2.2, unlike governments, suppliers usually have digitalised reporting systems which ensure that data is stored in one place at the same time.

As shown in Appendix I, the numbers of CCE deployed varied across the operational deployment plans, the costed operational plans, the information held at Gavi HQ, the narrative progress reports, and the latest information on the CCE installations provided by the UNICEF CO. The document collection and analysis indicated that Gavi does not have clear visibility on the status of deployment in each country, in particular on: (i) the number of CCE installed in the country to date; (ii) the status of the CCE across the different stages (from the application, procurement, shipment, customs clearance, warehousing, transportation and installation). As also shown in Appendix I, different documents contain different information on the number of CCE procured and installed in each country in part reflecting the evolving nature of the deployment plans. In addition, not all reporting documents are available at the Gavi level. This was the result of the project design whereby it was agreed that UNICEF would be reporting only on the number of CCE installed in the country and not the status across the different stages of deployment, as deployment is managed in-country, and not via contracted supplier (similar to the supplier-led deployment). This was then adjusted as part of CCEOP2 through the introduction of the monitoring and reporting annex in the grant agreement.

Reporting was not carried out in a timely manner, limiting its usefulness for addressing implementation challenges and enabling course corrections. Except for the pre-P11, the other reporting mechanisms were often not timely to address bottlenecks and challenges. Deployment status updates were only requested bi-annually. In addition, stakeholders highlighted that the fact that there were multiple reporting layers involved, led to information being delayed. Several global stakeholders described that, following procurement, there was limited visibility between the equipment arrival and installation. One stakeholder said: *“once the equipment arrives to the country, we often don’t have the installation data, we don’t know if the equipment is in the warehouse or is being distributed. We need more frequent check-ins. Otherwise we might find out a year later that progress has not taken place.”* Moreover, the site assessments found that the installation reports were not shared regularly at district or national levels, delaying the timeliness of information being shared to next reporting layer and preventing early identification of issues.

There was limited oversight capacity due to insufficient human resources. Stakeholders noted that the lack of resources at Gavi dedicated to overseeing CCEOP more generally (including the country-led deployment modality), both in the Health System and Immunisation Strengthening (HSIS) and country teams, reduced Gavi’s monitoring capacity and led to an overreliance on UNICEF to report any implementation issues. In particular, unlike Gavi’s standard grant reporting, CCEOP1 reporting was handled by the Gavi HSIS team and not by the Gavi SCMs. In general, this can be viewed as sufficient given the Alliance nature of Gavi and need to harness different partner strengths and capacities, as well as function efficiently within the Secretariat. However, stakeholders commented a degree of disconnect as Gavi SCMs manage Gavi’s relationships with the countries and overall Gavi had reduced ability to have constant visibility on the deployment process and intervene promptly in case of bottlenecks and challenges.

Finding 4B: Financial reporting was suboptimal as the standard UNICEF financial reporting limits tracking of expenditures against the key budget items of the country-led modality.

Strength of evidence rating	Rationale
High (4) 	Confirmed through documentation and data, and strong agreement among global stakeholders.

The standard UNICEF financial reporting does not track expenditure against the budget line items specific to the country-led modality, limiting the usefulness of the financial reports. UNICEF was required to provide an annual financial statement. However, the standard UNICEF financial reporting provides an overview of the total expenditures per year (i.e. one figure) against the Gavi CCEOP1 grant and an overview of the total spending against the UNICEF country programme budget lines.³¹ This standard reporting does not allow tracking of expenditures against the key components of the country-led deployment modality (namely project management, warehousing, in-country distribution and transport, installation, and training), limiting its usefulness in tracking budgets versus actuals (and any learnings thereof) as well as overall accountability.

This has improved under CCEOP2 through the addition of a project-specific, “non-standard financial utilisation sheet” in the legal grant agreement in Annex D and to the Delinking toolkit. This sheet allows for more detailed financial reporting by tracking expenditures against the country-led deployment modality cost categories. UNICEF COs are now required to report on this bi-annually. Some stakeholders commented that this has increased oversight on

³¹ The standard UNICEF financial reporting is based on a global digitalised reporting system. The budget lines and reporting are based on each UNICEF country programme budget, rather than each grant programme. The country programme budget lines represent the different activities of the whole UNICEF country programme (such as systems capacity for health service delivery, national immunisation programme, EPI enabling environment, cold chain management, communication) rather than the Gavi grant budget lines. As this system is digitalised, the UNICEF CO downloads a report for Gavi which shows the expenses of the whole CCEOP grant against the UNICEF internal country programme budget lines, instead of the CCEOP1 grant budget lines.

expenditures against the different costs of country-led deployment. However, some stakeholders also highlighted that, as this is a UNICEF non-standard report, UNICEF CO have to develop this manually, which requires additional time and resources.

Going forward, stakeholders highlighted the need to develop a “non-standardised – standardised template”, which can be incorporated into UNICEF’s financial digital system and which allows tracking at the UNICEF level against the country-led CCEOP five budget lines (project management, warehousing, in-country distribution and transport, installation, and training) to streamline reporting, reduce manual work and improve consistency and financial tracking across countries.

2.2. OUTCOMES

2.2.1. Cost-efficiency and cost-savings

EQ5. How does delinking costs compare with a supplier-led service bundle approach and what savings were generated and how were they repurposed?

Finding 5A: The country-led deployment modality offered significant cost savings, although the drivers of these cost-savings are context-specific and may not apply equally across all countries. Cost savings were contingent on being able to leverage existing country capital and operational expenditure and can be underestimated if these are not in place.

Strength of evidence rating	Rationale
High (4) 	Confirmed through global and country stakeholders, actual cost data in Kenya and Sudan and an analysis of country-led modality cost data compared with modelled benchmarking data for supplier-led deployment from UNICEF.

The country-led deployment modality can offer significant cost savings – in the range of 40-65% – when compared against (modelled) supplier-led deployment. The actual quantum of cost savings is highly context-specific and may not apply across all countries. As shown in Figures 2.1-2.4, the comparative analysis of service-bundle costs with country and supplier deployment shows that country-led deployment is between 35-87% (low and high modelled amount respectively) cheaper across countries in the case of ILRs, and between 39-74% (low and high modelled amount respectively) cheaper in the case of SDDs. Most countries fall in the range of 40-65%.

These findings are subject to the following caveats:

- As explained in Appendix H.1, our methodology for the costing analysis uses *actual* country-led deployment costs and *modelled* supplier-led deployment costs from the UNICEF Supplier-led 2021 benchmarking tool³². To compare, the weighted average unit costs per SDD and IRL unit was calculated based on actual equipment type and volume ordered by countries.
- The tool provides an estimated cost of delivery and installation of a specific number of CCE based on different suppliers across Gavi countries taking into account country contexts (including security, site remoteness and labour costs) as well as equipment specifications. However, the tool does not include the same service bundle cost categories used in the country-led deployment budgets, which limits like-for-like comparison. For example, project management costs under supplier-led also include deviation allowance, security and longer warranty

³² Benchmark_v2_Final June 2021.

provisions, which are not included under the country-led deployment modality. In contrast, the country-led deployment service-bundle costs includes customs clearance costs and UNICEF HQ recovery fee costs.

- The costing analysis looked at high-capacity (Kenya, Laos) and conflict countries (Afghanistan, Syria, Sudan).³³ These results may therefore not be applicable to fragile countries which are not conflict countries or non-fragile low-capacity countries. As further elaborated below, the drivers of these cost savings are country-specific.

Figure 2.1: % Estimated cost savings for country-led vs modelled supplier-led modality per ILR unit

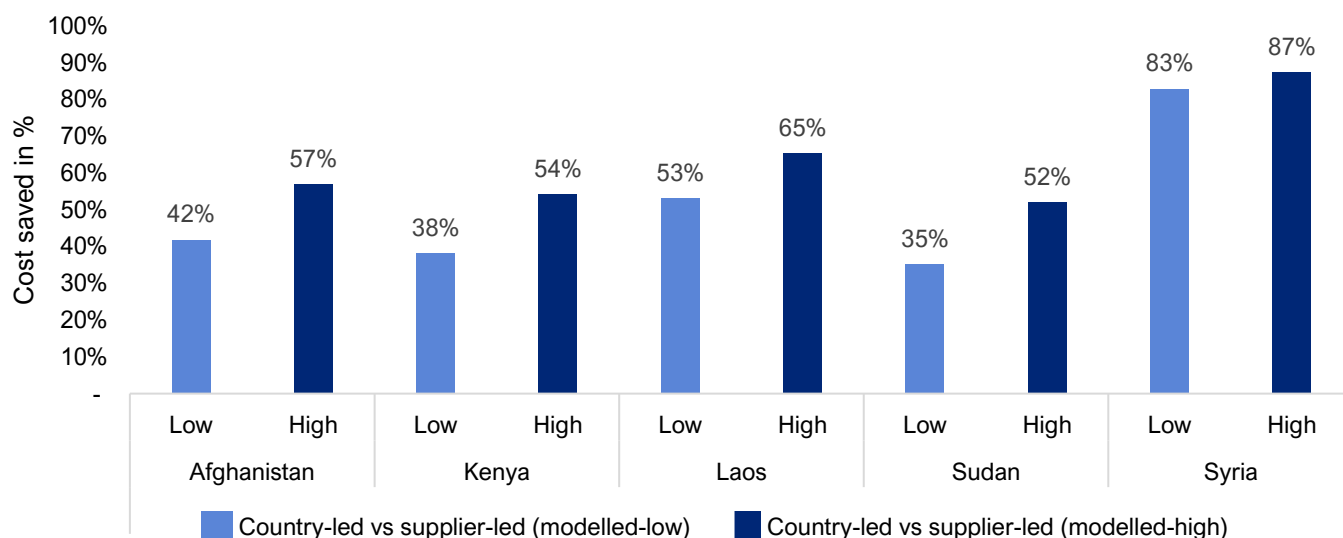
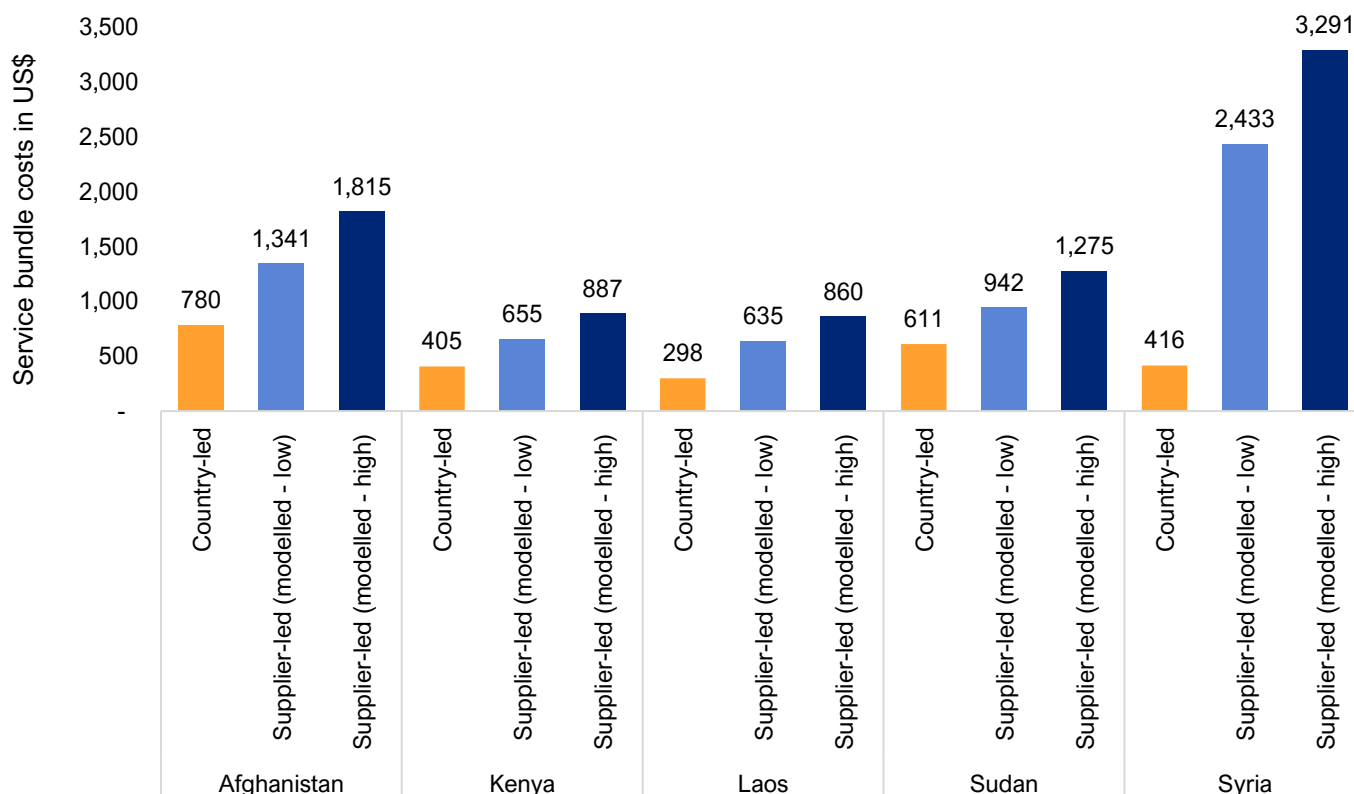


Figure 2.2: Weighted average service-bundle cost per unit by ILR for country-led vs supplier-led deployment



³³ Due to lack of documentation received from Yemen given the ongoing conflict, the cost analysis does not include Yemen.

Figure 2.3: % estimated cost savings for country-led vs modelled supplier-led modality per SDD unit

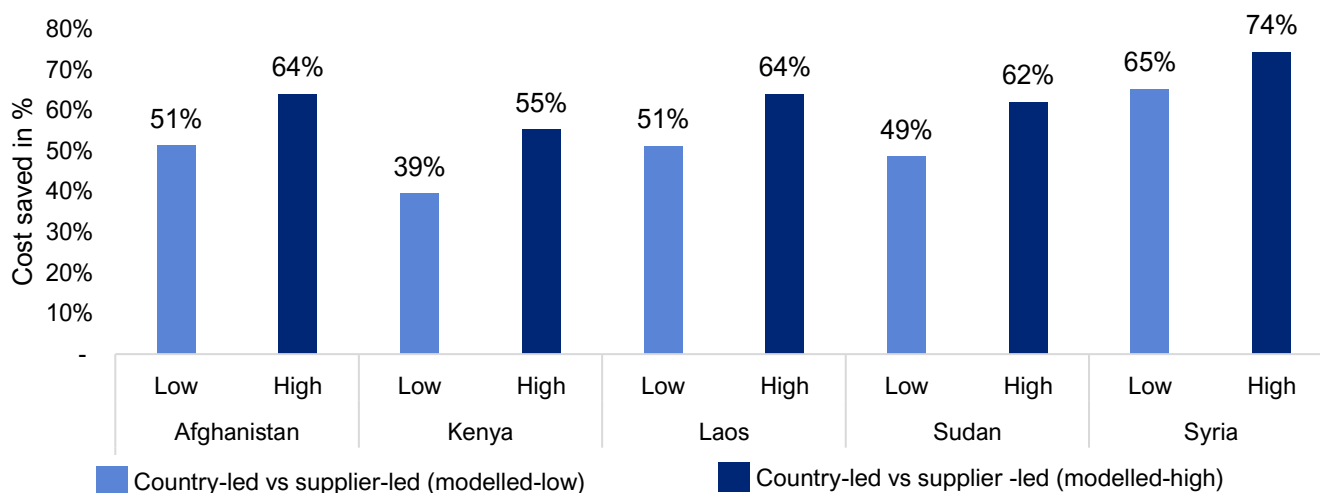
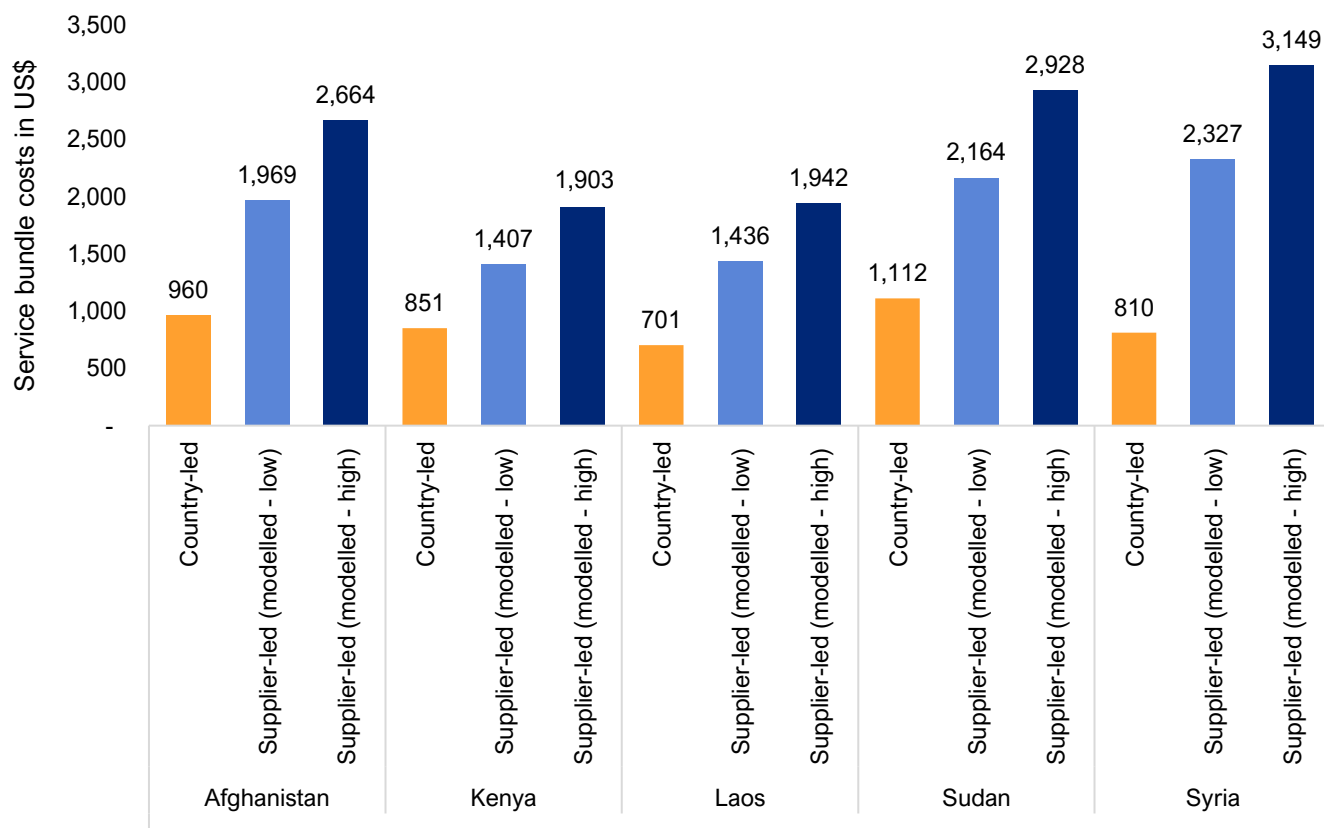
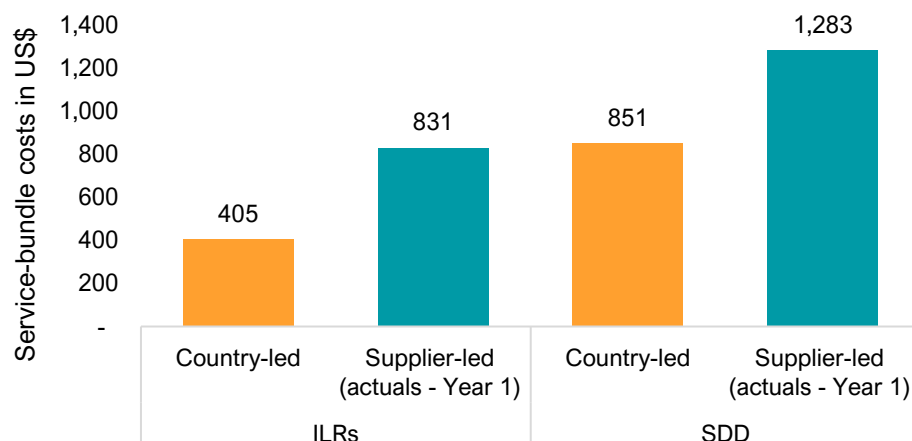


Figure 2.4: Weighted average service-bundle cost per unit by SDD for country-led vs supplier-led deployment



Analysis of actual supplier-led service-bundle costs in Kenya and Sudan confirmed that country-led deployment is cheaper than supplier-led deployment. Kenya carried out its CCEOP Year 1 deployment through the supplier-led approach, before switching to the country-led approach. As shown in Figure 2.5 and further explained in Appendix H.3, analysis of the actual costs of the Year 1 supplier-led deployment shows that country-led deployment was cheaper by 51% for ILRs and 34% for SDDs. Similarly, Sudan conducted its Year 1 SDD deployment through the supplier-led approach. The comparison shows that country-led deployment was 24% cheaper.

Figure 2.5: Kenya service-bundle cost per unit by ILR and SDD for country-led vs actuals in Year 1



Overall, cost savings through the country-led deployment modality was highlighted during all of our global and country level stakeholder consultations. Additional confidential analysis conducted by UNICEF also confirms this.

The drivers of these cost-savings are context-specific and may not apply equally across all countries. The key factors driving down the costs of the country-led service-bundle deployment include:

- Leveraging of existing public sector human resources and, to a lesser degree, vehicles:** Country-led deployment is usually carried out by existing government technicians and also leverages existing staff to support on project management and coordination. In some instances, the country-led deployment modality also relies on partial use of government vehicles (unless this is fully covered under distribution agreement managed by UNICEF CO). In countries where there is spare capacity of technicians to install the CCEOP equipment and vehicles are available, there are no additional direct costs by the government for these aspects, and this can be considered a “sunk cost” by the government which would take place anyway. This is especially the case in high-capacity countries like Kenya which has been able to leverage existing government technicians and vehicles. **However, when already financed human resources are not available and cannot be leveraged, the budgeted costs of the country-led deployment can be underestimated and potentially lead to an absence of sufficient resources to ensure timely and high quality deployment.**
- Leveraging long-term contracts for warehousing and delivery that can offer good value for money:** As illustrated by the Accountability Frameworks and the country stakeholder consultations, existing UNICEF CO long-term agreements (LTAs) for warehousing and delivery were leveraged, which can lead to lower costs in these areas. Instead, suppliers generally need to hire warehousing space and transport for delivery often paying for warehousing on a weekly basis. Whilst this increases costs, it also introduces commercial pressure on the supplier to reduce the warehousing and delivery time, to achieve higher profit margins. **In contrast, in the case of the country-led deployment, some stakeholders commented that governments do not have the same pressure to free up space in the warehouses as these are managed by UNICEF (and not paid for on a weekly usage basis).**
- Lower project management costs due to lower insurance costs, risk premiums and profit margins and by leveraging lower country labour costs and, in some instances, existing partner resources.** Project management costs under the supplier-led deployment are higher than in the country-led modality, especially in fragile and conflict settings. This is due to the fact that external suppliers are often less familiar with the country context and require additional insurance and risk premiums to operate in these country contexts. For example, Figure 2.6 illustrates the different cost drivers in Afghanistan, illustrating how project management costs under supplier-led deployment can be significantly higher (Appendix H.2 similarly illustrates this for Sudan and Syria).

As a result, the country-led approach becomes a much more cost-effective and viable option in these countries. In other country settings, there are also often cost savings on project management costs due to lower local labour costs (compared to project management by a global supplier) and, in some instances, by leveraging on existing partner capacity to further support the project management.

Figure 2.6: Afghanistan service-bundle cost breakdown for the average ILR and SDD unit under country-led vs (modelled) supplier-led modality in percentages (top) and in actual US\$ (bottom)³⁴



Overall, the cost analysis found that deployment through the country-led approach is significantly cheaper than with the supplier-led approach. **However, the cost savings are dependent on context-specific drivers, which may not apply to all countries. In particular:**

- Cost savings in high-capacity countries are mainly driven by “sunk costs” which the government can leverage (such as existing human resources, project management capacity and, to a lesser degree, vehicles)
- Cost savings in fragile and conflict settings are mainly driven especially by the absence of risk premiums which are generally charged by suppliers to operate in high security areas.

It is important to highlight that given the lack of data for countries which are not high-capacity and non-conflict countries, one cannot expect the same cost savings to be applicable unless the countries exhibit some of the underlying drivers outlined above.

Some of the cost savings under a country-led deployment approach can come with its own set of unintended consequences. For example, reduced commercial pressure when using government facilities and existing LTAs can

³⁴ The supplier-led costing of the technical training is covered under installation and commissioning. The project management component under supplier-led also includes risk premiums, insurance and profit margins.

lead to longer lead times for deployment of CCE. As such, any cost savings should also be considered holistically to the actual time required to implement the country-led deployment (not including the Gavi application time). As explained in Section 2.2.3, country-led implementation can be lengthier than the supplier-led implementation and this needs to be taken into account while assessing the cost-effectiveness of the modality.

Finding 5B: Cost savings from country-led deployment were used to purchase additional CCE.

Strength of evidence rating	Rationale
Medium (3) 	Based on modelled benchmarking data for supplier-led deployment from UNICEF. Uncertainty remains on the specific estimates given the difficulties in directly comparing country-led vs supplier-led costs for a single deployment round.

The CCEOP1 grant budget ceiling had already been agreed by Gavi with the Decision Letter for the supplier-led deployment. As countries decided then to switch to the delinking modality, stakeholders reported that the cost-savings led to additional purchasing of equipment.

While there is no documentation on the exact number of additional CCE purchased exclusively due to cost savings from a modality switch, we used modelled estimates based on supplier-led benchmarking data to approximate this number.³⁵ This was calculated by estimating the total number of IRLs and SDDs units that could have been purchased hypothetically by a country using the modelled weighted average supplier-led prices for IRLs and SDD.³⁶ These numbers were then compared against the actual number of units purchased under the country-led modality to determine an estimate of additional units.

Table H.3 in the Appendix shows the hypothetical additional units purchased under the country-led deployment (Appendix H.3 provides further details for each country). The analysis shows that the estimated cost savings allowed for a range of ~50 to 180 additional CCE units additionally purchased due to cost savings under country-led deployment modality.

EQ6. To what extent have actual delinking costs been close to estimated budget costs, and if costs were higher what were drivers of these costs?

Finding 6: Actual delinking costs largely matched budget costs when there were no significant implementation delays. However, in countries with longer implementation delays budget revisions have been required mostly due to general price inflation and costs increases related to security concerns.

Strength of evidence rating	Rationale
Low (2) 	The findings are supported by limited documentation – with a key challenge being that UNICEF financial reports do not provide a detailed breakdown against the budget. Additionally, the CEPA team did not receive financial reports over time for all countries making it difficult to accurately track and attribute budget changes and some countries continue to still implement.

³⁵ The number of units included in the initial decision letters to countries was not used for this calculation, as additional units cannot be exclusively attributed to cost savings given that unit differences between decision letter and actual purchases also reflect changes in type of CCE equipment purchased.

³⁶ These used the same specifications of IRLs and SDD types purchased under the country-led deployment modality allowing for a more direct comparison.

Actual country-led deployment costs were largely in line with the budgeted costs in countries where there were no large implementation delays once budgets were finalised (e.g. Kenya and North Yemen). As noted in Section 2.1.1, several revisions of the budgets were required across countries during the review process to correct inaccuracies and global stakeholders commented on the need to double-check sources for the bottom-up costing exercise to ensure accurate estimates. However, no major deviations were identified between the total expenditures and the total revised budget contained in the legal grant agreements.³⁷

Given the lack of detailed and regular financial reporting against CCEOP1 budget line items (see Section 2.1.4), it was not possible to assess if there were any changes against different budget categories over time. However, stakeholders reported that some flexibility to change spending allocation across budget categories has been used and is generally helpful to adapt to changing costs arising from price fluctuations and exchange rate movements.

In contrast, in countries that experienced longer delays in implementation, accurate budgeting was more of a challenge and needed revision. This was in particular the case in countries where conflict and fragility led to a longer delay in implementation (e.g., due to putting deployment on hold during conflict or government change). For example, Sudan's deployment is not yet completed and to date, there were some minor cost savings due to exchange rate movements during the first deployment phase. However, the planned budget was not accurate for the second deployment phase which got delayed due to the outbreak of the war. The initial budget planning underestimated the costs due to price inflation and increased costs related to the conflict. This delay also coincided with a range of process challenges to complete the new grant agreement with Gavi (including completion of the certified financial review and wider legal adjustments between Gavi and UNICEF legal teams) leaving Sudan currently in a situation in which equipment arrived, but no funding was available for deployment.

2.2.2. Quality

EQ7. Who was responsible for the installation of equipment, did it meet quality standards and what mitigations were in place?

Finding 7A: The quality of installations was acceptable and in line with specifications but the reporting process remains a challenge in most countries.

Strength of evidence rating	Rationale
High (4) 	Based on site assessments, documentation (especially pre-PIL and progress reports) and global and country stakeholder consultations (including with cold chain technicians).

The vast majority of CCE installations were done to an acceptable or at least adequate quality (see Table 2.6).

³⁸ The quality of installation did not vary significantly within countries (based on current data), but (minor) issues occurred more often with SDD installation in remote and hard to access areas (e.g., see examples for Afghanistan, Kenya and Laos in Table 2.6). A common shortcoming related to securing cables or positioning of the equipment. This evidence to-date from the site assessments is also supported by the insights from the pre-PILs which were completed for all countries (see Table 2.6) where only significant issues in Sudan were identified.

Under the country-led deployment, the distribution of equipment was more country context specific with most countries using a mix of government and UNICEF LTA transporters, but both Syria and Laos relying on local private service providers.

³⁷ The exception to this has been Laos which required a change in budget due to CCE price increases and freight surcharges driven by the COVID-19 pandemic. However, this was seen as an unrelated issue to the country-led modality.

³⁸ Quality of installation was assessed against three groups following the approach of the post installation inspect reports: (i) acceptable; (ii) unacceptable and (iii) adequate with minor shortcomings.

No significant difference was observed in the quality of installations across government technicians and private sector providers. Stakeholders familiar with both country-led and supplier-led modalities stated that there was little difference in installation quality between modality highlighting that in reality often a similar group of local CCE technicians would be doing the installation regardless of modality (this was for example the case in Kenya where (current and former) government CCE technicians were also used under the supplier-led modality).

Table 2.6: Quality of installations across case study countries

Country	Installation conducted by whom	% of sites with acceptable & adequate installation	Issues (if any)	Pre-PIL data (% of sites acceptable)
Afghanistan	National technicians	49/50 (98%)	1 site unacceptable as solar panel was not fixed on the roof	86%
Kenya	County & sub-county government technicians	50/50 (100%)	6 sites (12%) assessed as adequate with minor shortcomings due to power supply cables of SDD not secured properly	100%
Laos	Local technicians for installation, delivery through Laos Industrial Solutions	28/28 (100%)	10 sites (36%) assessed as adequate due to equipment not being properly levelled or elevated from the floor, wiring problems including lack of a grounding system, and equipment not being securely fixed to the ground. These issues are primarily due to site unreadiness (including earthing, mounting and electrical connections) and relocation of the equipment to other sites	94%
Sudan	MoH-certified technicians	32/32 (100%)	2 sites (6%) required corrective action post installation, including due to non-functioning stabiliser (reportedly the equipment was damaged post-installation)	69%
Syria	Private contractor	9/9 (100%)	2 sites (22%) required minor corrective action post installation, including repositioning the equipment to maintain adequate clearance from walls	87%
Yemen	National technicians	9/9 (100%)	1 site adequate as solar panel was not well positioned and damaged by a rock but still functioning	92%

Legend: Red = less than 80% / Orange = between 80 - 90% / Green = above 90%

There have been some deviations in installations (ranging between 8-15% of CCE assessed) when compared with the finalised ODP. Deviations were predominately on public health grounds and roughly in line with the deviations seen under the supplier-led modality (see Table 2.7). Despite heavy involvement of country stakeholders (including sub-national stakeholders) in the process, countries experienced some deviations from the final ODPs primarily due to changing public health needs at the local level (e.g., existing CCE still functional or higher needs in other facilities in local area). Country stakeholders saw advantages in the flexibility of deviations as long as they took place due to public health grounds. The proportion of deviations were in line with those under the supplier-

led approach (which were reported by global stakeholders to be around 10% on average). The underlying drivers for deviation vary and include (i) challenges to produce accurate information on existing CCE needs and gaps in the absence of strong asset inventories, (ii) delays in the deployment process (e.g., leading to outdated ODPs) and (iii) country-specific factors including conflict / fragile contexts as well as devolved settings.

Table 2.7: Deviations (in site or type of equipment installed) compared against the updated ODP

Country	% of deviations	Underlying issues and drivers
Afghanistan	4/50 (8%)	3 sites replaced on-grid ILR planned in ODP with SDD. The reason for this was that the health facility lost its electricity connection. 1 site replaced a small SDD (model TCW40SDD) with a larger SDD (model TCW2043SDD) as more storage capacity was required
Kenya	7/50 (14%)	2 sites switched from SDD to IRL (as they received grid access) 3 sites switched as there was existing CCE (whereas nearby new sties did not have any) 2 sites were closed / changed location
Laos	2/28 (7%)	1 site due to movement of health facility (e.g., did not exist as indicated in ODP) 1 site due to existing functioning equipment
Sudan	1/32 (3%)	1 site changed location due to the location being unsuitable (poor ventilation and limited space).
Syria	0/9 (0%)	N/A
Yemen	0/9 (0%)	N/A

Legend: Red = more than 20% / Orange = between 10 - 20% / Green = below 10%

Reporting on completed installations at country-level remained weak. There was also limited digitisation of the asset inventory – a well-known challenging aspect for countries and yet a missed opportunity to not having been emphasised through the Gavi CCEOP funding. Table 2.8 provides a cross-country overview. All countries used installation checklists and some linked payments to CCE technicians to receipt of signed installation checklists. This helped with compliance. In theory, the installation checklist needs to be available at the facility and national level with some countries requesting up to 5 copies (e.g., in Kenya this included 1 copy with CCE technician, 1 copy at health facility, 1 copy at district / regional facility, 1 copy at national level and 1 copy at UNICEF CO). However, in practice the availability of installation checklists was not complete across different administrative levels and not all countries incorporated installation into an Excel-based inventory. In most instances there was no digitalisation of the checklist and no incorporation of the installation into a digital inventory. While not an exclusive challenge to the country-led deployment modality and not emphasised in the design, global and country stakeholders agreed that this is a missed opportunity, and a digital inventory should be a priority going forward with benefits for in-country asset management and for timely upward reporting to Gavi.

Table 2.8: Installation reporting across case study countries

Country	% of sites with completed installation checklist ³⁹	Key reasons for incomplete reporting
Afghanistan	35/50 (70%)	Linking of payment to installation checklist was seen as helpful. However, availability of installation checklist at district and national level was poor.
Kenya	50/50 (100%)	Installation checklists were used throughout though copies were not always available at site level and needed to be sourced from district or national level.
Laos	20/28 (71%)	Issues on accessing checklists at many levels
Sudan	28/32 (86%)	Installation reports were missing in some locations where forms were either not archived at the facility, not transmitted to the state office or lost during the conflict.
Syria	6/9 (67%)	Three sites missed the information at site level
Yemen	8/9 (89%)	The unit installed in Aden was missing a signed and completed installation report.

Legend: Red = less than 50% / Orange = between 50-80% / Green = above 80%

Finding 7B: Functionality of equipment largely worked well with some emerging challenges relating to weak monitoring, lack of spare parts and issues around warranty. Where CCE was fully functional, it led to significant improvements in vaccine availability.

Strength of evidence rating	Rationale
High (4) 	Based on site assessments, documentation (especially pre-Pil and progress reports) and global and country stakeholder consultations (including with cold chain technicians).

The site assessment analysis indicated > 90% of the CCE installed is functioning in most countries. However, there are already some CCE (ranging between 2% to 15% of all assessed CCE per case study country) that are no longer fully functional or have at least minor issues requiring repair (see Table 2.9 for an overview by country).⁴⁰ This highlights the issues that countries face to ensure sustainable use and maintain long-term functionality of CCE. These issues are not exclusive to the country-led deployment modality and include: (i) **weak monitoring**

³⁹ Proportion of sites for which a signed and stamped installation checklist could be produced (either at national, district / regional or health facility level).

⁴⁰ It should be noted that this is only based on sites that could be accessed (either remotely or in-person). For example, in Sudan there were health facilities that have reportedly been looted during the war meaning that the functional of all installed equipment is even lower.

system that is not built on temperature monitoring and lacks a (digital) asset inventory; and (ii) **issues on curative maintenance** due to the lack of spare parts and clear accountability lines under warranty as well as access challenges due to security and lack of vehicles. These aspects are discussed in more detail in Section 2.2.5 which discuss monitoring and maintenance in more detail.

Table 2.9: Functionality of CCE across case study countries

Country	% of sites with full functionality	Issues (if any)	Underlying drivers
Afghanistan	49/50 (98%)	1 site (sub-centre Shema Nisi in Takhar province), the SDD was out of order since July 2024	Unavailability of spare parts
Kenya	46/50 (92%)	2 sites with major issues which have been non-functional for over 6 months due to defective power board supplies. 2 sites with minor issues which experienced a compressor cooling fan failure	No response from manufacturers (or local agents) to provide spare parts despite constant follow up illustrating the difficulties on warranty & accountability
Laos	23/28 (82%)	5 of the units showed temperatures crossing the threshold of 8°C with one of them lacking a voltage stabiliser.	- Power reliability - Lack of vehicles constraining access in some areas
Sudan	30/32 (94%)	1 site has intermittent temperature fluctuations and does not have a stabiliser 1 site refrigerator is not functional since war outbreak	- Conflict - Unavailability of stabiliser
Syria	7/9 (78%)	1 site unit not in use due to site being under reconstruction 1 site unit has temperature fluctuations	- Power reliability - Reconstruction of site
Yemen	9/9 (100%)	1 site failed due to a main control board malfunction and was replaced with a new unit which is functioning.	Timely replacement after malfunction

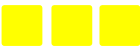
Legend: Red = less than 80% / Orange = between 80 - 90% / Green = above 90%

Significant improvements in vaccine availability were noted across all countries after the CCEOP1 deployment. The presence of functional equipment installed through CCEOP1 improved vaccine availability across all countries in the sites assessed. The supported CCE (i) replaced older and outdated types of equipment (often with higher risks of temperature excursions or without temperature monitoring), (ii) increased storage space or (iii) was installed in sites without any prior CCE at all. More detail can be found in the separately provided country case Appendices.

2.2.3. Timeliness

EQ8. To what extent was the implementation of the delinking approach conducted in a timely manner, what were supporting factors and how have delays affected operational outcomes?

Finding 8: Overall timelines were lengthy, within which timelines specifically for deployment were extended (but reasonable) for high-capacity countries and considerably longer (not unexpectedly) for fragile countries. Delays within and across multiple deployment rounds are especially on account of external factors (COVID-19, conflict and security issues) but also due to challenges related to the country-led modality (phased deployment, unavailability of technicians, logistical constraints, lower economic incentives, coordination across multiple stakeholders).

Strength of evidence rating	Rationale
Medium (3) 	Confirmed through documentation and global and country stakeholders and site assessment data. However, the robustness of tracking timelines is weakened by reporting challenges explained elsewhere and the lack of clear benchmarks or timeline objectives.

We present an analysis of the timelines by looking at: (1) overall timelines for grant implementation; (2) specific timelines for deployment; and (3) timelines between deployment rounds noting that each country had multiple rounds. Factors driving timelines for each of these are discussed in turn below.

(1) The overall timelines for CCEOP1 country-led deployment (from application to completion of deployment) were very long (averaging four years or more), even when accounting for deployment stops due to conflict and/or regime change⁴¹. However, these extended timelines should be interpreted considering the unique country contexts and the specific components of the grant and deployment process. Table 2.10 shows that the country-led deployment overall timeline across the six country case studies took a minimum of 2 years and 9 months and is still ongoing in three out of the six countries. These extended timelines must be looked at according to each country context and across the specific components of the CCEOP process: (i) application & review process; (ii) procurement & shipment; and (iii) service-bundle implementation. Figure 2.7 below shows the timeline for each country case study, highlighting how external factors, namely COVID-19 and conflict, and procurement delays which affected the timelines across each component of the CCEOP process notwithstanding the deployment modality.

- **Application and review process:** The application and review process was lengthy and inefficient. This led to delays in the start of procurement and deployment, which was then reflected in longer overall CCEOP1 timelines. This has already been partly addressed by Gavi through CCEOP2 (See Section 2.1.1)
- **Procurement, shipment and custom clearance:** Procurement, shipment and custom clearance were delayed in CCEOP1 largely due to the COVID-19 pandemic and remain a challenge in many country settings, **but this is not specific to the country-led modality**. As shown in the country timelines below, most procurement and shipments across countries were lengthy, primarily due to the COVID-19 pandemic. Except for the additional coordination needed under the country-led modality approach, stakeholders did not note any additional factors that contributed to the delays which were unique to the country-led deployment modality. Stakeholders widely agreed that customs clearance remains an issue in many countries that needs to be actively managed given the bottlenecks in achieving customs clearance approvals. However, stakeholders noted that this is not unique to the country-led deployment approach.
- **Service-bundle deployment:** CCE deployment through the country-led approach was phased into at least two rounds of deployment: (i) a smaller deployment of around 200 CCE units to test country capacity through a pre-PIL; and (ii) the remaining amount of CCE units procured (in some countries, deployed over multiple rounds

⁴¹ This only accounts for the times in which deployment needed to put completely on hold due to security concerns and does not account for delays due to external factors once deployment resumed.

depending on country capacity)). Table 2.10 below indicates that countries used at least 1.5 years (Kenya, Laos, Syria) for deployment with some reaching over 2.5 years (Afghanistan, Sudan and Yemen), when accounting for deployment stops due to conflict and regime change and all countries surpassed their initial planned deployment timelines. Most countries still have an overall deployment time above 3 years and, in some cases, over 4 years when adjusting the timelines for total deployment stops due to conflict and regime change. There were a number of factors driving extended timelines both within and across deployment round. These are discussed in turn below, noting that some of the factors are specific to the country-led deployment modality.

Table 2.10: Overall CCEOP1 timelines across the six case study countries⁴²- adjusted and unadjusted for full deployment stops due to external factors⁴³

Country	Application to Grant Agreement (GA)	Actual deployment (from equipment arrival to deployment end) ⁴⁴⁴⁵	Actual deployment (adjusted for deployment stops)	Total timeline (actual)	Total timeline (adjusted)	Total # of units	Deployment status
Afghanistan	~ 10 months	~ 3 years 2 months	~ 2 years 8 months	~ 4 years 5 months	~ 4 years	1,300 ⁴⁶	Completed
Kenya	~ 2 years 6 months	~ 1 year 6 months	~ 1 year 6 months	~ 4 years 6 months	~ 4 years 6 months	2,061	Completed
Laos	~ 11 months	~ 1 year 6 months	~ 1 year 6 months	~ 3 years 11 months	~ 3 years 11 months	539 ⁴⁷	Completed
Sudan	~ 1 year 6 months	> 3 years 5 months (ongoing)	~ 2 years 7 months (ongoing)	> 5 years 3 months	> 4 years 5 months (ongoing)	1,138	Y1 completed (193) Y2 ongoing (946 pending)
Syria	~ 1 year 3 months	> 1 year 10 months (ongoing)	> 1 year 5 months (ongoing)	> 3 years 3 months	> 2 years 9 months (ongoing)	186	Ongoing (79 installed; 107 pending)
Yemen	~ 1 year 6 months	> 2 years 6 months (ongoing)	> 2 years 3 months (ongoing)	> 5 years 6 months	> 5 years 3 months (ongoing)	638	Y1, Y2 completed; Y3 ongoing (608 installed; 30 pending)

⁴² The table is based on the documents made available to the evaluators.

⁴³ Adjustments due to full deployment stop due to conflict / regime change include: (i) Syria – November 2024-April 2025; (ii) Yemen – on hold since August 2025; (iii) Sudan – from April 2023 to February 2024 and (iv) Afghanistan – from August to December 2021.

⁴⁴ Procurement timelines covered by UNICEF SD and Gavi (e.g. tendering, disbursement, placement of orders) are not included in the deployment timelines and would further extend the timelines reported in this column.

⁴⁵ Most countries had planned for a 2 year deployment.

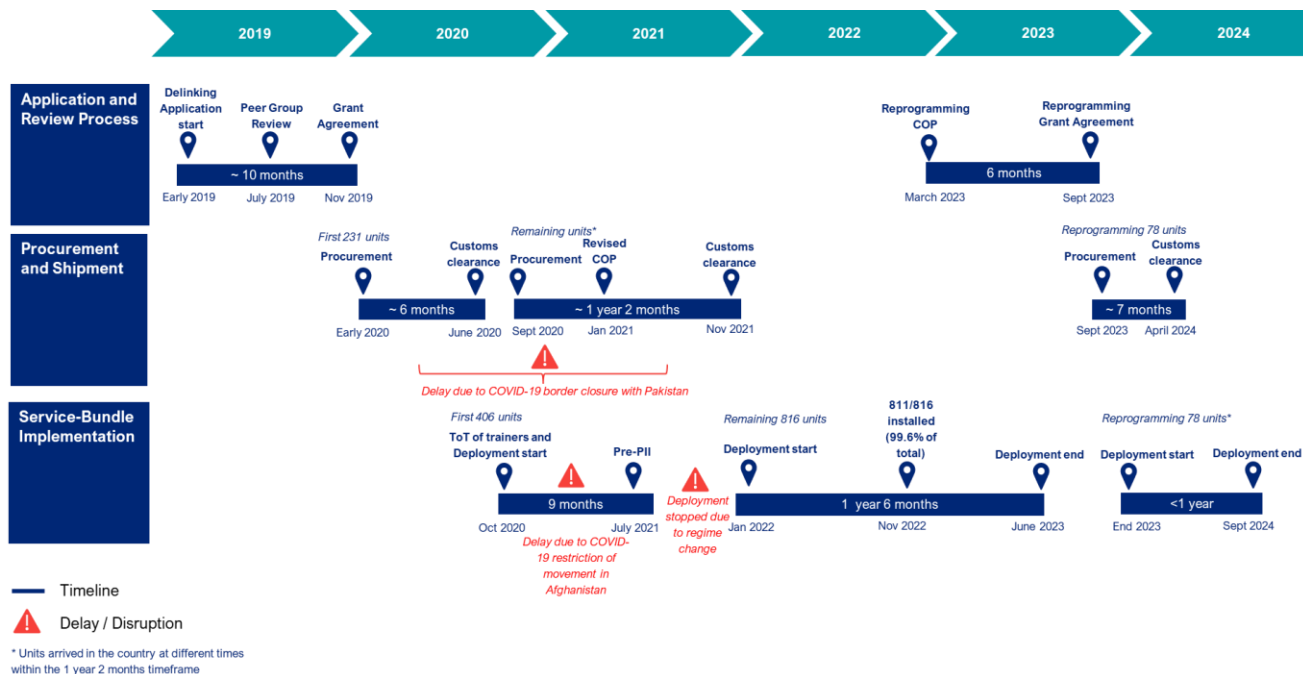
⁴⁶ This includes the 2023 reprogramming

⁴⁷ In Laos, 539 units were procured through CCEOP1 grant funding. An additional 340 CCE units were procured through HSS top-up funding.

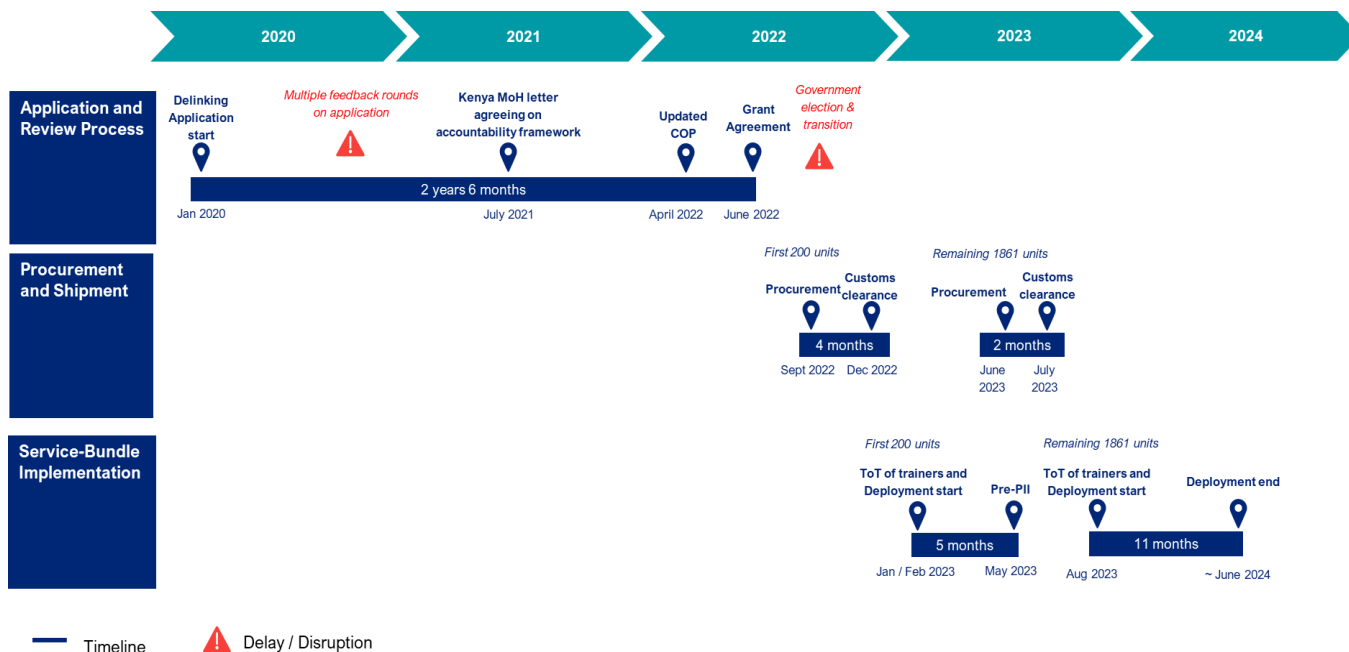
Legend: **Green** = deployment complete / **Orange** = deployment minority outstanding / **Red** = deployment majority outstanding

Figure 2.7: Country case study timelines

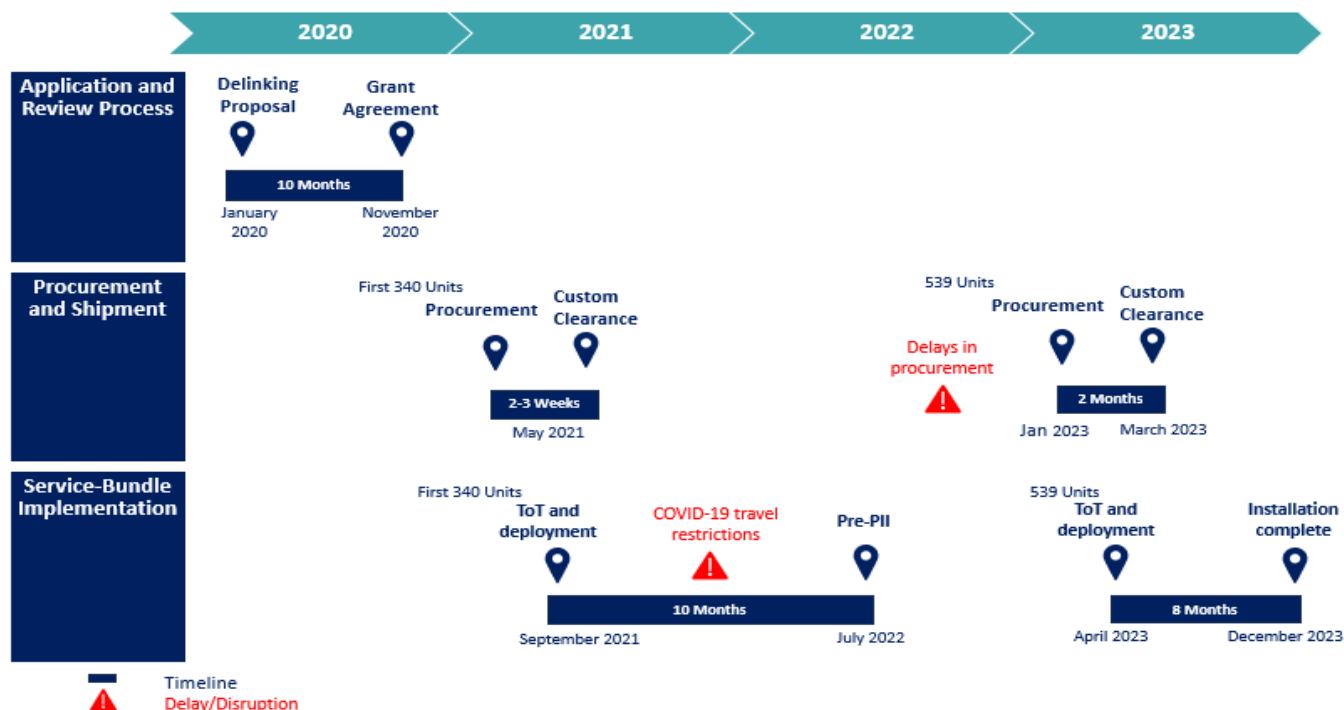
Afghanistan



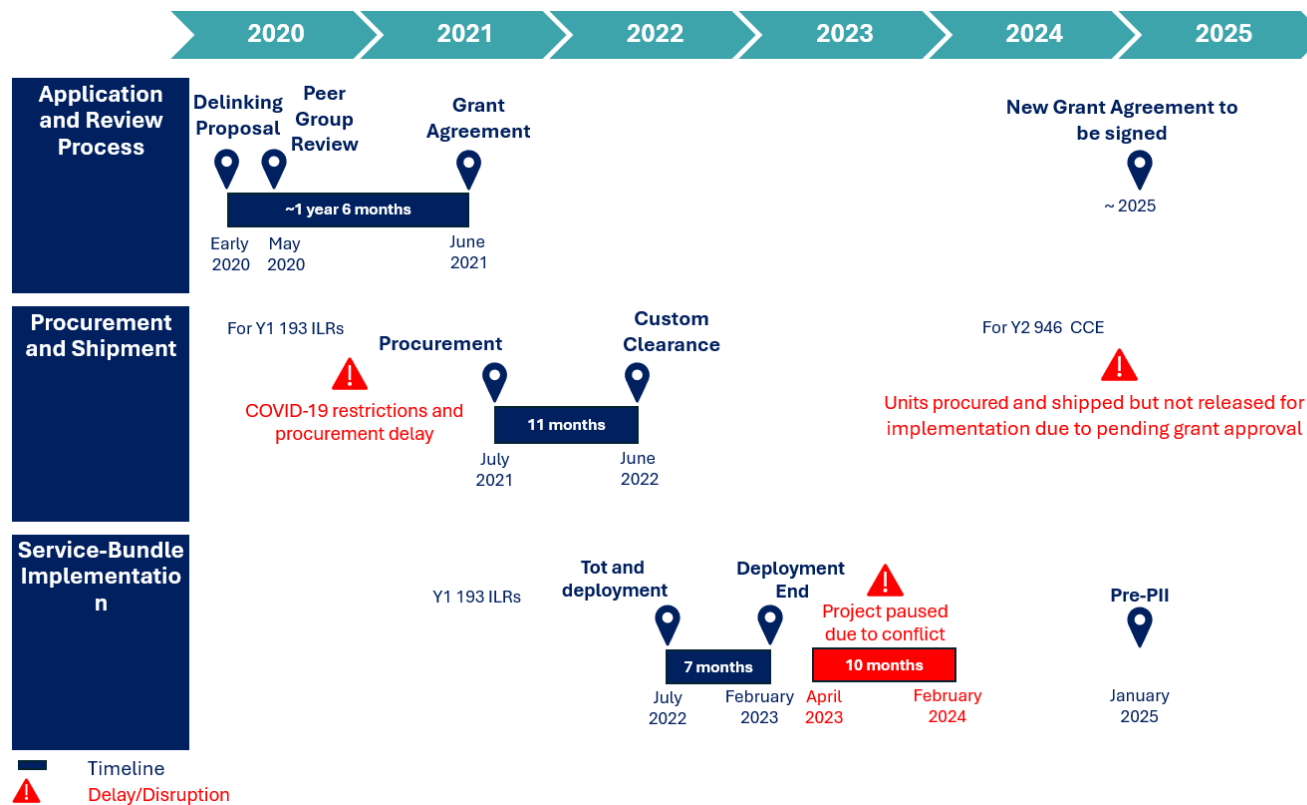
Kenya



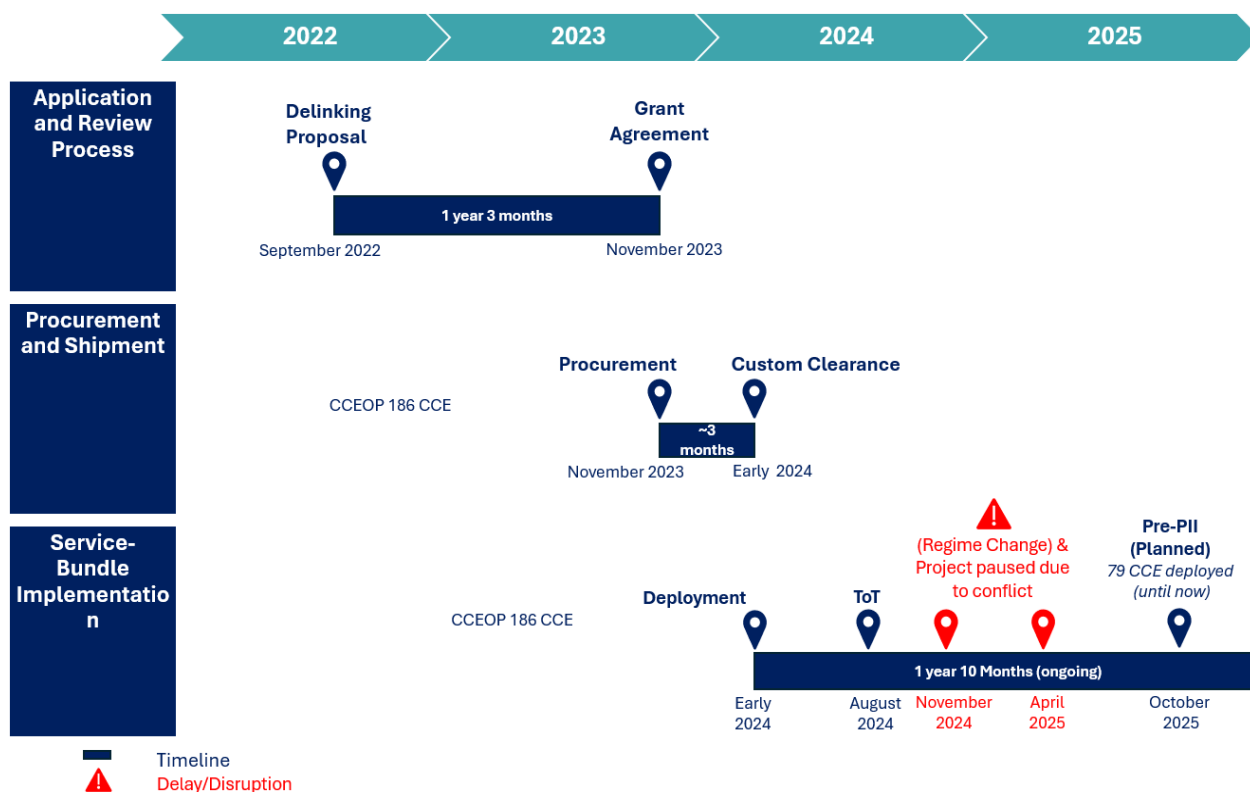
Laos



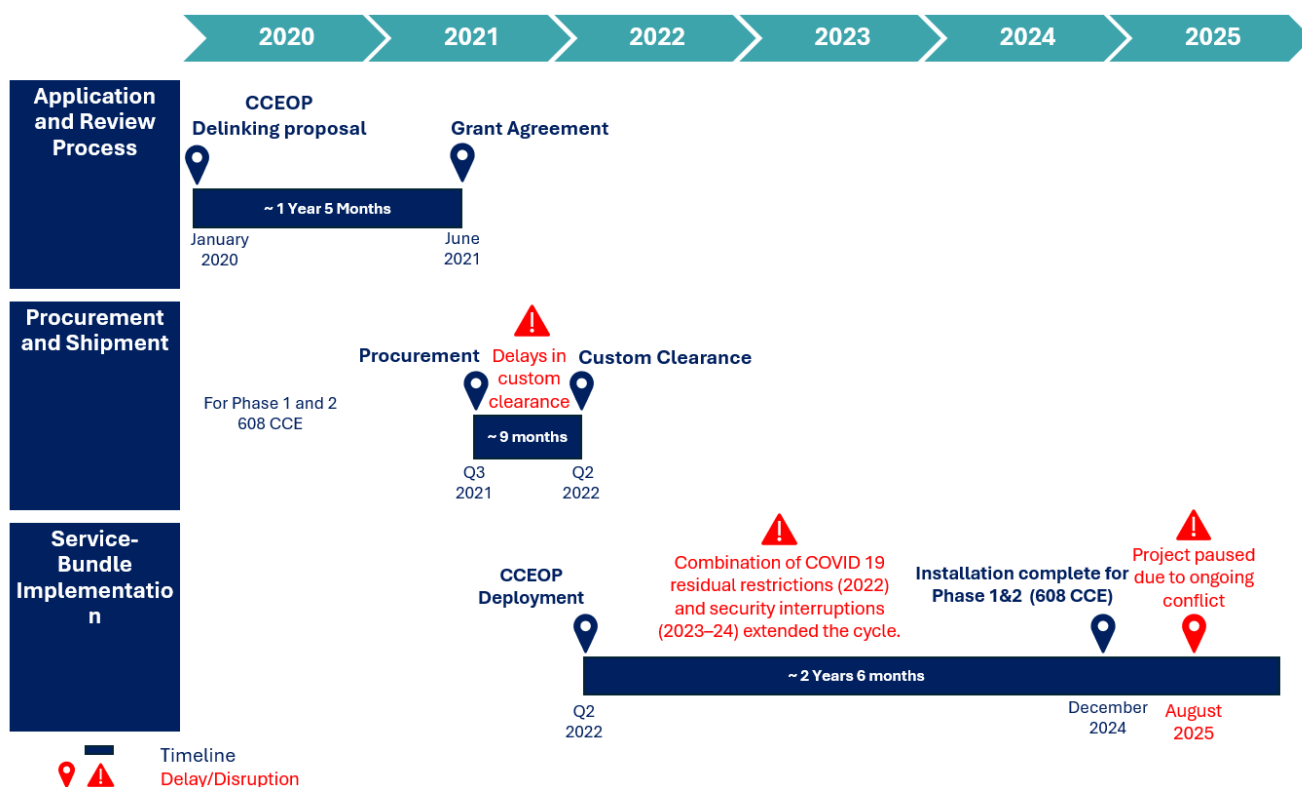
Sudan



Syria Damascus



Yemen



(2) Timelines within a deployment round (i.e. from after customs clearance to installation) were slower than with the supplier-led deployment modality but were still largely reasonable (around ~6 to 12 months) in high-capacity countries. Timeliness remained (not unexpectedly) more challenging in conflict and fragile settings. Table 2.11 illustrates the length of each deployment round in each country and the key drivers. Deployment rounds in high-capacity countries (Kenya and Laos) took between 6 to 12 months. While there are no clear benchmark standards that could be used, stakeholders largely indicated this timeframe as acceptable as supplier-led deployment is reportedly completed within a 6 to 9 months timeframe for similar amounts of equipment. In contrast, timelines were considerably longer in fragile and conflict-affected countries, exceeding 18 months in many cases even when accounting for full deployment stops due to conflict. The key drivers of these lengthy timelines are covered below.

Table 2.11: Timelines within each deployment round across case study countries

Country	Deployment Round (Years)	Total # of units	Total length	Key driver behind result
Afghanistan	First phase (2020-2021) ⁴⁸	406	9 months	– COVID-19 disruption
	Second phase (2022-2023)	816	18 months	– Regime had just changed
	Reprogramming (2023-2024)	78	~11 months	✓ Low number of CCE
Kenya	First phase (2023)	200	5 months	✓ Low number of CCE
	Second phase (2023-2024)	1,861	~11 months	
Laos	First phase (2021-2022)	340	10 months	– COVID-19 disruption
	Second phase (2023)	539	8 months	
Sudan	First phase (2022-2023)	193	~7 months	✓ Low number of CCE
	Second phase (2025-ongoing)	946	Ongoing	– Conflict
Syria	First phase (2043-2025)	79	~ 1 year 10 months	– Regime change – Supplier access constraints and incomplete shipments
	Second Phase (2025-ongoing)	107	Ongoing	– Regime had just changed
	COVAX (2022-2024)	93	~2 years	– Regime change
Yemen	First and Second Phase (2021-2022) ⁴⁹	501	~12 months across two phases (roughly 6 per phase)	✓ Good UNICEF CO capacity and working relationship with government
	Third Phase (2024-ongoing)	137	Ongoing	– Conflict
	COVAX (2021-2022)	88	6 months	✓ Low number of CCE

Legend: ✓ = positive driver; – = negative driver

Red = deployment too lengthy (> 18 months) / Orange = deployment lengthier than with supplier-led deployment (6-12 months) / Green = deployment within the supplier-led timelines (~6 months) or <12 months with high CCE

⁴⁸ In Afghanistan, the first phase (October 2020-July 2021) saw the installation of 406 units, more than the required 231 units for the pre-PIL. This is because the procurement of the first 231 was immediately followed by the procurement of the remaining units.

⁴⁹ Based on the documents made available to the evaluators, it is not possible to distinguish between Phase 1 and 2. It seems that Yemen had two overarching deployment phases: (i) between 2021 and 2022; (ii) starting from 2024 and currently ongoing.

Across countries, there were a number of drivers which led to longer timelines – some linked to the deployment modality and also external factors:

- **Larger CCE quantities:** As shown in Table 2.11, deployment rounds with lower quantities of CCE tend to take less time than rounds with larger quantities. Larger quantities require more effort as deployment is carried out often across more regions, requiring longer transport times and involving a larger number of sub-national actors. This can strain the existing capacity of local technicians, especially in cases where CCEOP1 deployment was added to their existing jobs.
- **External factors (e.g. COVID-19, conflict and government changes):** External factors played a primary role in delaying deployment timelines for almost all countries. In particular, the COVID-19 pandemic and consequent border closures, restriction of movement and changes in priority (including in some cases prioritising CCE received through emergency measures), affected all deployments in 2020, 2021 and 2022. In addition, government changes, such as the elections in Kenya in 2022, the regime change in Afghanistan in 2021 and in Syria in 2024, led to slower deployment and, in some cases completely stopped deployment (see above). Similarly, conflict outbreak and worsening security, such as in Sudan in 2023 and Yemen in 2025, led to significant delays due to the complexity of transporting and installing equipment during conflict, reduced government capacity and competing priorities. In most instances, it is these external factors that led to countries needing longer than 1 year to finalise deployment.
- **Long installation timelines (from CCE arrival at facility to installation date) due to unavailability of technicians, logistical constraints and existing functioning CCE at the facility:** From the site assessments conducted, the actual installation timeline from the arrival of the CCE at the facility was not always in line with the supplier-led deployment modality installation timeline of roughly 2 weeks. As shown in Table 2.12, in several sites assessed in Afghanistan and Sudan installation was delayed primarily due to unavailability of technicians. In Laos, in addition to the COVID-19 challenges, some sites already had CCE and opted to install the new CCEOP1 procured CCE only once the older ones became non-functional
- **Lower economic incentives:** Under supplier-led modality, the cost pressure on warehousing, transport and staff hiring creates economic incentives that push the supplier to reduce deployment timelines. This reduces the risk that equipment is stored for long periods in warehouses. These economic incentives are not present under the country-led deployment modality. Stakeholders generally agreed that the government (and UNICEF CO) does not have the same pressure to reduce warehousing and transport timelines, as the facilities used are under UNICEF contracts often with a fixed cost. Similarly, CCE technicians are already employed by government and not hired separately for a given timeframe to conduct installation as done under the supplier-led model. While this can have advantages (e.g., when needing to respond to changing local circumstances), this also inevitably leads the country-led modality to have less incentives than the supplier-led modality to have shorter deployment timelines. For example, Kenya shows that the supplier-led deployment was carried out faster than the country-led deployment.

Table 2.12: Timeline between CCE arrival at facility and installation date

Country	% of sites where CCE was installed within two weeks	Reasons why CCE was not installed within two weeks in the remaining sites
Afghanistan	47/50 (94%)	In 3 sites, installation was completed within a month due to unavailability of the cold chain technicians in the region who were busy with other installations.
Kenya	40/50 (80%)	- In several sites, the gap between equipment arrival and installation exceeded one month due to unavailability of manpower and logistical constraints. - Delay due to deviations from ODP - Delay due to incomplete electrical grid installation
Laos	1/28 (4%)	Installations took several months and up to 2 years delay primarily due to COVID-19 (in part as COVAX CCE equipment was prioritised as emergency measure by the country)
Sudan	32/32 (100%)	Minor delays were noted in a few sites due to technical team scheduling or travel constraints, but none exceeded two weeks.
Syria	6/9 (67%)	Delays due to scheduling and organisational constraints.
Yemen	2/9 (22%)	In most sites, installation was delayed by one to two months, primarily due to logistical and travel challenges in reaching remote areas.

Legend: Red = less than 50% / Orange = between 50-80% / Green = above 80%

(3) Delays in timelines between the deployment rounds, due to the phased approach, greater coordination required between the multiple stakeholders and external factors, contributed to delaying the overall timelines. Between deployment rounds the following factors led to delays:

- Phased approach:** Stakeholders generally agreed that, while the pre-PIL and phasing approach are sound risk mitigation strategies, they have the trade-off of leading to longer overall deployment timelines. A key part is that another deployment round is added and that further deployment is only taken place after completion of the pre-PIL to be able to add corrective action as needed. Generally, stakeholders commented that this approach has worked well for new countries adopting the country-led deployment modality.
- Involvement of multiple stakeholders with own specific internal processes and sign-off procedures:** Stakeholders highlighted that the involvement of many different actors in the country-led deployment approach (including Gavi, different UNICEF divisions and country offices, national and sub-national government) with their own respective internal processes and sign-off procedures that need to be coordinated reduced the agility to respond to challenges and external factors. This was for example the case in Sudan for the second deployment round where respective requirements and processes added to the timelines. Additionally, while aligned with the Lusaka agenda and the push towards more government ownership, stakeholders mentioned that government processes can be lengthier and require more coordination leading to longer timelines compared to the supplier-led approach. For example, in Syria, ODPs and Gantt charts repeatedly required updates between the phases to adjust to the evolving security context. Interviewees described this process as very bureaucratic and leading to further delays.

- **External factors (e.g. COVID-19, conflict and government changes):** External factors played a key role in delaying deployment timelines also between deployment rounds. For example, in Afghanistan, the regime change in August 2021 happened after the pre-PII and led to a complete halt for 6 months of any further installations.

2.2.4. Country ownership

EQ9. To what extent has the country-led deployment modality led to increased government ownership?

Finding 9: The country-led deployment modality has led to greater country ownership in high-capacity countries and less so in fragile countries where the deployment is considered as “UNICEF CO-led”.

Strength of evidence rating	Rationale
Medium (3) 	Confirmed through global and country stakeholders. Limited evidence is available in the documentation.

Across our case study countries, there have been good examples of improved country ownership fostered through the country-led deployment modality:

- **Leadership and engagement of the PMT/ NLWG:** The Ministry of Health through the PMT and/or the NLWG have been very engaged in the country-led deployment process across countries. For example, in Laos, the PMT was pro-active as exhibited through swift approvals of ODPs, establishment of LTAs for efficiency, remedial actions after the first PII, engagement with other donors to support maintenance of CCE, devising local innovations and solutions (e.g. the adoption of modular, lightweight aluminum H-frames for solar installations, which addressed long-standing challenges of remote deployment). The Ministry of Health hired three additional staff members (a cold chain engineer, a technician and a supply chain specialist) in 2020 to increase the government’s capacity to support the project, attesting to their strong commitment. Moreover, as analysed in the PMT accountability reports, the PMT quickly responded to bottlenecks, such as by relocating 27-30 units to reliable sites and following up on defective equipment.
- **Empowered local technicians:** The stakeholder interviews and site assessments found that, through the country-led modality, local technicians were being empowered, increasing their sense of ownership of the deployment and maintenance. Firstly, local technicians are being used more than in the supplier-led modality and, importantly, are also more often used for the deployment in the areas that they are covering through their government roles – creating ownership and greater sense of community. Secondly, the stakeholders across the country case studies noted that the local technicians feel more committed and accountable for the correct functioning of the equipment, as they are the ones who have done the installation. This was emphasised in Kenya where stakeholders highlighted the positive effects that the country-led deployment modality has on county technicians that are much more involved in the process and reportedly take much higher accountability for equipment that they have installed themselves.
- **Greater involvement of the sub-national and community levels:** In some countries, the country-led deployment also led to a greater involvement and ownership at the sub-national and community levels, leading to higher interest and, in some instances, to direct purchasing of CCE equipment by sub-national decision-makers. For example, in Kenya, given the devolved government nature, the country-led deployment in Kenya required the involvement of both the national government and the counties which were closely involved in the selection of sites and, in some instances, distribution to the health facilities. This reportedly led to improved visibility and engagement by county governments and, in a few instances, to direct CCE purchases.

However, the experience has been (not unexpectedly) more challenging in fragile contexts. For example, in Sudan, stakeholders emphasised that Sudan’s shift to delinking was motivated by a desire to strengthen national

leadership over cold chain. Stakeholders described the PMT as central in coordinating training, site selection, and accountability processes, with local technicians and EPI officers directly involved in implementation. This experience highlights greater government engagement under the country-led and as compared to the supplier-led modality. Further, stakeholders highlighted that the country-led implementation also increased community participation. In fact, health facility committees and local leaders were involved in the site selection for equipment installation, increasing community ownership. However, since the outbreak of conflict in 2023, PMT functions became fragmented, and trained staff were displaced or unable to operate in affected states. Equipment losses due to looting further eroded confidence. These disruptions underscored the fragility of ownership in fragile and conflict settings: while government structures existed, their effectiveness and sense of ownership was contingent on broader security and political conditions. In general, country ownership in fragile and conflict countries has not increased to the same extent given conflict, UN sanction policy and high government, technician and HCW staff turnover.

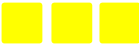
Moreover, in fragile and conflict countries, the approach is considered as “UNICEF CO-led”, on account of weaker government capacities and reflecting the great allocation of roles and responsibilities amongst UNICEF as compared to government. While appropriate for risk mitigation, in these cases country governments are not in the driving seat or building extensive capacity. This has implications for longer term sustainability in terms of effective transitioning to the government. For example, given the ongoing sanction policy in Syria, all procurement and contracting has to flow through UNICEF. UNICEF manages the entire cold chain process in Syria, and the Ministry of Health is only able to provide oversight and coordination. Stakeholders commented that the country-led deployment built some capacity by enabling the Ministry of Health to be involved in the technicians’ training selection, planning and site approval. However, due to the sanction policy and limited country capacity, the responsibility was largely held with UNICEF and its contractors. Moreover, limited human resources with fewer than ten biomedical engineers nationwide, and high staff turnover, further restricted the Ministry’s ability to oversee installations at scale. In Afghanistan as well, while the PMT is chaired by the EPI manager and co-chaired by UNICEF, majority of the staff in the national EPI team are funded by UNICEF highlighting the dependence on UNICEF for delivery of the country-led approach (and EPI more generally in the country).

The successful functioning of the modality is also more contingent on UNICEF CO capacity and relations with the government. For example, in Afghanistan, due to the change in regime, UNICEF CO has had to rebuild its relationship with the new government, leading to delays in the CCEOP1 deployment. In addition, this also has some wide-ranging implementation on sustainability of the cold chain systems.

Despite some of the advantages of the country-led deployment modality, it is not in itself a panacea for functioning cold chain systems. In fact, as further explained in Section 2.2.5, despite the increased engagement of local engineers through the country-led modality, **curative maintenance of the installed equipment remains a big challenge due to lack of country budget lines and emphasis on these aspects, threatening the long-term effectiveness of the deployed CCE.** As such, this modality – as designed under CCEOP1 – has not been able to address the root cause of underfunding and underemphasis on maintenance by countries. Moreover, while there some larger synergies through country ownership (discussed in EQ10 below), there remains untapped potential especially in high-capacity countries.

EQ10. What other synergies or benefits have been identified through the delinking approach?

Finding 10: Minor synergies, such as applying learnings and improved capacities to manage other CCE deployments, have materialised through the delinking approach to-date but there remains potential for significant synergies especially in high-capacity countries

Strength of evidence rating	Rationale
Medium (3) 	Confirmed through country stakeholder consultations. Limited evidence is available in the documentation.

Minor synergies were identified through the country case studies to date. There have been some examples of countries applying learnings and improved capacities to manage deployments to other donor funding for CCE. For example, in Kenya the PMT (and related processes) have also been used for recent CCE procurement from the World Bank and the African CDC. Additionally, some countries have directly purchased CCE after engagement through the country-led deployment modality under CCEOP1.

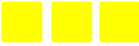
Greater ownership fostered through the modality has contributed to greater efforts by governments to coordinate across donor funding (for example, as described for Laos in Finding 9 above).

The country-led modality was also seen as a stepping stone to support the integration of CCE into the wider logistic and supply chain system. Stakeholders identified this as a major potential synergy albeit there are no concrete examples where this has materialised to-date.

2.2.5. Training

EQ11. Was training well done, and if not, what mitigations were put in place?

Finding 11: Training of technicians on installations and end-users on preventative maintenance was acceptable, although in some countries there were delays in the former. While a well-known challenge at the country level, a missed opportunity was that the modality design did not emphasise regular refresher trainings despite high technician and HCW turnover.

Strength of evidence rating	Rationale
Medium (3) 	Based on site assessments. The evidence has been triangulated with documentation and global and country stakeholder consultations (including with technicians).

Training of local technicians on the new equipment and installation was acceptable, although it was delayed in some countries and requires regular refreshers. As shown in Table 2.13, the country case studies found that the training of local technicians was acceptable and resulted in quality installations across most sites (as described in Section 2.2.2). Under the country-led deployment modality, the supplier remains responsible in most instances for delivering training to technicians on their new equipment, and the content coverage is the same as in the supplier-led modality (although the evaluators were not specifically tasked with conducting a comparison).

The organisation of the training sessions, which was managed by the government under the country-led deployment, was delayed in some countries or had to take place virtually or in other locations due to COVID-19 or conflict. For example, in Laos the ToT training took place online in December 2021 to all provincial health technicians involved in the ODP as the COVID-19 pandemic measures did not allow the training to take place in person. In Syria, due to the ongoing sanction policy, it was not feasible to carry out the ToT in the country given suppliers could not get visas and/or had own travel restrictions on team members given the security situation. This was mitigated by moving the training to Dubai in August 2024, which had however consequences for the timeline and costs of the provided training.

Overall, the lack of refresher trainings impacted on the effectiveness of the sustainability of the training provided. Stakeholders highlighted that regular refreshers are critical given the high turnover of technicians and to ensure that the training is not a one-off experience, but rather an iterative process that allows to build the capacity of the local

technicians more effectively. Refresher trainings were not in scope of the CCEOP support (equally apply to the supplier-led modality), and countries had to pay for this additionally, but can be viewed as a missed opportunity that could have been further emphasised by Gavi give its importance. Refresher trainings were organised only in Afghanistan, Laos and Sudan, but these were sporadic and not institutionalised given that they were not part of the CCEOP funding.

Table 2.13: ToT overview

Country	# of technicians trained	Refresher trainings conducted	Key challenges highlighted
Afghanistan	83	Yes	High staff turnover
Kenya	10 National level trainers and, ultimately, 188 country & sub-county technicians	No	- Staff turnover - Requirements for trainings on new equipment
Laos	18	Limited	- COVID-19 - No budget for refresher training
Sudan	66	Limited	- High staff turnover - Conflict made refresher trainings challenges
Syria Damascus	25 (21 MoH technicians and 4 UNICEF staff)	No (though project still ongoing)	- Delays and higher costs due to sanction policy resulting in training in Dubai as the supplier could not enter the country - High staff turnover and retention is a key challenge
Yemen	N/A	Limited	- Staff turnover - Conflict also requiring training to take place outside of the country in Djibouti

The end-user training of HCWs on use and preventive maintenance remains challenging with refresher trainings lacking in all countries (see Table 2.14). Stakeholder interviews and site assessments showed that the training of HCWs on how to use and maintain the equipment was generally conducted well across countries reflecting that end-user training is a core requirement of the installation and required for the sign-off of the installation checklist. However, the actual number of sites with trained staff available at facility level is lower with a key reason cited being high turnover, limited human resources and facility level (especially in remote areas) and limited refresher trainings. These challenges are however not linked to the country-led modality and apply equally to the supplier-led modality.

Table 2.14: End-user training of healthcare workers

Country	% of sites assessed who received end-user training	Refresher trainings conducted	% of sites with more than two trained staff available at facility level	Key challenges highlighted
Afghanistan	50/50 (100%)	0/50 (0%)	37/50 (74%)	Refresher trainings are organised every 2 or 3 years depending on funding
Kenya	50/50 (100%)	0/50 (0%)	43/50 (86%)	NA (staff at all the sites felt confident in performing basic troubleshooting)
Laos	28/28 (100%)	0/28 (0%)	12/28 (43%)	- No refresher trainings - High staff turnover

Country	% of sites assessed who received end-user training	Refresher trainings conducted	% of sites with more than two trained staff available at facility level	Key challenges highlighted
Sudan	32/32 (100%)	6/32 (19%)	22/32 (69%)	- Staff turnover or reassignment following the 2023 conflict - Refresher trainings organised every 2 years, but were disrupted due to conflict
Syria	9/9 (100%)	2/9 (22%)	9/9 (100%)	Limited refresher training
Yemen	9/9 (100%)	2/9 (22%)	9/9 (100%)	Limited refresher training

Legend: Red = less than 50% / Orange = between 50-80% / Green = above 80%

EQ12. Were government capacities strengthened for maintenance through this deployment modality?

Finding 12: While not specific to the deployment modality, CCE performance monitoring and maintenance remain as key challenges under the country-led deployment modality.

Strength of evidence rating	Rationale
High (4) 	Based on site assessments, documentation and global and country stakeholder consultations (including with technicians).

As outlined in Section 2.2.2, the full functionality of CCE has been compromised in a few areas primarily due to weaknesses in monitoring and maintenance. While curative maintenance was not directly included in the scope of CCEOP and the country-led modality, there was an initial hypothesis that the modality could lead to better monitoring and maintenance due to greater country ownership. However, this was not observed in practice with maintenance and monitoring remaining critical areas requiring further improvement across deployment modalities. While these challenges are not directly linked to the country-led deployment modality, stakeholder emphasised their importance and need for attention in the future.

The country experience highlighted weaknesses across the following areas:

(1) Weak monitoring system including lack of an effective (digital) asset inventory and systematic temperature monitoring in many settings.

- As highlighted in Section 2.2.2, none of the country case studies used an effective (digital) asset inventory for CCE to track the installation status and functionality of CCE and to support pro-active decision-making around maintenance and distribution. Instead, countries relied on Excel-based inventories for internal use (as well as separate Excel-reporting worksheets to report progress on CCEOP1).
- While many sites had a 30-day logger in use (see Table 2.15), the information was rarely included in a national dashboard or used in real time for appropriate action. More automated ways to record temperature (e.g., through RTMDs) was also absent in many sites. Moreover, in some instances RTMDs were installed but only shared information with the manufacturers and not the local engineers in charge of curative maintenance severely limiting their usefulness. While RTMDs were not considered a silver bullet (in particular given challenges in remote areas around connectivity), they were seen as an important factor in ensuring swift responses after breakdown and to also improve accountability when they were working as envisioned.

Table 2.15: Monitoring and maintenance findings across site assessments

Country	% of sites with functional RTMDs	% of sites with a 30-day logger in use	% of sites with data included in national dashboard
Afghanistan	48/50 (96%)	50/50 (100%)	0/50 (0%)
Kenya	21/50 (42%)	50/50 (100%)	4/50 (8%)
Laos	0/28 (0%) ⁵⁰	22/28 (79%)	0/28 (0%)
Sudan	0/32 (0%)	22/32 (69%)	24/32 (75%)
Syria	1/9 (11%)	7/9 (78%)	0/9 (0%)
Yemen	6/9 (67%)	7/9 (78%)	0/9 (0%)

Legend: Red = less than 50% / Orange = between 50-80% / Green = above 80%

Box 2.1 Weak monitoring across country case studies

Afghanistan: RTMDs were installed in all 50 (100%) assessed CCEs provided through the CCEOP1 grant; however, in 2 sites, the devices were not functional because in one case, the RTMD was faulty, and in the second case, the SDD was not functioning. Moreover, despite all sites assessed had a 30-day logger, it was noticed that a uniform template for recording temperature is not used by the vaccinators, and the vaccinators do not know how to record the past 24-hour temperature data in the log sheet.

Kenya: All the 50 sites (100%) had a 30-day logger in use. However, only 4 sites out of 50 sites (8%) have their data included into a national dashboard. An additional 21 sites (42%) had a function RTMDs with 4 sites using a functional RTMDs (a CT5 type from Nexleaf Analytics) and 17 sites using B-Medical RTMDs. While stakeholders were generally positive about the potential of RDTM, they highlighted also current shortcomings of the system. For example, the TOLOGG-4.0-GL that are supplied with B-Medical fridges did not allow to share information with facility-level staff as they did not have access to the digital monitoring platforms and did not receive automated text alerts. The absence of user-level access and alerting capabilities at the facility level represented a critical bottleneck for real-time accountability and swift corrective action.

Laos: Although 79% of sites had a 30-day logger in use, only 12 of these 28 sites (43%) maintain a 30-day logger readout and none of them review this data regularly. None of the sites had temperature data integrated into a national dashboard or digital reporting system. This reflects limitations in digital infrastructure, data management capacity, and standardised reporting adherence within the cold chain program. However, Laos RTMD data is now synced with Thrive 360 suite from Sep 2025.

Sudan: While no sites recorded using RDTMs, 69% of sites had 30-day loggers. In the other sites, these were destroyed or lost due to the conflict. 24 out of 32 sites (75%) of sites have their data included into the National Asset registry.

Syria: 7 of the 9 sites (78%) had a 30-day temperature logger installed, but only five facilities (56%) reviewed logger data daily. Consistent temperature readouts were maintained at four sites (44%). Most facilities used the Fridge-Tag 2E model, with the Jerodieh Company responsible for repair and troubleshooting. Only one facility (11%) had a remote temperature-monitoring device (RTMD). Three facilities had an emergency plan in place, with on-site technicians trained to respond to temperature excursions.

Yemen: Although 7 out of 9 sites (78%) had a 30-day temperature logger in place, only 5 facilities (56%) reviewed logger temperature data daily. Consistent readouts were maintained in only 3 sites (33%). Although most sites were equipped with a logger (model: Fridge-Tag 2E), more than half of the facilities reported limited understanding of its operation. Additionally, 6 sites (67%) were equipped with RTMD devices (ICE3, BEYOND) for temperature monitoring, but (33%) of these were non-functional due to screen failures or network coverage issues. Limited technical capacity and a lack of spare parts contributed to the underutilisation of these digital monitoring systems.

⁵⁰ Lao PDR has intentionally opted not to use RTMD across all levels, preferring FT2 devices for temperature monitoring due to their suitability for the existing workforce capacity, zero-maintenance requirements, and cost-effectiveness.

(2) Challenges in curative maintenance – even in high-capacity settings – with spare parts both within and after warranty being a key bottleneck. As shown in Section 2.2.5, a key driver for non-functioning CCE has been the lack of timely spare part provision. There have been a number of key underlying drivers for this:

- **A critical point is the lack of understanding and enforcing the warranty of equipment at both local and, at times, national level.** While some assessed sites had local numbers to reach manufacturers, in the vast majority of cases it was not clear at the local level whether the equipment was still under warranty and what the enforcement mechanism would be in case manufacturers did not resolve the spare part provision promptly. In some countries there is an added layer of complexity in that manufacturers have outsourced spare part provision (and usually also curative maintenance) to local agents especially in countries in which they have a low footprint (see Box 2.2 for examples from Kenya). However, in the country-led modality, local agents have been less (or not at all) involved in CCE installation often leading to lengthy follow-ups on accountability that get even harder by lack of clear information on warranty lengths and conditions for equipment. While this is particularly pronounced at the local level, it is also the case at national level where some stakeholders were not aware of the specific warranty terms that were agreed between UNICEF SD and manufacturers. The absence of visibility on these terms then makes it even harder for country stakeholders to enforce the warranty. This is a challenge also in other countries and there are current discussions at the global level to address this by requiring manufacturers to include key warranty information directly on the fridge.
- **Other challenges include staff turnover (discussed above) as well as access / security challenges.** For example, access issues were common in security compromised areas especially where a private provider was used to address warranty issues (see Box 2.2 on Afghanistan and Kenya) and access was also delayed due to the lack of vehicles especially for highly remote areas (e.g., this was flagged in Laos, Sudan and in a select few cases in Kenya).

Box 2.2 Challenges in curative maintenance

Kenya: A key issue in Kenya has been the challenge of determining responsibility under warranty and having a clear enforcement mechanism in case of inaction by the manufacturer. This is especially complicated in cases in which the global supplier has outsourced the service to local agents (a dynamic that is more complex under the country-led approach as local agents are less involved in the deployment and, thus, pushed back on responsibilities or delayed action in some cases). The lack of warranty knowledge at local level is commonplace with only 8% of sites indicating to have clear access to warranty processes and relevant contact numbers. The lack of enforcement and clear knowledge of warranty terms is a wider issue with warranty information being held by UNICEF SD at the global level and no full sharing of these contractual arrangements with Kenyan MOH officials is reportedly taking place.

Afghanistan: The capacity of the local contractor who provides maintenance services, is limited according to the national EPI directorate in relation to the needs and terrain of the country and the response times are slower than required. As a result, several CCE remain unrepaired (since 2023, 300 SDD have been reported by the government in need of repair, and still, 20 remain unrepaired). Spare parts access is a challenge because international couriers do not operate in the country.

(3) Challenges in preventative maintenance also persist in the country-led deployment modality in particular regarding maintenance protocols, documentation and appropriate usage and cleaning. Many of the assessed sites having at least some weaknesses in this area including (i) unclean equipment including dust; (ii) lack of maintenance plan and (iii) lack of reporting logbook for temperature and maintenance. As outlined previously, a key driver for this has been challenges in refresher trainings for staff in facilities. Another driver is the lack of a clear preventative maintenance protocol followed in facilities (for example by recording temperature and maintenance in logbook). In contrast, preventative maintenance check-ups by the local engineers worked better in many countries (including Laos and Kenya) with majority of sites recording quarterly check-ins. Box 2.3 provides examples across the case study countries.

Box 2.3 Weak preventive maintenance across country case studies

Afghanistan: Preventive maintenance is conducted but not recorded in a logbook. During the assessment, filled checklists from the year 2022 for preventive maintenance were witnessed at only 2 out of 50 sites (4%). There were no plans for preventive maintenance shared by the national/ provincial levels with the health facilities. However, 98% of sites had at least quarterly preventative maintenance conducted, the refrigerators were apparently clean, while the solar panels in 3 out of 43 sites (7%) were not clean.

Laos: A total of 26 out of 28 sites (93%) had at least quarterly preventative maintenance conducted. This maintenance typically involved cleaning the refrigerator, checking the voltage stabilizers, inspecting door seals, defrosting freezers, and recording temperature data consistently. However, there were notable issues around maintenance practices. Many sites lacked up-to-date maintenance logbooks or did not maintain them properly, which makes it difficult to verify routine maintenance scheduling and interventions. Some sites reported irregular or inconsistent preventive maintenance, often due to staffing shortages or lack of technical knowledge. The absence of clearly followed maintenance plans at several facilities contributes to variation in equipment performance and increased risk of breakdown.

Sudan: 24 out of 32 sites (75%) assessed reported at least quarterly maintenance. However, maintenance schedules and logbooks were inconsistently maintained.

Syria: Only 4 of the 9 sites (44%) had documented preventive maintenance activities conducted at least quarterly. While most refrigerators were clean and properly wired, key maintenance practices, such as preventing ice build-up and managing water condensation, were inconsistent. More than half of the facilities (56%) had visible layers of ice accumulation on the interior walls. 4 sites had a cold chain maintenance plan; however, none integrated logger data into national dashboards or reporting systems.

Yemen: Only 1 out of 9 sites (11%) had documented preventive maintenance activities conducted monthly. While most refrigerators were clean and well-wired, critical maintenance tasks such as avoiding water condensation, water accumulation checks inside the fridge, and regular temperature recording were inconsistent. Among the assessed installations, 5 sites had dusty panels as they were not cleaned and 1 panel was partially obstructed, which may reduce energy efficiency.

2.3. CROSS-CUTTING

2.3.1. Enablers & barriers

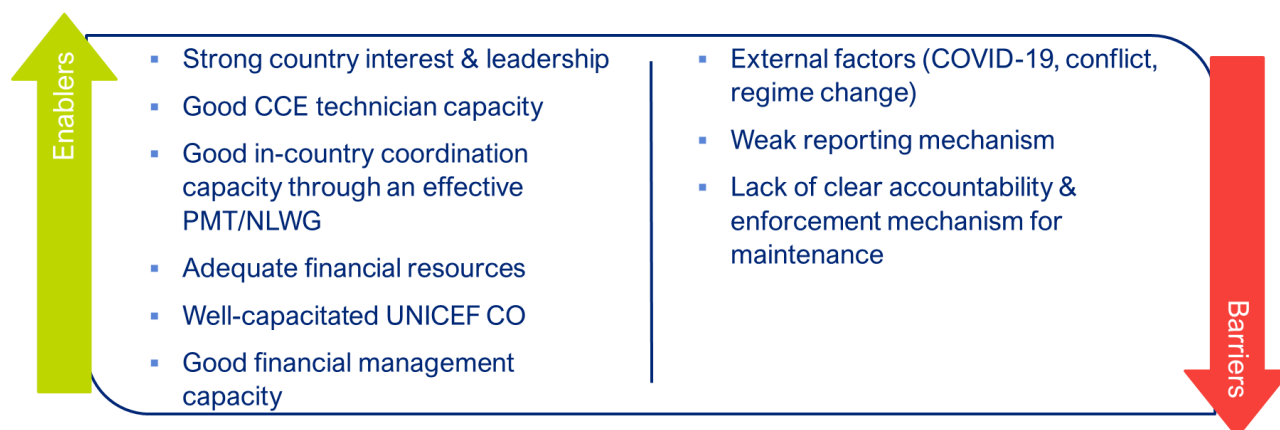
EQ13. What have been key enablers (and barriers) for the successful (or challenging) implementation of the delinking approach and achievement of outcomes?

Finding 13: The success of the country-led deployment modality is enabled by strong country interest to adopt this modality as well as leadership, good in-country coordination and CCE technician capacity, adequate financial resourcing across the cold chain system and good UNICEF CO capacity. Observed barriers were limited emphasis on curative maintenance, weak reporting systems and a range of external factors (COVID-19, conflict, etc.)

Strength of evidence rating	Rationale
High (4) 	Strong agreement among global and country stakeholders, confirmed by case study site assessments and documentation.

Figure 2.8 summarises key barriers and enablers to the successful functioning of the country-led deployment modality. Each factor is discussed in turn below

Figure 2.8: Enablers and barriers to successful country-led deployment



Key enablers include:

- Strong country interest and leadership:** Given the government engagement required for the country-led deployment, stakeholders widely agreed that country interest and government leadership is a key prerequisite for a successful country-led deployment modality. In particular, the Kenya and Laos case studies showed that the strong government interest to apply the delinking modality, led to government commitment and buy-in, which facilitated the deployment process.
- Good in-country coordination capacity through an effective PMT/ NLWG:** Across the country case studies, stakeholders agreed that a strong and well-capacitated PMT led to effective coordination with sub-national levels, timely resolution of bottlenecks, and overall smoother implementation. Achieving this requires that the PMT/NLWG have adequate human resources. For instance, in Laos, the government strengthened capacity by hiring three additional staff (a cold chain engineer, a technician, and a supply chain specialist) to support country-led deployment. Conversely, in Sudan, stakeholders reported that the decline in the PMT's capacity following the 2023 conflict contributed to challenges during the Year 2 deployment.
- Good CCE technician capacity:** Stakeholders widely agreed that the presence of an adequate number of well-trained CCE technicians both at national and sub-national levels is indispensable for the success of the country-led deployment modality. For example, in Kenya, stakeholders mentioned there were enough biomedical engineers (around 350) directly employed at national, county and sub-county levels that come with accredited high-quality education on CCE. This was seen as pre-requisite for successful implementation with stakeholders commenting that engineers came with good capacity levels and then just required additional training on the latest equipment and monitoring devices.
- Adequate financial resources across the cold chain system to pay salaries, electricity and vehicles:** Site assessments and stakeholder interviews indicated that existing expenditure across the entire cold chain system are essential for successful country-led deployment. Without an adequately financed cold chain system allowing to leverage on existing capacities, stakeholders commented that the effectiveness of the country-led deployment would be reduced and in fact underestimate the true cost of implementation.
- A well-capacitated UNICEF CO:** As described in Section 2.2.4, country-led deployment in fragile and conflict-affected settings relied heavily on the capacity of the UNICEF CO and its relationship with the governing authorities. Global stakeholders noted that UNICEF CO capacity varies across countries (also due to staff turnover), and that deployment and coordination tend to proceed more smoothly where the UNICEF CO demonstrates strong capacity and maintains effective collaboration with the Ministry of Health. In Yemen, for example, stakeholders highlighted that the high capacity of the UNICEF CO was crucial in ensuring deployment continued despite the severe challenges posed by the ongoing conflict.

- **Good financial management capacity:** Stakeholders emphasised the importance of ensuring that either the Ministry of Health and/or the supporting UNICEF CO possess adequate financial management capacity. This requires sufficient and skilled human resources, as well as digitalised tools and processes, to ensure effective monitoring of expenditures and accurate, timely financial reporting.

As illustrated across Section 2.2, several barriers had a negative impact on the effectiveness of the country-led deployment outcomes. In particular, the following barriers were most frequent across countries:

- **Lack of clear accountability and enforcement mechanisms for curative maintenance:** While not explicit in the design of the CCEOP1 country-led deployment modality, country stakeholders in Afghanistan, Kenya, Laos, Syria and Sudan mentioned that curative maintenance is a key challenge to the long-term sustainability of the CCE deployed, as the Ministry of Health representatives and technicians are not aware of the warranty arrangements and the processes to procure spare parts.
- **Weak reporting systems:** As highlighted in Section 2.1.4 and 2.2.2, weak reporting was identified at the global, national and sub-national level. Stakeholders highlighted that strengthening monitoring and reporting is important to ensure better implementation and identification of bottlenecks early on.
- **External factors (e.g. COVID-19, conflict and regime changes):** Overall, external factors were a major barrier that negatively affected the application, procurement and deployment timelines and outcomes. In particular, the COVID-19 pandemic and consequent border closures and movement restrictions, conflict outbreaks and deteriorating security, and regime changes, were the most common external factors that negatively affected deployment in the case study countries analysed.

Appendix K summarises the enabling factors and barriers identified by stakeholders across countries.

EQ14. What are key insights for each country to strengthen implementation of cold chain programmes?

Finding 14: Strengthening cold chain systems across countries requires improving monitoring and maintenance.

Strength of evidence rating	Rationale
High (4) 	Confirmed through documentation and data, strong agreement among global and country stakeholders, and site assessments.

Across the case study countries, stakeholders consistently identified weak monitoring systems and insufficient maintenance capacity as major constraints to effective cold chain programme implementation. These issues are general across deployment modalities, and do not only apply to the country-led deployment. Table 2.18 summarises priority recommendations for each country to strengthen their cold chain systems given their specific context and experience – in general most recommendations are applicable to all countries. Across countries, the main insights include:

- Enhancing monitoring mechanisms, including the introduction of digital inventories and, where feasible, integration with RTMDs;
- Improving curative maintenance systems, ensuring timely access to spare parts and effective use of equipment warranties; and
- Strengthening preventative maintenance practices to reduce equipment downtime and extend lifespan.

Table 2.16: Key recommendations by country

Country	Recommendations
Afghanistan	• Risk: Need for further risk monitoring and planning • Warranty: Clarify warranty processes and sharing of warranty information by UNICEF SD with the country. New CCE should be delivered with warranty stickers on the fridges clearly stating term length and responsibilities. • Maintenance: Introduce periodic maintenance procedures along with proper monitoring and reporting tools.
Kenya	• Warranty: Clarify warranty processes and sharing of warranty information by UNICEF SD with the country. New CCE should be delivered with warranty stickers on the fridges clearly stating term length and responsibilities. • Monitoring: Ensure facility staff have access to RTMD dashboards and alerts and that there is a system in place to enable immediate action. Integrate monitoring data into a single national digital system. • Training and preventative maintenance: Institutionalise continuous learning (e.g. refresher trainings) for cold chain technicians and health workers using blended training methods (in-person and online).
Laos	• Asset management & planning: Integrate monitoring data into national digital systems and improve facility-level assessments before procurement to avoid duplicate equipment supply and optimise resource allocation. • Monitoring: Equip every site with TMDs to improve real time monitoring. • Training and preventative maintenance: Institutionalise continuous learning (e.g. refresher trainings) for cold chain technicians and health workers. Develop a national preventive maintenance plan with dedicated budgets and spare-part pipelines to reduce downtime. Implement regular preventative maintenance checks.
Sudan	• Asset management & planning: Integrate monitoring data into national digital systems and improve facility-level assessments before procurement to avoid duplicate equipment supply and optimise resource allocation. • Reporting: Strengthen documentation and reporting systems, especially in remote sites, by ensuring consistent use of standard forms. • Monitoring: Expand temperature monitoring coverage by ensuring operational RTMDs and 30-day loggers at all facilities. • Training and preventative maintenance: Institutionalise continuous learning (e.g. refresher trainings) for cold chain technicians and health workers. Create a preventive maintenance plan with scheduled activities, sufficient budgeting, and a robust spare parts pipeline.
Syria	• Human resources: Foster retention of trained technicians and health workers. • Asset management & planning: Integrate monitoring data into national digital systems and improve facility-level assessments before procurement to avoid duplicate equipment supply and optimise resource allocation. • Monitoring: Ensure facility staff have access to monitoring data and that there is a system in place to enable immediate action.

3. CONCLUSION

The evaluation of the pilot programme on country-led deployment modality during the first phase of Gavi CCEOP (CCEOP1) is positive – less so on the Gavi process side, although significant developments have taken place since, and reasonably well performing on the outcomes side. The basic rationale for the modality (lower costs, higher reach, increased country ownership) has proven to be valid through this evaluation, although the modality requires important enablers to be in place and risks and issues to be appropriately managed.

With regards to the Gavi **processes** employed for CCEOP1 country-led deployment modality, the main conclusions are as follows:

What worked well	What worked less well
- The review process was stringent in identifying issues and risks with country applications and guiding them for improving overall design and reducing risks. Legal agreement constituted for the modality worked well to identify and manage stakeholder roles and responsibilities. - The funds transfer process worked well between Gavi, UNICEF and country governments.	- The application and review process was inefficient and burdensome in that it was a parallel process, lacked sufficient guidance and the application materials were cumbersome for countries. - The review process could have been designed to go further to encourage countries to better manage maintenance related issues. - Lack of standardisation in the legal agreement annexes added to complexity. Programmatic reporting did not work well due to fragmented reporting requirements, non-standardised templates, involvement of multiple stakeholders, poor timeliness and inadequate monitoring capacity. Financial reporting was sub-optimal as the standard UNICEF financial reporting limits tracking of expenditures against the key budget items of the country-led modality.

Since the pilot, improvements have been made under COVAX CCE and CCEOP2 that have aimed to circumvent a number of the key issues identified above. Key amongst these is a more streamlined application and review process, and simplified and consolidated templates and requirements, with further improvements expected in 6.0.

With regards to the **outcomes** achieved through the CCEOP1 country-led deployment modality, the main conclusions are as follows:

- One of the main rationales for the country-led deployment modality in terms of **cost efficiencies** has proven to be valid. Actual cost comparisons in Kenya and Sudan place country-led deployment as 24-51% cheaper and modelled estimates for other countries suggest even higher cost savings.
 - But the extent of cost savings is highly context dependent and can be higher where government sunk costs on health systems expenditures can be leveraged (more so in high-capacity countries).
 - Some of the cost savings advantages come at the expense of delayed timelines for deployment – e.g. access to lower price LTAs for warehousing and delivery, but with reduced commercial pressures to expedite timelines.
- In general, **timelines for deployment** under the country-led modality have been extended, still reasonable at 6-12 months per deployment round in high-capacity countries but considerably longer for fragile countries (exceeding 18 months in some cases). Taking account of multiple deployment rounds in countries, the

average time to deploy between 500-2,000 CCE has been 1.5-2.5 years. While external factors have driven many of these extended timelines (COVID-19, political issues), delays are also due to challenges related to the country-led modality (phased deployment, unavailability of technicians, logistical constraints, lower economic incentives, coordination across multiple stakeholders)

- **Country ownership** has been fostered through the country-led deployment modality, with governments playing a driving role in PMTs/ NLWGs and this ownership sentiment filtering to the lower levels as well in terms of enhanced commitment from local technicians. But there is a spectrum of experiences in that for a number of fragile and conflict countries, the modality is UNICEF-led and less empowering and capacitating for governments. While the right choice for risk management and to drive progress, and the only option due to the sanctions policy in the fragile setting, there are implications in terms of the extent to which this modality can trigger country ownership in certain settings as well as what this means for countries in their path to transition from Gavi support. Country-led deployment is also not a panacea in its own right in that it did not address many of the longstanding challenges in country CCE and asset management in terms of progressing towards effective monitoring and maintenance systems.
- Another measure of the limited effect of country ownership is vis a vis in-country **trainings of technicians**. While training of technicians on installation as well as end-user training on preventive maintenance was acceptable in most countries (and included in the funding), regular training refreshers (not included in the funding) are not institutionalised across countries despite high technician and HCW staff turnover – representing another missed opportunity for the overall improved outcomes on CCE use.
- Very positively, there have been minimal **quality** comprises in terms of installations, but the documentation and reporting process on installations remains challenging across all countries, with knock-on effects on effective asset management. This can be viewed to in part affect equipment functionality – although mainly compromised due to overall weak monitoring, lack of spare parts and issues around warranty.
- In general, and while independent of deployment modality, **monitoring and maintenance** continue to be key challenges in countries. Countries lack effective monitoring systems for CCE, including limited digitisation which prevents active maintenance. There has been a lack of understanding and enforcing of warranty arrangements in most countries and spare parts access post warranty has also been a challenge across. Further, preventive maintenance plans may exist at the central level but are not well-communicated at the local level and there is no systematic implementation. Overall, this is viewed as a significant weakness in Gavi's approach to providing CCE infrastructure to countries to date, and we understand is a key priority under the current supply chain strategy.

The above highlights the good potential of the country-led deployment modality but also that it requires certain enablers to be in place and issues to be managed to ensure its full potential. The key ingredients for the successful implementation of this modality are good country leadership and engagement, a strong and well-capacitated UNICEF CO, and adequate technician capacity. But the cost savings potential needs to be closely managed to ensure that the country has the capacity to deliver on certain imputed costs and that cost savings are not at the expense of effective implementation, especially in terms of managing timeliness.

The country-led deployment modality also presents an opportunity to progress countries on the sustainability pathway – very important in current times of reduced global health financing. In this regard, one clear limitation of the approach (also relevant to the supplier-led deployment modality) has been the lack of emphasis on encouraging countries to better plan for and manage maintenance arrangements. There needs to be realism in terms of what can be achieved in this regard and the extent to which countries are truly taking on ownership and responsibility for the process as well as wider aspects that support the overall functioning of the equipment, critical to support vaccine availability and thereby vaccine coverage and equity.

4. RECOMMENDATIONS

The final section of the report provides recommendations for CCEOP country-led deployment in Gavi 6.0.

All recommendations are for Gavi 6.0 and hence an immediate priority. Recommendations 1-3 would support the design of the modality whereas 4-5 are focused on implementation.

Recommendation 1: Develop and apply clear, evidence based eligibility criteria for use of the country-led deployment modality

Recommendation 2: Streamline, integrate and standardise Gavi CCE processes for the country-led modality

Recommendation 3: Place greater emphasis on country-level monitoring and maintenance

Recommendation 4: Expediate approval and deployment timelines

Recommendation 5: Support country transition and sustainability

Recommendation 1: Develop and apply clear, evidence based eligibility criteria for use of the country-led deployment modality

Relevant findings	#1A, #1B, #2, #3, #5A, #7A, #7B, #8, #9, #11, #13.
Responsibility	Gavi Alliance – 6.0 eligibility and application design teams; IRC for application review
Timeframe	In time for communication on country eligibility and application guidelines for Gavi 6.0

This recommendation aims to guide Gavi on country eligibility criteria to apply for the CCEOP country-led deployment modality.

An upfront **principle** for this recommendation is that countries should demand this modality – i.e. it should not be imposed by Gavi, given the high level of country engagement that is required to ensure successful delivery. That said, given timelines for transition from Gavi support, preparatory and accelerating transition countries could be encouraged to adopt this modality in the path to self-sufficiency.

While the rationale for the country-led deployment modality in fragile countries is different from that in non-fragile countries, we recommend that an **initial capacity threshold checks** be incorporated for all countries as a **screening mechanism** to determine countries eligible to apply for this support. This can include a mix of quantitative and qualitative assessments, including:

- *Quantitative* – (see Appendix K for a review of criteria). A quantitative threshold has the benefit of being clear and transparent, but data availability is not complete or up to date and hence qualitative assessment may be preferred. Potential indicators include:
 - Indicator #1 - CCE technician capacity: EVM HR score > 80%
 - Indicator #2 – Existing financial resources: EVM financial resource score > 80%
 - Indicator #3 – Functioning Coordination Mechanism: NLWG maturity using data from SCIP tool
- *Qualitative* – based on Gavi's understanding of functioning of NLWG/ PMT, CCE technician capacity, UNICEF CO capacity, financial management capacity

Based on this eligibility assessment, and assuming countries are interested and demanding this modality, they should be invited to submit an application for the country-led deployment modality. That said, there may be some exceptions in terms of countries that do not meet capacity thresholds but for which there is a strong rationale for the country-led deployment (e.g. certain fragile countries for which there are no / only prohibitively expensive suppliers, countries demonstrating commitments to improving capacity over time).

As this evaluation has not covered non-fragile low capacity countries, Gavi may wish to pilot the country-led deployment approach in a few of these countries before scaling up.

A comprehensive **application review criteria** should be used to guide technical review and approval of country applications. This should build on the current approach employed by Gavi - e.g. COVAX and CCEOP. This would ensure that key conditions for successful implementation are in place (or there are credible commitments to put them in place). Key topics to cover include:

- previous country CCE procurement experience
- functioning coordination mechanism – e.g., NLWG, PMT or similar coordination group
- availability of cold chain inventory and technically cleared deployment plan
- dedicated HR capacity at UNICEF CO and MoH as well as technician capacity
- identified risks and mitigation strategies
- good financial management – e.g., estimated budget availability
- clear roles and responsibilities

Additionally, monitoring systems and capacity as well as provisions for maintenance should be emphasised – an aspect which could be strengthened in the checklist.

Context of changes introduced after CCEOP1	As noted, several criteria recommended above for the application review checklist have already been incorporated during COVAX CCE and CCEOP2.
Consideration of trade-offs	It is important that the screening criteria is well applied to ensure a reasonable pool of countries eligible to apply. This is important to ensure that scale-up is done in a measured and risk appropriate manner to ensure minimal risk for failure. We understand Gavi is trying to simplify the application procedure for countries and hence a long checklist might be contrary to this direction of travel. Where countries have provided this information for previous applications, Gavi should leverage this information.

Recommendation 2: Streamline, integrate and standardise Gavi CCE processes for the country-led deployment modality

Relevant findings	#1A, #1B, #2, #3, #4A, #4B
Responsibility	Gavi Secretariat, UNICEF PG (also highlighted in italics by sub-recommendation below))
Timeframe	In time for communication on country eligibility and application guidelines for Gavi 6.0

The evaluation highlighted a number of issues with the processes employed during CCEOP1 that merit streamlining and integrating, whilst also ensuring adequate capacity within Gavi to support as scale-up of this approach. The following specific recommendations are proposed:

Application and review (for Gavi Alliance)

- Streamline CCEOP application, building on the positive changes made under COVAX CCE and CCEOP2, and incorporate into one Gavi-wide application & review 6.0 process
- Provide clear guidance to countries upfront (including on choice between modality, key requirements etc.)
- Build on positive changes (e.g., delinking toolkit) from COVAX and CCEOP2

Legal agreement (for Gavi and UNICEF legal teams)

- Streamline legal agreement to fit with Gavi's HSS legal agreement as part of Gavi-wide 6.0 process to ensure simplification and streamlining. Moving forward in Gavi 6.0, it is important for Gavi to standardise the CCEOP grant agreements, using one template in alignment with the Gavi/UNICEF and the Gavi/Government standard grant agreement, ideally through a tripartite agreement.
- Use tripartite agreements for all countries, with exemptions where not feasible (e.g. some fragile states)

Financial management (for Gavi co-financing team)

- Consider risk of country joint investment delaying process and purchases e.g. subject to managing any risks to country delivery against its joint investment requirements, Gavi could consider accepting payment in tranches. This recommendation applies beyond CCEOP country-led deployment modality.

Reporting to Gavi (for Gavi HSS/ CCEOP and M&E team, also UNICEF PG and finance)

- Introduce a standardised reporting template for Gavi with regular updates on procurements, customs clearance and deployments.
- Leverage on existing online tools to streamline reporting and reduce country burden (e.g., through Thrive360)
- Agree with UNICEF on financial report which allows for systematic reporting against the CCEOP service-bundle budget lines (programme management, customs clearance, warehousing and distribution, installation and training)

Documentation and capacity (for Gavi and UNICEF)

- Improve CCEOP country-led documentation and its management amongst Gavi Secretariat and partners, by having clear SOPs on which documents, data and progress reports are owned and managed by which partner. Also ensure up-to-date data is available amongst all stakeholders to avoid data discrepancies.
- Consider Gavi & UNICEF capacity for increased country-led deployment (as more LoE heavy), especially with potentially decreased Partner/Gavi resourcing

Context of changes introduced after CCEOP1	Improved guidance and templates have been introduced under COVAX CCE and CCEOP2, which can be leveraged further. We understand Gavi 6.0 is looking to streamline all cash grants into one and also standardise approval processes and legal agreements and seeks to redefine reporting mechanism between UNICEF and Gavi. Progress has also been made on expanding the Thrive360 platform.
Consideration of trade-offs	The main trade-offs within this recommendation are with regards to the aspects raised on financial management and capacity. On the former, this needs to align with Gavi's overall approach to country joint investments as HSS funds are no longer available to countries for this purpose. On the latter, Gavi's ambition on the country-led deployment modality needs to be matched by its available resourcing, balancing against other priorities for the Secretariat in a resource-constrained environment.

Recommendation 3: Place greater emphasis on country-level monitoring and maintenance

Relevant findings	#1B, #7B, #8, #12, #14
Responsibility	Countries, with guidance and emphasis from Gavi Secretariat and UNICEF PG, SD and COs
Timeframe	As part of approvals and agreements with countries, where feasible and also ongoing TA and monitoring support during deployment

Depending upon the specific issue and country context, Gavi should either require the following from countries as part of the country's application approval or ensure that countries are making progress towards these aspects during grant implementation by providing supporting TA. It is noted that these recommendations apply irrespective of deployment modality.

Introduce measures to improve in-country monitoring and preventative & curative maintenance

- **Improve use of digital inventory databases (eLMIS) and reporting of functionality of CCE**
 - Support countries with the development of an online dashboard to track procurement delivery, customs clearance and deployment, aligned with country e-LMIS
 - Encourage countries to make plans towards developing asset management database that can support better maintenance
- **Improve curative maintenance, including information about warranty and access to spare parts which is the major roadblock for timely maintenance**
 - *UNICEF SD* should share details on warranty / responsibilities with countries to aid enforcement. Overall, clarify responsibilities around warranty & spare part provision at national and local level
 - *UNICEF SD* should implement a requirement which obliges manufacturers to implement a standardised sticker which shows the warranty duration and the name and contact number of the organisation in charge of the repair.
 - Encourage countries to have a curative maintenance plan (not consultant driven but owned by them) and link with wider asset maintenance of other health products in country.
- **Improve processes on preventative maintenance**
 - Encourage countries to have a plan on preventive and curative maintenance which is filtered down from the policy/ plan level to the health facility level for implementation; encourage delivery against this plan by introducing relevant systems and monitoring e.g. through the use of logbooks.
 - Where feasible, assign responsibility of installation, health worker training and regular preventative maintenance checks with same local CCE technician to improve accountability & local ownership
- **Expand coverage & use of TMDs, where feasible**
 - Encourage countries to expand on use of TMDs (for new and existing equipment)
 - Ensure regional & local level staff have access to data from TMDs (e.g., manufacturers required to share RTMD data)

Context of changes introduced after CCEOP1	These recommendations are in line with the upcoming Immunisation Supply Chain Strategy 6.0 which highlights the need to strengthen monitoring and maintenance systems under Gavi 6.0.
Consideration of trade-offs	There are strong trade-offs if this recommendation is not implemented strongly as Gavi will be pumping in resources into countries for capital equipment without concomitant efforts at ensuring their sustainability and maintenance.

Recommendation 4: Expediate approval and deployment timelines

Relevant findings	#1A, #1B, #2, #8
Responsibility	Gavi Secretariat, countries UNICEF (also highlighted in italics by sub-recommendation below)
Timeframe	During grant implementation

The evaluation has highlighted extended timelines for grant completion on account of both inefficiencies in the application and review process (recommendations discussed under Section 4.2) and country-level issues. This recommendation considers ways in which Gavi can support the latter, noting these are largely outside of Gavi's control, especially in the fragile country context.

- Gavi can require countries to deliver as per their approved Gantt/ work plan in their applications in terms of total time period for grant implementation – especially relevant if Gavi introduces a “use it or lose it” policy under 6.0 given its current overall funding shortfall.
- Gavi should introduce timeline benchmarks to guide countries and manage expectations towards faster implementation (e.g. benchmark timelines for application development, review, implementation and distinguishing between high-capacity and fragile countries).
- Gavi can provide TA to countries *through the UNICEF CO* to ensure rapid update of country ODPs where needed and to help troubleshoot any operational challenges such as site readiness, etc.
- Where public sector technician capacity is weak, Gavi can encourage *countries* to use private sector local service providers to expedite installations.

Context of changes introduced after CCEOP1	n/a
Consideration of trade-offs	Generally, expedition of timelines should not come at the expense of existing risk mitigation measures which should be maintained.

Recommendation 5: Support country transition and sustainability

Relevant findings	#9, #10, #13, #14
Responsibility	Countries, with guidance and emphasis from Gavi Secretariat and UNICEF (also highlighted in italics by sub-recommendation below)
Timeframe	During grant implementation

The country-led deployment modality has been introduced for some very practical reasons, and alongside, we view it very important that Gavi considers and incorporates appropriate measures to ensure longer term transition and sustainability for the countries. The following recommendations are relevant:

- Gavi should encourage countries to take on greater responsibilities – as reflected in the Accountability Frameworks included with the legal agreements. This is especially the case where countries have experience of implementing this modality under Gavi 4.0 and 5.0.
- *UNICEF CO* should be looking into areas where countries can benefit from TA to develop the needed skills and systems to ensure effective delivery and management of this modality.
- *Countries* should develop transition plans with increased responsibilities with government and reduced responsibilities with UNICEF, whilst effectively managing risks.

Context of changes introduced after CCEOP1	These recommendations are in line and build on Gavi's draft Health System Strengthening Strategy which also calls for a more deliberate focus on building institutional capacity as countries progress through the transition continuum.
Consideration of trade-offs	None

Appendix A **BIBLIOGRAPHY**

Appendix A provides the list of documents and references used for this report.

Global level documents⁵¹

- Gavi (2020) CCEOP Country-led deployment process outline
- Gavi (2020) Overview of Gavi COVAX CCE support & application process. Presentation to ESA region.
- Gavi (2020) Application form for COVAX cold chain equipment (CCE) support
- Gavi (2021) COVAX CCE pre-screening template
- Gavi (2021) High level delinking toolkit COVAX CEE template
- Gavi and UNICEF (2021) COVAX CCE Gavi and UNICEF Grant Agreement
- Gavi and UNICEF (2022) Gavi and UNICEF CCEOP2 Grant Agreement (sample template)
- Gavi (2022) COVAX KPI September 2022
- Gavi, UNICEF and WHO. COVAX CCE Update week of 17th May
- Gavi and UNICEF (2023) Reflections from CCEOP and COVAX.
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- Gavi (2023) Cold chain equipment optimization platform: Technology Guide.
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- Gavi (2023) CCEOP2 Delinking budget template
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- WHO (2022) Target Product Profiles
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- UNICEF (2022) CCEOP Post-Installation Inspection in Nigeria. Inspection Report Findings.
- UNICEF (2021) Supplier-led cost benchmarking tool

⁵¹ Some of the global level documents, such as the CCEOP2 documents, have been reviewed by CEPA for a deeper understanding of the context and changes that have been implemented already.

Afghanistan

Approval and Agreement

Gavi Decision Letter July 2019

Gavi Grant Agreement SC190779

Government decision letter

Gavi Grant Agreement SC230536

Gavi Grant SC230536 Agreement Amendment 1

Gavi Grant SC230536 Agreement Amendment 2

Peer Group Technical feedback report

Finance

Afghanistan Gavi CCEOP Proposal Final budget

SC190779 Financial certified statement as of 30 April 2024

Gavi_SC230536_Financial Uncertified Statement as of 30 September 2024

Costed Operational Plan 2019

Costed Operational Plan 2023

CCEOP1 Delinking Country Budget 2019

Operational Deployment Plan

CCEOP1 and reprogramming Operational Deployment Plan

Reporting

UNICEF Post-Installation Inspection Report August 2021

Gavi SC190779 1st Progress Report

Gavi SC190779 2nd Progress Report

Gavi SC190779 3rd Progress Report

Gavi SC190779 4th Progress Report

Gavi SC190779 5th Progress Report

Gavi SC190779 6th Progress Report

Gavi SC190779 Final Progress Report

Gavi SC230536 1st Narrative Report

Gavi SC230536 Final Narrative Report

Minutes of meetings NLWG/ PMT 2019 and 2020

Training reports

Additional documents

Afghanistan Effective Vaccine Management (EVM 2.0) Assessment Report

Afghanistan CCEOP1 Country-led service-bundle proposal 2019

CCEOP1 and CCEOP1 Reprogramming ODP

CCEOP2 Grant Agreement

CCEOP2 Reprogramming Budget 2023

Kenya

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CCEOP1 Country-led service-bundle proposal 2020

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Kenya CCEOP and GOK-WB CCE Deployment Evaluation. MOH NVIP (2019)

Laos

Application & Review Process

CCEOP1 Country-led service-bundle proposal 2020

CCEOP1 Accountability Framework

CCEOP1 Delinking Country Budget 2020

CCEOP1 Risk and Mitigation Matrix

CCEOP1 Delinking Summary Report

CCEOP1 Responses to Gavi Peer Group Review

CCEOP1 Delinking Peer Group Final Report

CCEOP1 Gantt Chart

Approval and Agreement

Gavi Decision Letter 2019

CCEOP1 Tripartite Grant Agreement

CCEOP1 Costed Operational Plan

CCEOP1 Accountability Framework

CCEOP1 Risk and Mitigation Matrix

CCEOP1 Gantt Chart for Implementation 2020

CCEOP1 Updated Gantt Chart for Implementation Lao 2023

Operational Deployment Plans

CCEOP1 Final ODP

Finance

CCEOP1 Country-led service-bundle

CCEOP1 Costed Operational Plan

CCEOP1 Detailed Cost Breakdown Budget

CCEOP1 HSS Top-Up

CCEOP1 Government Approval on COP

Reporting

CCEOP1 Post Installation Report 2022

Cold Chain Hub Report 2024

UNICEF And MoH Training Report

Laos SC TWG Notes 2022

Laos SC TWG Notes 2023

Cross-cutting

CCEOP1 Detailed Cost Breakdown Budget 2019

CCEOP1 Detailed Cost Breakdown Budget 2020

Gavi CCEOP Delinking KII summaries

Post Training Assessment of ILR Installation Report 2019

UNICEF And MoH Training Report

Laos SC TWG Notes 2022

Cold Chain Hub Report 2024

Gavi CCEOP Delinking KII summaries 250819 v4 CCS.docx

2022 Laos SC TWG Notes

Laos Effective Vaccine Management (EVM 2.0) Assessment Report

Sudan

Application and review

CCEOP1 Delinking Country Budget 2019

CCEOP1 Delinking Country Proposal 2021

CCEOP1 Delinking Toolkit 2024

CCEOP1 Delinking Checklist

Peer Group Technical feedback report

Approval and agreement

CCEOP1 Grant Agreement

CCEOP1 Grant Agreement Amendment 2024

Gavi Decision Letter 2019-2020

Finance

Costed Operational Plan 2020

Approved Costed Operational Plan 2021

Costed Operational Plan ILRs final 2021

Costed Operational Plan 2024

Certified Donor Statement 2025

Uncertified Donor statement by activity 2025

Operational deployment plan

Operational Deployment Plan (received August 2025)

Reporting

UNICEF Post-Installation Inspections in Sudan 2025

PMT meeting minutes

Progress Report 2023

Progress Report 15 January 2024

Progress Report 23 July 2024

Scope of Cold Chain technicians training

Training report Haier 30 May – 3 June 2021

Cross-cutting

Sudan Effective Vaccine Management (EVM 2.0) Assessment Report

Syria Damascus

Application and review

CCEOP1 Delinking Country Budget 2023

CCEOP1 Delinking Country Tool-Kit

COVAX CCE Tool-kit 2022

COVAX CCE Independent Review Committee Country Report 2021

Approval and agreement

Gavi CCEOP1 Decision Letter 2021-2023

Gavi COVAX CCE Decision Letter 2021

Finance

CCEOP1 Costed Operational Plan 2019

COVAX CCE Funds transfer 2022

Operational deployment plan

Operational Deployment Plan 2022

COVAX CCE Operational Deployment Plan

Reporting

CCEOP1 preliminary draft post-installation inspection report

COVAX CCE delinking toolkit with progress monitoring

COVAX CCE budget expenditure

CCEOP1 Y1 implementation progress slides

CCEOP1 delinking toolkit with progress monitoring

Cross-cutting

COVAX CCE site readiness inspection reports

PMT minutes

Haier training report

Syria Effective Vaccine Management (EVM 2.0) Assessment Report

Yemen

Application and review

CCEOP1 Delinking Country Budget 2020

CCEOP1 Delinking Country Proposal 2020

CCEOP1 Delinking Country Toolkit 2025

CCEOP1 Operational Deployment Plan 2020

Peer Group Technical feedback report

COVAX CCE Budget 2020

COVAX CCE Application 2021

COVAX CCE Independent Review Committee Country Report 2021

Approval and agreement

CCEOP1 Grant Agreement

CCEOP1 Grant Agreement Amendment 2023

CCEOP1 Grant Agreement Amendment 2024

Gavi Decision Letter 2020-2022

Gavi COVAX CCE Decision Letter 2021

Operational Deployment Plans

Yemen CCEOP1 Operational Deployment Plan Year 1 and 2 Q1 2025

Yemen COVAX CCE Operational Deployment Plan

Finance

Costed Operational Plan 2020

Costed Operational Plan 2023

Reporting

UNICEF Post-Installation Inspections in Yemen 2022

COVAX CCE Operational Deployment Plan 2021

COVAX CCE Funds transfer 2022

Governorates risk classification

Cross-cutting

Yemen Effective Vaccine Management (EVM 2.0) Assessment Report

Appendix B **METHODOLOGY**

Appendix B provides a detailed overview of the evaluation objectives and methodology, in particular the theory-based approach (Section B.1), mixed-methods approach (Section B.2), the robustness assessment framework (Section B.3) and the limitations and mitigation measures (Section B.4).

The evaluation was implemented between July and November 2025. The findings were disseminated in December 2025. The paragraphs below explain the evaluations scope and objectives in line with the TORs/RFP issued by Gavi. As further explained in Section B.4, the following has deviated from the TORs/RFP:

- Papua New Guinea (PNG) case study for CCE COVAX was dropped on request from Gavi due heavy EPI team workload and the ongoing polio campaign. Fewer site assessments have been completed compared to the ISO plan in Laos, Syria and Yemen given the delays in approvals from the country on the site assessments and complex security challenges in Syria and Yemen, which have limited government clearance of the evaluator to access specific areas.

The **evaluation objectives** were to:

- Assess global and country level delinking processes (application and review process, legal agreement, funding flows, and reporting) and country level implementation outcomes (cost-efficiency, quality, timeliness, government ownership and technical capacity) under CCEOP1 and COVAX CCE implementation across a range of parameters in pilot countries.
- Provide recommendations on optimisation of country-led deployment processes and a criteria for selection of countries which are eligible to apply the modality in 6.0.
- Document enablers that supported the successful implementation of the approach and achievement of outcomes across fragile and high-capacity states.

The results of this evaluation are intended to help the Alliance inform the redesign of the cold chain component support in Gavi 6.0 (2026-30).

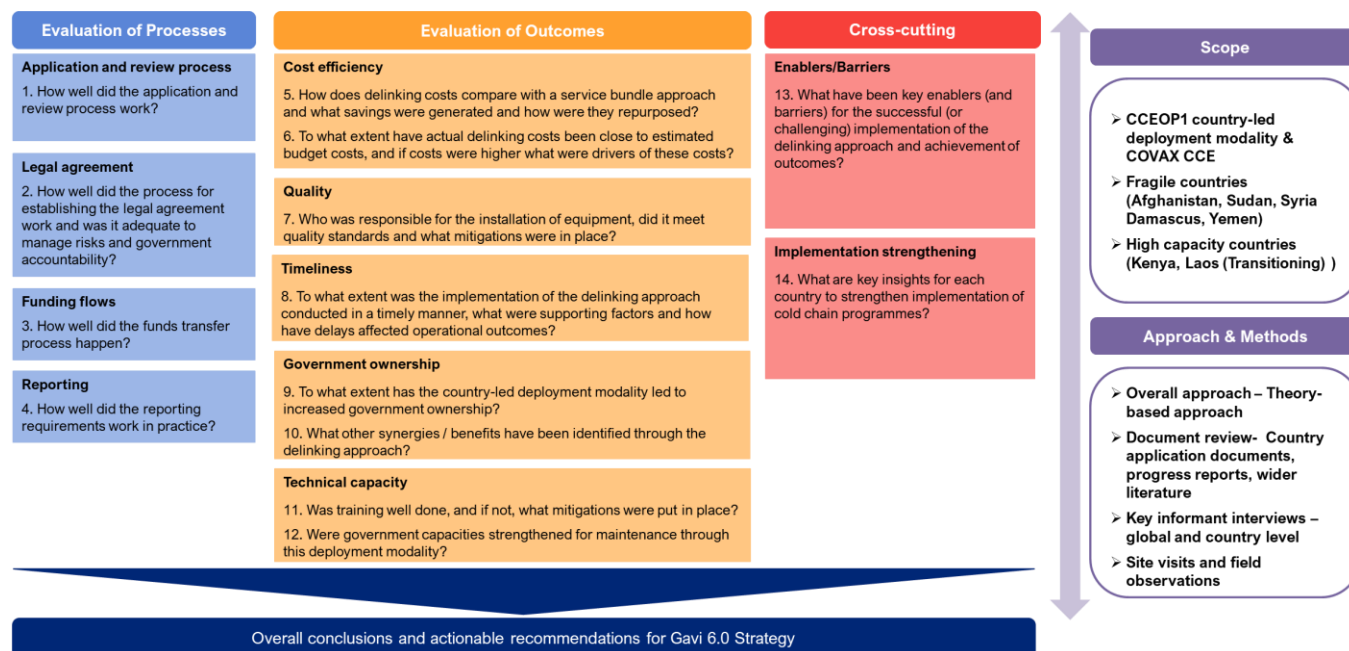
The **scope** of the evaluation is on both the global and country level deployment process (i.e. planning, distribution, installation, training, funds transfer, monitoring) and country level implementation outcomes. The focus is on CCEOP 1 (Gavi 4.0) grants implemented between 2019 and 2025 and COVAX CCE grants deployed between 2021 and 2024. The following aspects are outside the scope of this evaluation: CCEOP2, the supplier-led deployment and assessing CCEOP global level objectives. The evaluation draws on previous results and evaluation findings⁵² on the supplier-led deployment modality in order to assess outcomes of the country-led modality, but it is outside of the scope of this evaluation to provide a direct comparison between the two modalities. Given the CCEOP implementation was delayed, there was nothing to fully evaluate at the time of the evaluation. Only changes already implemented for CCEOP2 are reflected in the report where changes are fit for purpose in 6.0.

The **evaluation framework and methodology** are presented in Figure B.1. The evaluation questions have been structured around the OECD DAC evaluation criteria focusing on efficiency, effectiveness and sustainability.

A theory-based approach based on a retrospective Theory of Change (ToC) developed by CEPA for this evaluation was applied to answer these evaluation questions (described in Section B.1). A mixed methods approach has been employed to conduct the evaluation (described in Section B.2), supported by a robustness assessment framework for findings (described in Section B.3).

⁵² JSI (2022) Gavi CCEOP Evaluation 2022

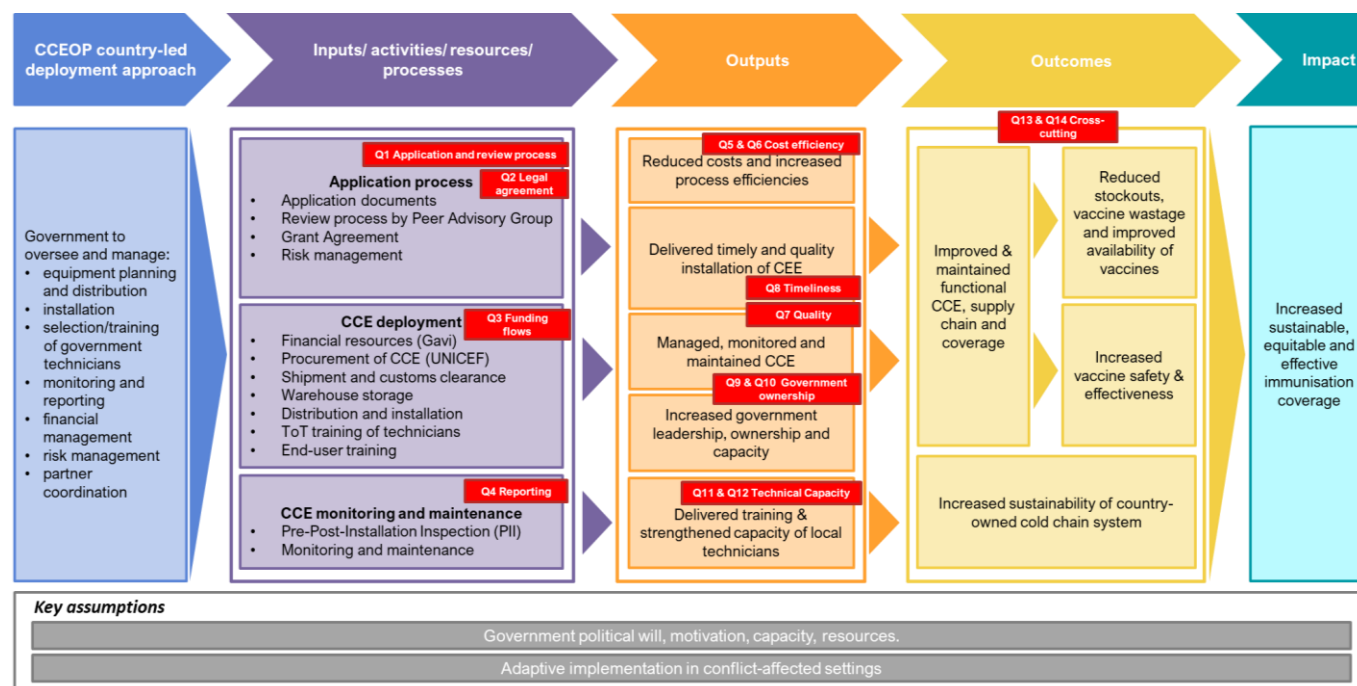
Figure B.1. Evaluation framework, criteria and questions



B.1. THEORY-BASED APPROACH

The evaluation applied a theory-based approach, which entails a review of the extent to which the impact pathways identified in the ToC for the CCEOP country-led deployment modality have played out in practice. Figure B.2 presents the ToC which has been developed retrospectively for this evaluation by CEPA, and includes mapping of how the evaluation questions align with the developed ToC. The evaluation assessed how and to what extent the country-led deployment modality has influenced intermediate outcomes including improved, maintained and functional CCE and increased sustainability through country ownership, validating the causal pathways outlined in ToC for these investments.

Figure B.2. Theory of Change



B.2. MIXED METHODS AND METHODOLOGICAL LIMITATIONS

Table B.1. below details the key methods applied for the evaluation, as well as the limitations and the status for this report.

Table B.1. Evaluation methods

Method	Limitations	Impact of the limitations across the evaluation	Implementation
Document review Includes CCEOP1 and COVAX CCE applications and review documents, legal agreement/UNICEF CO approval letter, progress and financial reports, wider Gavi and UNICEF HQ and CO documentation.	Lack of availability of full documentation, including final documentation	Impacted the completeness of the findings by not being able to review specific documents such as latest ODPs, details on timelines, and regular reporting updates.	A bibliography is provided in Appendix A.
Key stakeholder and focus-group interviews at global and country level Multi-stakeholder consultations with Gavi (CCE team, SCMs), UNICEF (SD, PG, COs), Ministry of Health, technicians, other partners (e.g. WHO)	Largely “internal” stakeholders, with limited if any external perspectives	Limited opportunity to triangulate findings with external perspective to remove potential biases	Global – 16 consultations (all completed) Country – 51 consultations The stakeholder consultation list and guides are provided in Appendices C and D, respectively. The country stakeholder list can be found in the respective country case studies.
Site visits/Field observations In-person and remote site assessments were conducted in the 6 case study countries. In particular, remote assessments were conducted for sites in harder to reach areas due to security concerns. The sampling selection followed the level 1 inspection requirements of ISO 2859. Selection was done to ensure representation of the country while taking into account security aspects (e.g., certain conflict areas in Sudan were not included). The selected sites were included in the respective site assessment implementation plans which were reviewed by the UNICEF CO and approved by the	Cancellation of in-person assessments due to security, delayed start of many assessments	The analysis does not include assessments of sites in high insecure areas (e.g. Darfur in Sudan), which anecdotal evidence shows are the sites where deployment has had issues due to looting	The following site assessments have been completed and the findings have been included in the final report (with country-specific details in the country reports). • Afghanistan: 50/50 (16% in person by CEPA evaluator, 84% in-person through EPI) • Kenya: 50/50 (100% in person) • Laos: 28/32⁵³ (43% in person, 57% remote) • Sudan: 32/32 (34% in person, 66% remote)

⁵³ Due to the rainy season and road access, there was a delay in some of the planned mission so that only 28 site assessment were completed within the timeframe.

Ministries of Health in order to get government clearance to visit the sites, given security and other country requirements. The site assessments were conducted through a standardised site assessment checklist tool. Appendix D presents the site assessment tool for in-person and remote assessments for ILRs and SDD. The site assessment checklist tool was translated in the national languages in Afghanistan, Lao PDR, Yemen, Syria and Sudan.		• Syria: 9/18⁵⁴ (100% in-person) • Yemen: 9/37⁵⁵ (100% in-person)
Quantitative data analysis An excel-based, costing analysis of country-led vs supplier-led (counterfactual) modality was conducted.	Based on UNICEF 2021 Supplier-led Benchmarking tool which includes modelled assumptions	The costing analysis is based on the assumptions used in the UNICEF benchmarking tool on length of time of arrival of fridges to final commissioning, percentage of facilities in security zones, security zone price multiplier for labour and vehicles, percentage of hard to reach facilities and number of extra days for hard to reach facilities

B.3. ROBUSTNESS ASSESSMENT FRAMEWORK

Evidence was collated across methods and the strength of evidence was assessed based on the quality and quantity of the evidence. Table B.2 presents the strength of the evidence framework. All robustness rankings are relative robustness rankings, based on careful consideration and are ultimately judgement-based.

Table B.2. Strength of evidence rating for findings

Rating	Assessment
High (4) 	The finding is supported by multiple sources of data of generally good quality, allowing for robust triangulation including documents, site assessments, different stakeholders in different contexts and majority of consultations (both quantitative and qualitative sources)
Medium (3) 	The finding is supported by a few data sources of good quality, limited triangulation, where corroborative sources allow for reasonable but evidence coverage not complete.

⁵⁴ Due to the regime change in Syria (including changing MOH and EPI personnel), there has been a delay in the site assessments and document sharing for Syria. Only the in-person site assessment were completed within the timeframe.

⁵⁵ Based on request from UNICEF, the engagement with Yemen North and UNICEF CO in Sanaa has been put on hold given the sensitive security situation that aggravated recently and is impacting the operations of UN offices in Yemen North, including UNICEF and not all documents were received. Site assessments for Yemen South (9 sites) were completed. Given the situation in Yemen no separated country case study report was developed.

Low (2)



The finding is supported by very limited evidence (1 or 2 sources) or by multiple sources of lower quality and no triangulation.

Insufficient (1)



The finding is supported by incomplete or unreliable evidence or contradictory consultations. Should not be included in report.

B.4. LIMITATIONS AND MITIGATING ACTIONS

Table B.3 presents the limitations for this evaluation and the mitigating actions that were taken to minimise these.

Table B.3 Limitations and mitigating actions

Overall limitations	Mitigating actions
Comparisons with supplier-led not in scope, implying some conclusions are not made with context/ comparisons.	Included caveats on this throughout the report and specified when assumptions on the supplier-led modality were made.
Country case studies have not included countries without conflict/ fragility but with low capacity, limiting full consideration of countries to inform recommendations.	Included caveats on this in the conclusion and recommendations, including in the consideration of the country eligibility criteria.
Incomplete and delayed dataset for this evaluation provided by Gavi, UNICEF HQ and UNICEF CO	- Followed up extensively to receive any missing documents (last batch of documents were received by the evaluators in November despite requests were initiated in July/August). - Clear mapping of missing data reported to Gavi to outline the limitations of the evaluation. - Comprehensively assessed all documents available. - Used of mixed-methods approach including consultations and site visits to complement and triangulate information and findings across a number of evidence sources.
Limitations during the evaluation implementation	Mitigating actions
Papua New Guinea (PNG) case study for CCE COVAX was dropped on request from Gavi due heavy EPI team workload and the ongoing polio campaign.	A number of different modalities for the PNG case studies (including a more light-touch review) were offered and discussed with Gavi, but ultimately it was decided to drop the case study to not put additional burden on the country.
Security issues hindered some of the in-person site assessments to take place as planned.	- Maintained regular communication with the UNICEF CO to monitor security developments and adjust plans accordingly (e.g. for Afghanistan). - For Yemen, the site assessments and stakeholder interviews in Yemen (north) were put on hold on request from UNICEF given sensitive security situation impacting the operations of UN and other international development offices in Yemen North, including UNICEF on the ground - Conducted remote assessments in areas which could not be assessed in-person or used locally based staff to access areas (e.g., as done in the case of Afghanistan)

Appendix C GLOBAL CONSULTATION LIST

Appendix C provides in Table C.1 the list of global stakeholders interviewed. Several stakeholders from Gavi and UNICEF PG were also interviewed during the inception phase. The list of country stakeholder consultations can be found in the respective case study reports. 56 country stakeholder interviews were conducted.

Table C.1: List of global level consultations

Stakeholder group/ Organisation	Department/Division	Name ⁵⁶	Position	
Gavi				
Gavi Secretariat	Country Delivery Department	Veronique Maeva Fages ⁵⁷	Afghanistan Senior Country Manager	
		Anna Standertskjold ⁵⁸	Afghanistan Senior Programme Manager	
		Billie Nieuwenhuys	Kenya Senior Country Manager	
		Mariabruna Jennings	Kenya Programme Manager	
		Craig Beyerinck	Kenya previous Senior Programme Manager	
		Nadia Lasri	Laos Senior Country Manager	
		Veronique Maeva Fages	Syria Damascus Senior Country Manager	
		Anna Standertskjold	Syria Damascus Senior Programme Manager	
		Anne Cronin	Sudan Senior Country Manager	
		Alissa Konstantinova	Sudan Senior Programme Manager	
		Jamilya Sherova	Sudan previous Senior Country Manager	
		Anne Cronin	Yemen Senior Country Manager	
		Alissa Konstantinova	Yemen Senior Programme Manager	
	Comprehensive Vaccine Management (CVM) team	Karan Sagar	Head of Team	
		Jalia Nanfuka	Senior Manager, Cold Chain Equipment	
		Finance	Persefoni Politi	Consultant
		Legal	Kate Fendler	Senior Legal Counsel
	Laurent Gabus		Senior Legal Counsel	
Technical Partners/Peer Review Group				
UNICEF	HQ Programme Group, Health	Michelle Seidel	Senior Advisor Immunisation	
		Anahitta Shirzad	Health Specialist	
	HQ Supply Division, Immunisation Technology Centre (ITC)	Thomas Sorensen	Chief ITC	
		Hailu Kenea	Technical Specialist ITC	

⁵⁷ Also Laos previous Senior Country Manager.

⁵⁸ Also Laos previous Senior Programme Manager.

Stakeholder group/ Organisation	Department/Division	Name ⁵⁶	Position
	HQ Finance Division, Department of Financial and Administrative Management (DFAM)	Angelina Oketch	Finance Manager
WHO	Department of Immunisation, Vaccines & Biologicals (IVB), Essential Programme on Immunisation (EPI)	Souleymane Kone	Team Lead
Clinton Health Access Initiative (CHAI)	Global Vaccines Delivery	Ashvin Ashok	Former Technical Manager

Appendix D **INTERVIEW GUIDE**

This Appendix presents the general interview guides for global stakeholders (Section D.1) and for country-level stakeholders (Section D.2). Tailored interview guides were then developed for each stakeholder group depending on their background (e.g., more targeted questions on legal and finance were shared with the Gavi and UNICEF legal and finance team, respectively, aligned with their areas of expertise). Section D.3 presents an example of a tailored interview guide for technicians.

The interviews with global stakeholders were conducted in English. Interviews at the country-level were also conducted in local languages as required (e.g., for interviews with technicians) and the questionnaire was translated by our local consultants as needed.

D.1. GLOBAL INTERVIEW GUIDE (CROSS-COUNTRY)

This global interview guide was used during the interviews with global stakeholders, namely Gavi, UNICEF and WHO HQ representatives who have been involved in the CCEOP1 and COVAX CCE processes and implementation, as well as additional partners working on immunisation and health systems strengthening. Depending on the roles covered by the different representatives (e.g. programme design, procurement, legal, finance, country coordination), the interview guide was tailored to ensure relevance for the interviewee.

Application and review process

1. To what extent do you view the application and review process for the Gavi CCEOP country-led deployment modality to have worked well? What have been key challenges and bottlenecks and what, if any, mitigation measures were put in place? In particular:

- a) Was the application process efficient and appropriate for countries in terms of required information (e.g. separate application to CCEOP was required, separate COVAX tool kit). If not, why?
- b) Was the application review process efficient and conducted within anticipated timelines? If not, why?
- c) Did the application help effectively screen deployment risks for each country? What improvements are needed?

Legal agreement

2. To what extent did the process for establishing the legal agreement work well and was it adequate to manage risks and government accountability? In particular:

- a) Was the process for establishing the legal grant agreement for CCEOP delinking efficient? If not, why?
- b) Were the roles and responsibilities of different stakeholders established through the legal agreement appropriate and if not what would you suggest?
- c) Was the legal agreement established for the delinking process adequate to manage the risks and guarantee government accountability? If not, why and what mitigations were put in place?

Funding flows

3. To what extent did the funds transfer process work well at the global (e.g., between Gavi and UNICEF) and country level (e.g., from UNICEF CO to government)?

- a) Did UNICEF CO/ government receive the deployment funds from Gavi for CCEOP/COVAX CCE on time to implement the delinking project and was the funds transfer process efficient? If not, why and what mitigations were put in place?

Reporting

4. How well did the reporting requirements work in practice?

- a) To what extent were the reporting requirements as per the signed CCEOP legal agreements met? If not, why and what mitigations were put in place?
- b) What might be key reporting requirements to support effective implementation and results monitoring from the CCEOP country-led deployment modality?
- c) How well is the Gavi-required reporting integrated within country data and monitoring systems?

Cost efficiency

- 5. Do you have any insights on the difference between the delinking costs and costs under the supplier-led approach?
 - a) What are the key cost components driving price differences?
 - b) Where any savings generated from switching and how were they repurposed?
- 6. Do you know if the actual delinking costs have been aligned with the estimated budget costs? If not, what have been the key drivers leading to higher costs?

Quality

- 7. Do you have any insights on the evidence to-date with regard to the quality installation of CCE through the country-led deployment modality (e.g. management of installation through government technicians or contracted private sector, extent to which pre-PILs were conducted, whether CCE is well functioning and maintained)? What more could be done through the modality design to support quality installations and maintenance?

Timeliness

- 8. To what extent was the implementation of the delinking approach conducted in a timely manner, what were supporting factors and how have delays affected operational outcomes? What factors driving timelines are intrinsic to the modality design and what might be external factors (e.g. country-specific factors)? What more could be done through the modality design to support timeliness?

Government ownership

- 9. To what extent have governments taken increased ownership with the country-led deployment modality? What is the range of evidence to support increased government ownership?
 - a) Has the Government taken lead via the PMT/NLWG for the deployment and installation of the equipment? Does the PMT/NLWG now cover broader supply chain issues, beyond just Gavi supported CCE installations? If not, why and what mitigations were put in place?
 - b) How well have governments and UNICEF COs worked together under the country-led deployment modality?
- 10. What other synergies or benefits have been identified through the delinking approach?

Technical capacity

- 11. How well has training of technicians and end-user health workers (including ToT) been delivered across countries in the country-led deployment modality? What mitigations have been put in place to address any challenges and gaps?
- 12. What evidence is there of government capacities being strengthened for maintenance through this deployment modality?

Cross-cutting

- 13. What have been key enablers (and barriers) for the successful (or challenging) implementation of the delinking approach and achievement of outcomes?

Recommendations

- 14. How can countries strengthen implementation of cold chain programmes?

15. Do you have any recommendations on how to improve the CCEOP country-led deployment for Gavi's 6.0 strategy?

16. For what countries do you think the country-led deployment modality would work well? What should be criteria for country selection?

D.2. COUNTRY INTERVIEW GUIDE

This country interview guide was used during the country case studies interviews, namely with Gavi senior country managers (SCMs), UNICEF CO and Ministry of Health representatives. Depending on the stakeholders, the interview guide was tailored further to ensure relevance for the interviewee.

Application and review process

1. To what extent do you view the application and review process for the Gavi CCEOP country-led deployment modality to have worked well? If not, what have been the key challenges and bottlenecks? Which mitigation measures were put in place? Specifically:

- a) Was the application process efficient for countries to provide required information (e.g. availability of information requested by Gavi, value of the different forms and templates, etc.). If not, why?
- b) Was the application and review process effectively screening the deployment risks for your country? What key risks were identified and did anything additional arise during implementation? If not, why?

Legal agreement

2. To what extent did the process for establishing the legal agreement work well and was it adequate to manage risks and government accountability? In particular:

- a) Was the process for establishing the legal grant agreement for CCEOP delinking efficient? If not, why?
- b) Were the roles and responsibilities of different stakeholders established through the legal agreement appropriate and if not what would you suggest?
- c) Was the legal CCEOP grant agreement established for the delinking process adequate to manage the risks and guarantee Government accountability? If not, why and what mitigations were put in place?

Funding flows

3. Did your country receive the deployment funds UNICEF CO for CCEOP/COVAX on time to implement the delinking project and was the funds transfer process efficient? If not, why and what mitigations were put in place?

Reporting

4 How well did the reporting requirements work in practice for your country?

- a) To what extent were the reporting requirements as per the signed CCEOP legal agreements met? If not, why and what mitigations were put in place?
- b) What might be key reporting requirements to support effective implementation and results monitoring from the CCEOP country-led deployment modality?
- c) How well is the Gavi-required reporting integrated within country data and monitoring systems?

Cost efficiency

5. How do the total delinking costs compare with a supplier-led service-bundle approach?

- a) What are the key cost components driving price differences?
- b) Where any savings generated from switching and how were they repurposed?

- c) *Data request: breakdown of costs by key components (planned vs actual); costs under a supplier-led service-bundle approach (if available)*

6. To what extent have actual delinking costs been close to estimated budget costs, and if costs were higher what were drivers of these costs?

Quality

7. To your knowledge, what has been the evidence to-date with regard to the quality installation of CCE through the country-led deployment modality?

- a) *Data request: Installation reports for all selected assessment sites*

Timeliness

8. To what extent was the implementation of the delinking approach conducted in a timely manner, what were supporting factors and how have delays affected operational outcomes?

- a) *Data request: Total CCE equipment installed (planned vs actual)*

Government ownership

9. To what extent have governments taken increased ownership through the country-led approach?

- a) Has the Government taken lead via the PMT/NLWG for the deployment and installation of the equipment?
Does the PMT/NLWG now cover broader supply chain issues, beyond just Gavi supported CCE installations?
If not, why and what mitigations were put in place?

10. Are there any other synergies or benefits in your country through the delinking approach?

Technical capacity

11. How did the country-led deployment modality impact on ToT training of government technicians and end-user training of health workers?

12. Were government capacities strengthened for maintenance through this deployment modality? If yes, in what way?

- a) *Data request: Number of conducted trainings for government technicians and health workers*

Cross-cutting

13. What have been key enablers (and barriers) for the successful (or challenging) implementation of the delinking approach and achievement of outcomes?

Recommendations

14. What are the key lessons learned from the country-led deployment in your country? Do you have any recommendations on how to improve the CCEOP country-led deployment for Gavi's 6.0 strategy?

15. Do you have any recommendation regarding Gavi and UNICEF engagement specifically for your country for CCEOP2?

16. For what countries do you think the country-led deployment modality would work well? What should be criteria for country selection?

D.3. TECHNICIANS INTERVIEW GUIDE

This interview guide was used for the consultations with government technicians who have received ToT training from the suppliers, installed the CCE in the country and provided training to end-user healthcare workers in the facilities where the equipment has been installed under the country-led deployment modality.

Training received

1. What type of training did you receive? From which supplier and how long did the training last?
2. How would you consider the quality of the training you received?

CCE installation

3. In how many sites covered by the country-led deployment modality did you install equipment? Did you cover any of the sites included in the site assessment?
4. Can you describe your experience with the installation of the CCE? Did you encounter any challenges and delays? If yes, what have been the key mitigation measures?
5. To your knowledge, were any other resources used for the CCE installation, such as manpower and vehicles, that were not supported financially by the Gavi CCEOP1 programme?

Training delivered

6. Can you describe your experience in delivering training to end-user healthcare workers on the installed CCE? How many trainings did you deliver? What did the trainings include?

Maintenance and monitoring

7. To your knowledge, how well is maintenance and monitoring done in the sites where the CCEOP country-led modality is being implemented? If not well done, how could it be further improved?

Government ownership

8. In your view, has the country-led deployment modality strengthened government ownership of CCE?
9. How can Gavi further strengthen the installation of CCE and country-led deployment and ownership modalities?

Appendix E **SITE ASSESSMENT TOOL**

Appendix E provides the site assessment checklist tools. Four site assessments checklist tools were developed both for in-person and remote assessments for ice-lined refrigerators/freezers and solar direct drive refrigerators/freezers, namely:

1. On-site assessment checklist for ice-lined refrigerators/freezers
2. Remote assessment checklist for ice-lined refrigerators/freezers
3. On site assessment checklist for solar direct drive refrigerators/freezers
4. Remote assessment checklist for solar direct drive refrigerators/freezers

The site assessment checklist tools are available here:



Site Assessment
Tool_Final.xlsx

The site assessment checklist tool was translated in the national languages in Afghanistan, Lao PDR, Yemen, Syria and Sudan, as required.

Appendix F ANALYSIS OF CCEOP1, CCEOP2 AND COVAX CCE APPLICATION AND REVIEW PROCESS

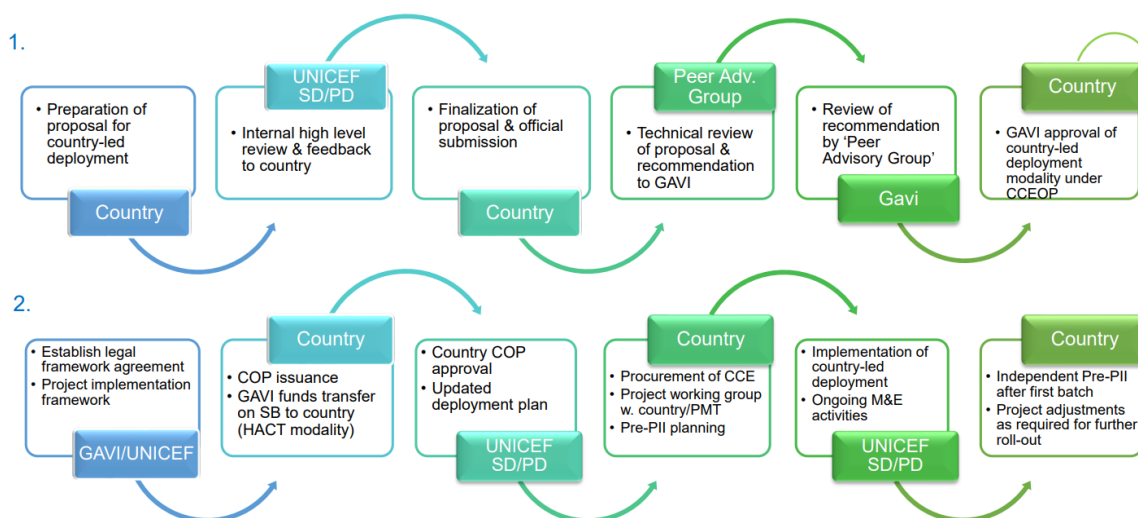
Appendix F provides further details on the application and review process: Section F.1 explains the application and review process steps required as part of CCEOP1; Section F.2 provides a summary of the different application processes under CCEOP1, COVAX CCE and CCEOP2.

F.1. CCEOP1 APPLICATION AND REVIEW PROCESS STEPS

The country-led deployment application process under CCEOP1 included several steps which were in part driven by the pilot nature of the programme which was set-up after the submission and review of the standard supplier-led deployment CCEOP1 applications. This section explains the different steps. Figure F.1 provides a summary of these steps (including implementation at the country level which is not discussed in detail here).

- 1. Application development and submission:** governments were required to develop and submit a proposal for country-led deployment, including a budget, accountability framework, risk matrix and a Gantt chart.
- 2. Review:** A Peer Review Group, comprising UNICEF, WHO and the Clinton Health Access Initiative (CHAI), would review the country proposal. Depending on the pass score assigned by the Peer Review Group, countries were requested to amend their proposal and provide additional clarifications with a re-submission to the Peer Group. Thereafter, the proposal would be submitted to Gavi with recommendations on the robustness of the proposal for approval.
- 3. Approval:** Gavi would review the recommendations of the Peer Review Group and approve the successful proposals. Following the approval of the country proposal, a legal agreement ('Grant Agreement', hereafter GA) was signed, per Gavi's requirements, to start the project. An updated ODP and costed operation plan were also required to disburse the funds.

Figure F.1 Country-led application, review and implementation process



Source: UNICEF, included in the Gavi (2025) CCEOP Delinking Evaluation 2025

F.2. COMPARISON OF CCEOP1, COVAX CCE AND CCEOP2 APPLICATION AND REVIEW PROCESS STEPS

The country-led deployment modality application and review process has seen a number of changes to streamline the process from the original CCEOP1 pilot. Table F.1 below provides an overview of the application documents and review modalities of COVAX CCE and CCEOP2, compared to CCEOP1.

In sum, CCEOP1 included a narrative proposal with a number of attachments. This has been improved overtime, mainly through:

- country checklist including a narrative (simplified application)
- delinking tool kit (including the accountability framework, risk matrix, Gantt chart, installation checklists and monitoring and implementation schedule)
- delinking budget tool
- requirements prior to submission

Table F.1 Comparison of application documents and review processes in CCEOP1, COVAX CCE and CCEOP2

	Application documents	Review process
CCEOP1	• Project proposal (containing information on the already approved supplier-led ODP, details on PMT, previous CCE projects, motivation for country-led service-bundle modality, proposed deployment plan, Gantt charts, monitoring and reporting of deployment, country risk assessments and mitigation plans and project budget) • The project proposal for CCEOP1 had both a full narrative proposal and some separate excel sheets with the proposed deployment plan, Gantt charts, country risk assessment and accountability framework (based on the documents made available to the evaluators) • Delinking budget as a separate attachment	A bespoke Peer Review Group comprising UNICEF, WHO and CHAI was constituted for application reviews
COVAX CCE	• A simplified application with yes/no checklist of requirements included: signature from the Ministry of Health, meeting minutes, updated cold chain inventory, completed WHO CCE sizing tool, ODP, budget, proof of status for CCE tariff exemptions waivers and customs clearance, and proof of vaccine request submission • A comprehensive Delinking toolkit that sought to bring together the accountability framework, risk matrix, deployment Gantt chart, the budget, monitoring and implementation schedule and the installation checklist so that they could be comprehensively planned for and reviewed. • Delinking budget tool	No separate review process for delinking
CCEOP2	• No separate application process but streamlined in the main CCEOP application • Delinking toolkit (containing an accountability framework, risk matrix, deployment Gantt chart, monitoring and implementation schedule, financial utilisation monitoring, and checklist for installations) • A simplified application with yes/no checklist of requirements (ODP availability, functioning PMT/NLWG, country's past experience, deployment plan, dedicated HR capacity, risk matrix available, estimated budget available, focal point available, accountability framework available) • Delinking budget tool (containing additional guidance and instructions for countries to fill out the budget)	Part of the standard Gavi IRC process

Appendix G SUMMARY OF RISKS IDENTIFIED IN THE APPLICATION REVIEW PROCESS

A risk matrix was one of the application requirements for both CCEOP1 and COVAX CCE. Appendix G provides an analysis of the risks identified in the CCEOP1 review process. Table G.1 below provides a more detailed summary for the case study countries for CCEOP1. The analysis does not include the Kenya and Syria CCEOP1 review as the Peer Group Review report was not made available to the evaluators.

Across countries, the following were the main risks identified in the risk matrices:

- Customs clearance delays due to delays in clearance documents;
- Challenges in coordination mechanisms;
- Exceeding costs of deployment;
- Lack of safety of supplies stored in government warehouses and during distribution due to theft, fire and armed attack;
- Delay in installation due to worsening of security situation, CCE deployed to incorrect site or site inaccessibility;
- Emergency situation due to flooding, landslides and insecurity.

All Peer Group Review reports for CCEOP1 found that the requirements were met with some shortcomings and gave countries a conditional recommendation upon satisfactory responses to requested clarifications. All country applications had some missing information or shortcomings across four key review areas: **(1) project management capacity, (2) timelines, (3) risk management and (4) budget.**

Box G. Risks identified during the review process

Afghanistan: The review process identified some inconsistencies in the submitted budget, in particular on logistics costs, travel costs and customs clearance costs.

Kenya: The review process led to the improvement of the proposal such as changes to the budget (e.g., reduction in custom clearance costs), timelines (e.g., an expansion of timelines) as well as clarification on project management and financial management (e.g., clear allocation for key tasks as well as clarification where existing resources were being used to support the process). The process also supported the identification of key risks and mitigation strategy – overarchingly, this has worked well (with a few minor exceptions such as the management of unplanned deviations from the initial ODP).

Laos: The review process highlighted the need for stronger provincial PMTs, clearer reporting lines, and explicit budgeting for training and service bundle costs. This led to Laos submitting a revised risk and mitigation matrix, an updated monitoring framework, and confirmation of more frequent PMT meetings.

Sudan: The review process in Sudan requested additional detail on demurrage charges, transport risks, and installation quality. This rigorous risk assessment resulted in the following mitigation measures being implemented: a phased deployment approach with ILRs being implemented in Year 1 through the country-led approach, while SDDs through the supplier-led approach to allow enough time to build technicians' capacity on SDDs and a pre-PIL prior to scale-up. However, the mitigation measures in place were insufficient to manage systemic shocks, such as the 2023 conflict and procedural delays in grant amendment approvals, which ultimately halted Year 2 implementation.

Yemen: The review process found inconsistencies in the application regarding the deployment timeline. While a phased approach was presented in the risk matrix, it was not reflected in the deployment timelines in the Gantt chart.

Project management capacity

Most countries were requested to expand on their past experience in CCE deployment, HR resources dedicated to deployment and financial management arrangements between UNICEF and the country. For example:

- Sudan was required to add more clarity on UNICEF CO's activities outsourced/ in-house as well as on available HR resources full time dedicated to this project from government and UNICEF CO.
- Laos was required to clarify resources for ensuring adequate data collection, monitoring and financial management, and whether these responsibilities were assigned to the UNICEF consultant appointed to lead the project, or if they will be outsourced. Moreover, Laos' programme management resources through the PMT were not seen as adequate and the country was requested to expand the role of the PMT as an active implementing body for smooth day-to-day coordination planning and real time M&E.
- Moreover, Laos and Sudan did not include a monitoring strategy or plan to indicate how issues would be reported and followed up on.

Timelines

All country applications were seen to have issues with timelines. Issues were due to: lack of details on timelines (in some cases), insufficient time allocated to installations, lack of time allocated to training, and ambitious timelines not accounting for security context. For example:

- Laos' Gantt Chart reflected four phases, but was high level and needed to contain more details on milestones. Further, some of the timelines were not clear and seem over/under-estimated. The plan included 4 x customs clearance every 4 months, however, it was recommended to reduce this to 2/max 3 especially in view of sufficient government warehousing capacity and given the longer lead times of customs clearance and the associated risks to the project on delays.
- In Yemen, while a phased approach was presented for risk-mitigation with a start-up batch of 100 units, to allow for lessons learned, this phased approach was not reflected in the deployment plan.

Risk management

All countries were asked to revise the risk matrix to account for any deviations in the ODP due to site readiness, installation or other issues. For example:

- In Yemen, given that there was potentially parallel non-CCEOP deployment project of 1,300 SDD units, and hence there was a risk of managing two projects simultaneously. It was recommended to address possible delays/overlaps and potential impact on the CCEOP deployment as part of the risk matrix.
- Afghanistan was requested to be clearer about the mitigation actions for potential deviation risks.
- Sudan was requested to clarify the mitigation measures associated to each identified risk. In addition, it was requested to clarify the contractual arrangements (with regards to customs clearance, in-country distribution and warehousing activities) and develop a checklist of all contractual arrangements to avoid delays in implementation.

Budgets

With regards to the budgets submitted, two countries had missing budget lines and inconsistencies, whilst two countries were missing sources for the different cost components. Specifically:

- Laos had no budget included for the activities related to UNICEF CO Project Management.
- Afghanistan was requested clarifications regarding the assumptions used to generate the estimates: why logistics costs for SDDs were the same as for ILR (given inclusion of solar arrays, PV racks, poles, etc. which should usually increase the weight and packaging), travel costs were captured as USD 50/day regardless of distance to facility; customs clearance: same number of SDDs and ILRs likely do not fit in the same sized container given SDDs also have the solar panel; travel cost trainer: will the same trainer train on SDDs and ILRs? If so, it may not be necessary to duplicate the trainer travel cost in both the SDD and ILR trainings.

Table G.1. CCEOP1 application technical review feedback received by Peer Group Review

Technical Review Feedback	Afghanistan	Laos	Sudan	Yemen
Date	10.07.2019	10.03.2020	15.05.2020	6.03.2020
Overall Rating	Conditional recommendation	Conditional recommendation	Conditional recommendation	Conditional recommendation
Project Management Capacity	Request for more detailed project management capacity: expand on past experiences and lessons learnt.	Request for clarifications on project management capacity: HR resources, PMT management activities and timelines. Further clarity on financial management	Request for more detailed project management capacity: expand on past experiences to inform the risk landscape and capability to manage risks, more details on coordination between national and subnational levels, more clarity on UNICEF CO activities sourced, project management and fiduciary roles not indicated, human resources capacities at MoH not indicated, more clarity on resources available from UNICEF CO for financial management.	Develop PMT ToRs: PMTs are not yet functional and must be established before deployment. Further clarity on financial management
Technical and Logistical Capacity	Revise timelines: timeline for installation (e.g. maximum CCE to be deployed per month), add user training and commission timelines.	Include monitoring strategy and plan: for monitoring and reporting activities, inventory management. Revise timelines: Gantt chart is too high level, include more details on timelines, reduce timelines for custom clearance, remove PIs from each phase, optimise installation time, and include internal M&E.	Revise timelines: Gantt is too ambitious given COVID-19 emergency. More details required on timeline for training and pre-PIL. Clarifications on contractual arrangements: in regard to customs clearance, in-country distribution and warehouse activity. Include a monitoring strategy: what will be monitored and	Revise timelines: Include phased approach in deployment plan and account for delays due to country security context.

Technical Review Feedback	Afghanistan	Laos	Sudan	Yemen
			how issues will be followed up	
Risk Management	Strengthen risk management: clearer mitigation actions of deviation risks from ODP (e.g. to avoid incorrect deployments, site readiness).	Strengthen risk management: address risks related to installation of SDDs, reporting, site readiness, and other technical and project management risks.	Add risks due to contractual agreements funding delays	Add risk of correlation of managing two CCE projects at the same time: as there is another ongoing CCE project overlapping with CCEOP1
Budget	Revise inconsistencies in budget: different logistics costs for ILR and SDD, justify travel costs, different customs clearance for SDD and ILR, training cost for SDD and ILR, inconsistency in excel vs word budget).	Revise budget: include project management costs.	Include data sources for the different cost components	Include data sources for the different cost components

Appendix H ANALYSIS OF SERVICE-BUNDLE COSTS WITH COUNTRY-LED VS SUPPLIER-LED DEPLOYMENT

This appendix provides an overview of the costing analysis undertaken to identify the service-bundle costs for country-led versus supplier-led deployment across five of the six case study countries⁵⁹ and compare for any cost savings. Section H.1 provides an overview of the costing analysis approach and methodology; Section H.2. provides the cross-cutting results; section H.3. provides the results for each country case study.

H.1. APPROACH AND METHODOLOGY

The costing analysis comprised of three steps: (i) calculation of the actual service-bundle costs for each country's country-led deployment; (ii) calculation of the hypothetical (modelled) service-bundle costs for the same amount of equipment deployed through a supplier-led approach; (iii) a comparative analysis of the service-bundle per unit of equipment cost in above cases. In the case of Kenya and Sudan, where part of the deployment was done through the supplier-led approach (Year 1 for Kenya, and the SDD deployment in Sudan), the analysis also calculated the actual service-bundle costs through the supplier-led deployment. The following paragraphs provide further details on each step.

- i. **Service-bundle costs through country-led deployment:** The costed operational plans provided the total cost for each component of the service-bundle cost, namely: project management, customs clearance, in-country warehousing and distribution, installation and commissioning, technical training and HQ cost recovery fee (8%). The total amount was then used to derive the per cost for one unit of ILR and SDD equipment, respectively.
- ii. **Modelled service-bundle costs through supplier-led deployment:** In order to study the counterfactual cost of delivering the same equipment as per the country-led deployment, but through a supplier-led deployment modality instead, CEPA used the UNICEF SD 2021 Benchmarking tool. The UNICEF SD 2021 Benchmarking tool enables to identify the service-bundle costs associated with the deployment of specific numbers of a particular CCE model procured from a specific manufacturer. The tool works by triangulating different historical data sources and analysis in order to build from the bottom-up an overall estimate of a potential order from a specific supplier, for a specific CCE model, specific volume for a specific country. Key assumptions in the model are country specific including labour costs, fuel prices etc. Moreover, the model enables to adjust the costs based on the length of time from arrival of the fridges to final commissioning, the percent of facilities in security zones, the security zone price multiplier for labour and vehicles, the percent to hard reach facilities, and the number of extra days for hard-to-reach sites. Table H.1 provides a summary of the assumptions that were made for these parameters across the case study countries. By inputting the same amounts of CCE of a specific CCE manufacturer and models as per the country-led deployment, the model showed the equivalent service-bundle per unit cost for a supplier-led deployment.⁶⁰ The weighted average of the service-bundle cost per unit of equipment across different CCE models was used to estimate the per-unit service-bundle cost for a supplier-led deployment, with a $\pm 15\%$ margin.

⁵⁹ Due to lack of documents received from Yemen given the ongoing conflict, the cost analysis does not include Yemen.

⁶⁰ The model estimates a fixed fee project management fee per supplier which is then applied across the volume ordered to get a project management per unit estimate. In order to not overestimate supplier-led project management costs, we inputted total actual volume ordered for each supplier in a country (i.e., an aggregate across all equipment types including IRL and SDD).

Table H.1: Parameters for the benchmarking tool

Parameters	Units	Kenya		Laos		Conflict countries (Afghanistan, Syria, Sudan)	
		ILRs	SDDs	ILRs	SDDs	ILRs	SDDs
Length of time from arrival of fridges to final commissioning	Months	4	4	6	6	6	6
Percent of facilities in security zones	%	-	-	-	-	100%	100%
Security zone price multiplier for labour and vehicles		1	1	1	1	1	1
Percent of hard-to-reach facilities	%	20%	80%	20%	80%	20%	80%
Number of extra days for hard-to-reach sites (return trip)	Days	1	1	1	1	2	2

- iii. **Comparative analysis of service-bundle per unit cost:** The above calculations allowed the comparison of the US\$ per unit cost of the service-bundle by ILR and SDD with the country-led deployment versus the supplier-led deployment.

H.2. CROSS-COUNTRY COMPARATIVE RESULTS

The comparative analysis, as illustrated in Figures H.2.1. and H.2.2 below, show that the service-bundle cost with the country-led deployment is cheaper than the supplier-led deployment for both ILRs and SDDs across all countries analysed. Given the uncertainty in the specific costs, we are presenting the modelled low and high range rather than a single point estimate.

Figure H.2.1: Service-bundle cost per unit by ILR for country-led vs supplier-led deployment

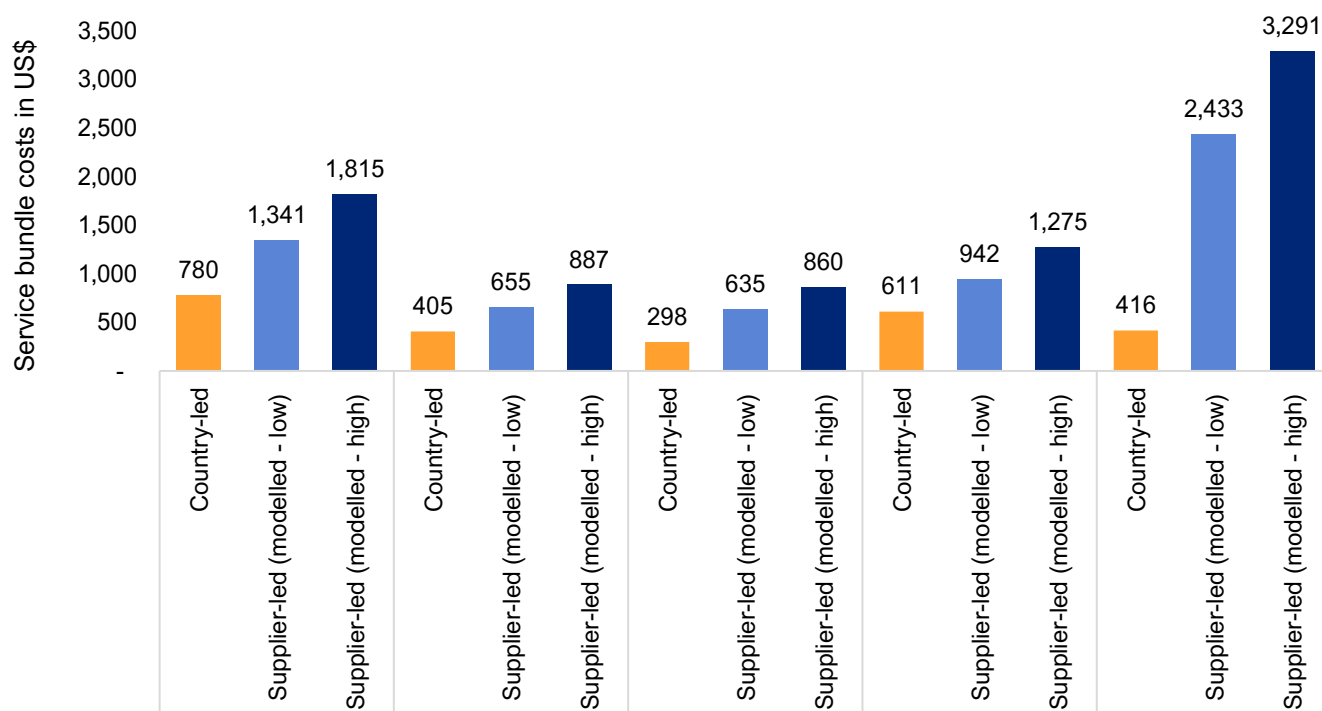
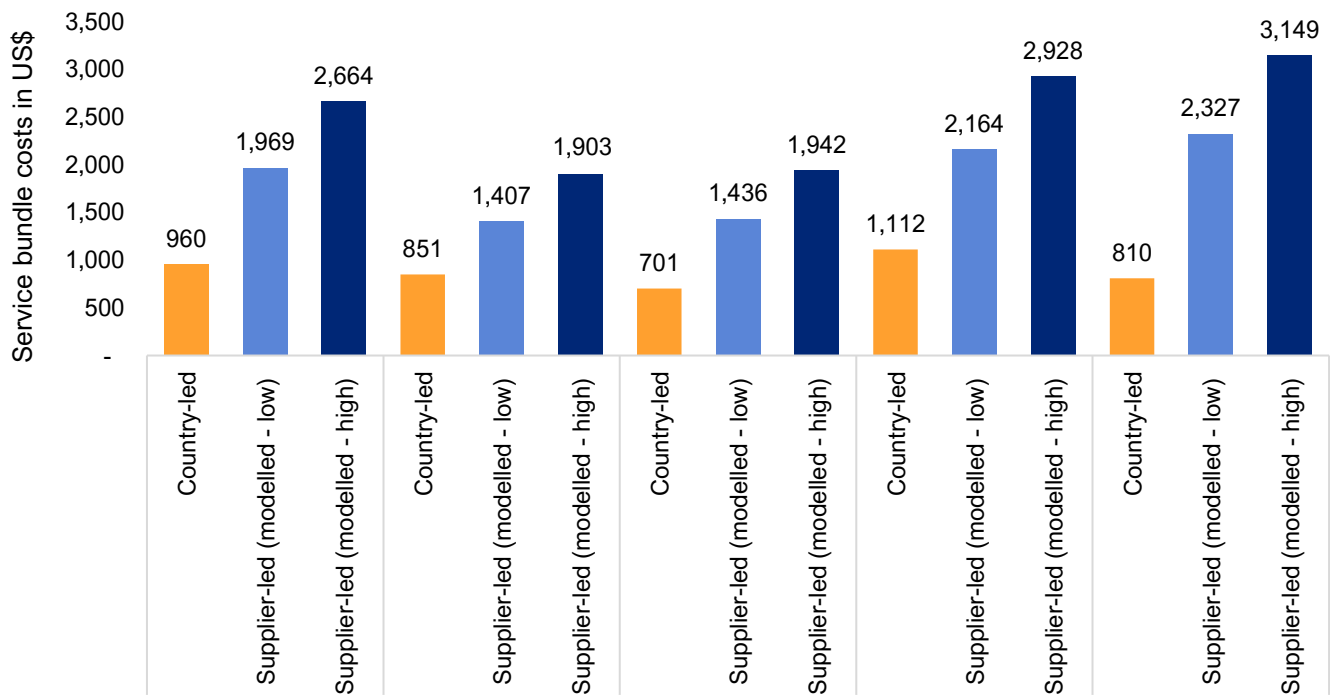


Figure H.2.2: Service-bundle cost per unit by SDD for country-led vs supplier-led deployment



In particular, as shows in Figures H.2.3-H.2.4, country-led deployment is around 35-87% (low and high modelled amount, respectively) cheaper across countries than with the supplier-led deployment in the case of ILRs, and between 39-74% (low and high modelled amount, respectively) cheaper in the case of SDDs

Figure H.2.3: % Cost savings country-led vs supplier-led modality per unit by ILR

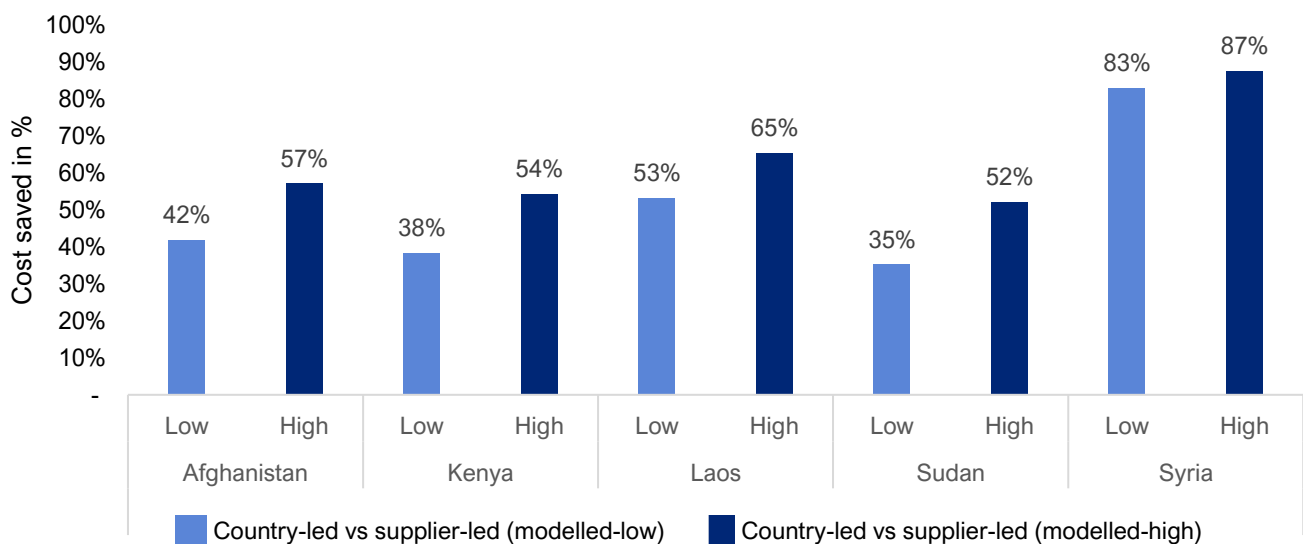
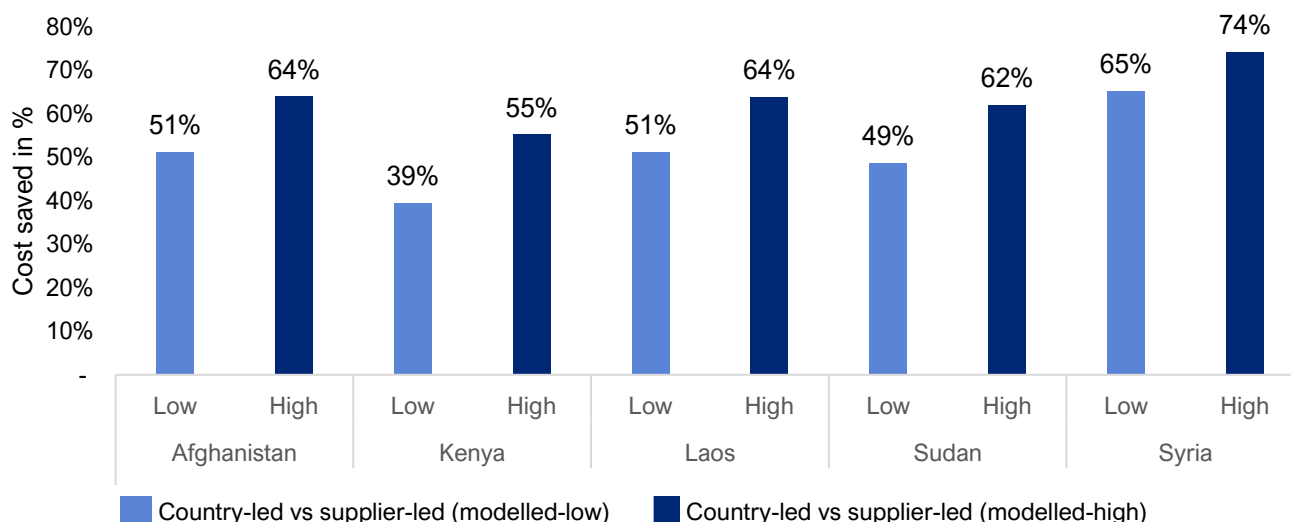


Figure H.2.4: % Cost savings country-led vs supplier-led modality per unit by SDD



Cost savings used to purchase additional equipment

While there is no documentation on the exact number of additional CCE purchased exclusively due to cost savings from a modality switch, we used modelled estimates based on supplier-led benchmarking data to approximate this number.⁶¹ This was calculated by estimating the total number of IRLs and SDDs units that could have been purchased hypothetically by a country using the modelled weighted average supplier-led prices for IRLs and SDD.⁶² These numbers were then compared against the actual number of units purchased under the country-led modality to determine an estimate of additional units.

Table H.3 in the Appendix shows the hypothetical additional units purchased under the country-led deployment (Appendix H.3 provides further details for each country). The analysis shows that the estimated cost savings allowed for a range of ~50 to 180 additional CCE units additionally purchased due to cost savings under country-led deployment modality.

Table H.2: Estimated additional CCE purchased under country-led approach compared to modelled supplier-led approach due to cost savings

Country	Additional units hypothetically purchased		
	ILRs	SDDs	Total
Afghanistan	33	149	182
Kenya	151	30	181
Laos	66	13	81
Sudan	128	38	166
Syria Damascus	11	40	51

⁶¹ Most countries did not have any data on expected CCE units to be purchased under the supplier-led approach. Even in countries like Kenya where this data exists from the first year under the supplier-led approach, the number of additional units cannot be exclusively attributed to cost savings as unit differences also reflect overall changes in type of CCE equipment purchased.

⁶² These used the same specifications of IRLs and SDD types purchased under the country-led deployment modality allowing for a more direct comparison.

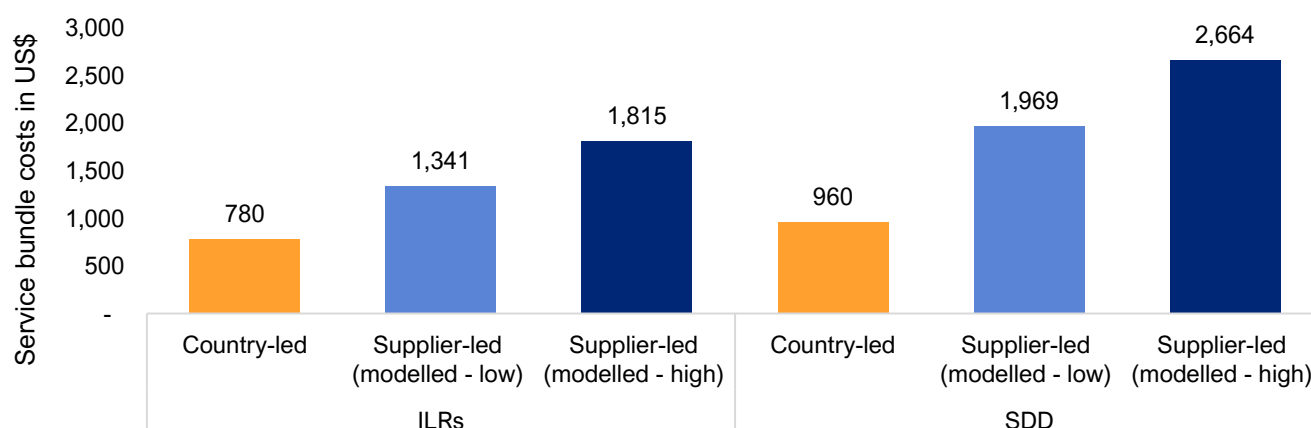
H.3. COUNTRY RESULTS

This section provides an overview of the costing analysis results for each case study country.

H.3.1. Afghanistan

The costing analysis in Afghanistan, as illustrated in Figure H.3.1a below, shows that the service-bundle cost with the country-led deployment are around 42-57% (low and high modelled amount, respectively) cheaper than with the supplier-led deployment in the case of ILRs, and between 51-64% (low and high modelled amount, respectively) cheaper in the case of SDDs.

Figure H.3.1a: Service-bundle cost per unit by ILR and SDD for country-led vs supplier-led deployment



Moreover, when comparing the different service-bundle cost components, project management is the component that most drives the increase in cost under the supplier-led deployment model: US\$ 84 per unit in the country-led modality compared to US\$ 989 and US\$ 890 for ILRs and SDDs, respectively, in the supplier-led deployment. Moreover, in-country warehousing and distribution costs are higher in the supplier-led deployment modality: US\$ 220 and US\$ 360 for ILRs and SDDs, respectively, in the country-led modality, compared to US\$ 436 and US\$ 853 for ILRs and SDDs, respectively, in the supplier-led modality. Figures H.3.1b and H.3.1c provide an overview of the service-bundle cost breakdown for country-led versus supplier-led modality.

Figure H.3.1b: Service-bundle cost breakdown for country-led vs supplier-led modality⁶³

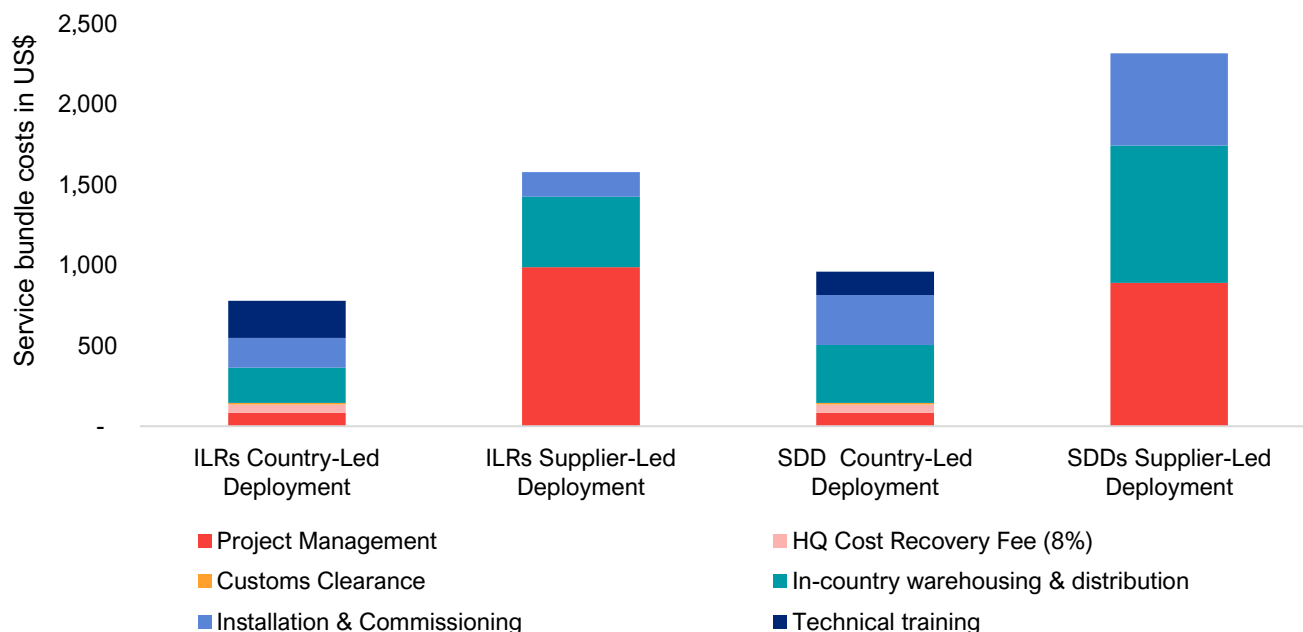
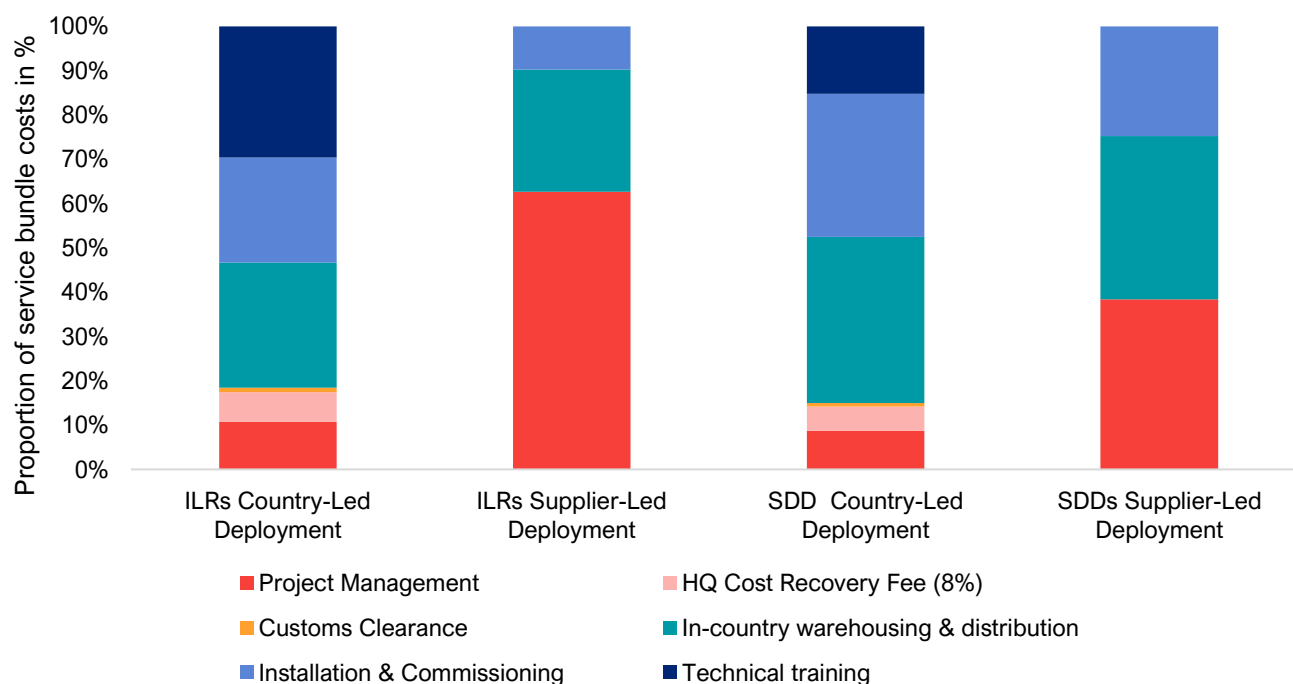


Figure H.3.1c: Service-bundle cost breakdown for country-led vs supplier-led modality in percentages



The comparison of the actual CCEOP1 budget for the equipment and service-bundle, with the average supplier-led costs vs the actual country-led modality costs, allowed for the calculation of cost savings achieved under the country-led approach. Switching to the country-led modality should have enabled Afghanistan to purchase an additional 182 CCE units (33 ILRs and 149 SDDs) compared to what could have been procured through a supplier-led approach.

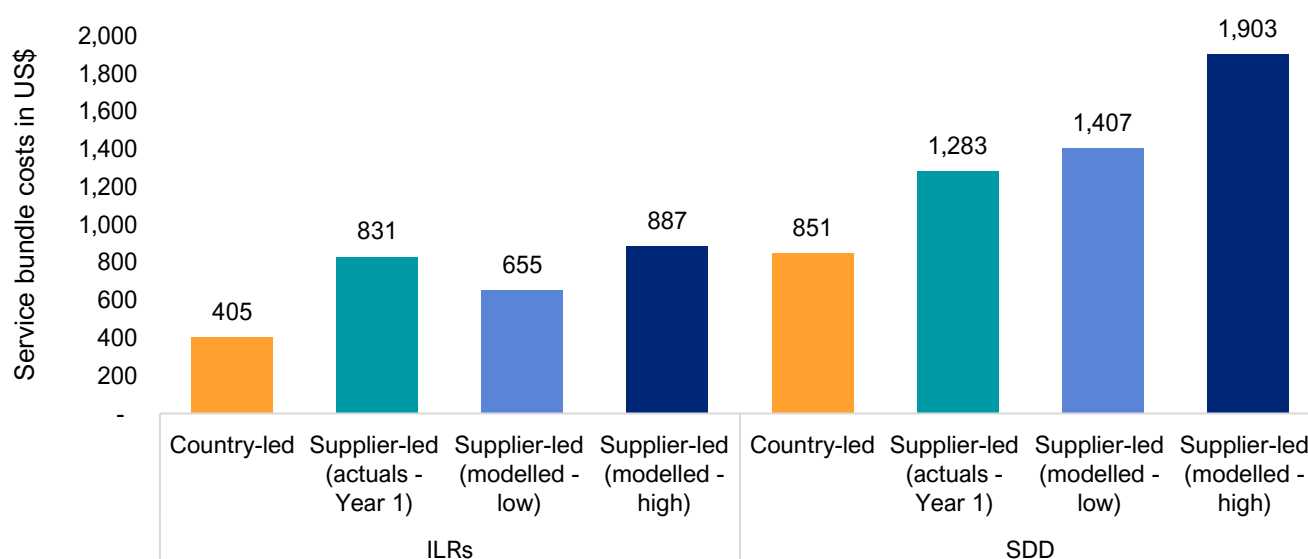
⁶³ Please note that in the supplier-led costing the technical training is covered under installation and commissioning.

H.3.2. Kenya

The costing analysis in Kenya, as illustrated in Figure H.3.2a below, shows that the service-bundle cost with the country-led deployment are around 38-54% (low and high modelled amount, respectively) cheaper than with the supplier-led deployment in the case of ILRs, and between 39-55% (low and high modelled amount, respectively) cheaper in the case of SDDs.

Given Kenya Year 1 deployment was done through a supplier-led approach, the analysis shows that compared to the Year 1 actual supplier-led costs, the country-led deployment was 51% cheaper in the case in ILRs and 34% cheaper for SDDs.⁶⁴

Figure H.3.2a: Service-bundle cost per unit by ILR and SDD for country-led vs supplier-led deployment



Moreover, when comparing the different service-bundle cost components, project management is the component that most drives the increase in cost under the supplier-led deployment model: US\$ 36 per unit in the country-led modality compared to US\$ 194 and US\$ 320 for ILRs and SDDs, respectively, for supplier-led deployment. Moreover, in-country warehousing and distribution costs are higher in the supplier-led deployment modality: US\$ 233 and US\$ 294 for ILRs and SDDs, respectively, in the country-led modality, compared to US\$ 420 and US\$ 757 for ILRs and SDDs, respectively, in the supplier-led modality. Figures H.3.2b and H.3.2c provide an overview of the service-bundle cost breakdown for country-led versus supplier-led modality.

⁶⁴ The lower cost savings in the case of SDDs compared to ILRs is likely due to the fact that one of the suppliers for SDD provided a very low bid for one SDD model, compared to the average SDD costs.

Figure H.3.2b: Service-bundle cost breakdown for country-led vs supplier-led modality⁶⁵

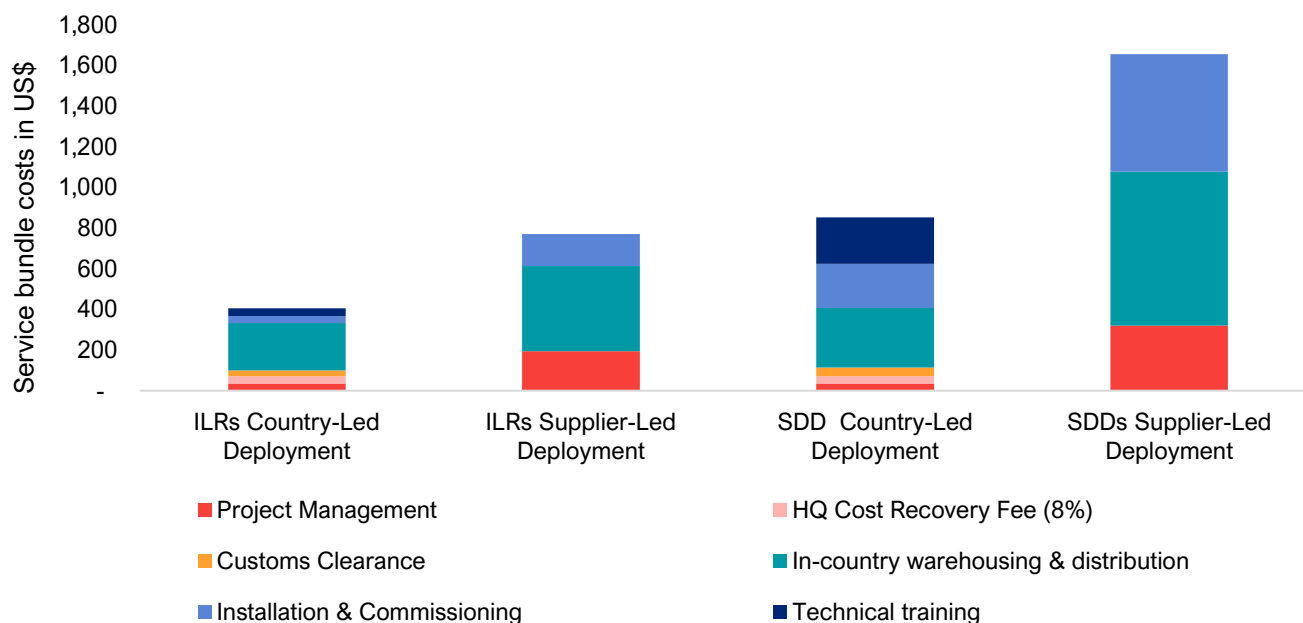
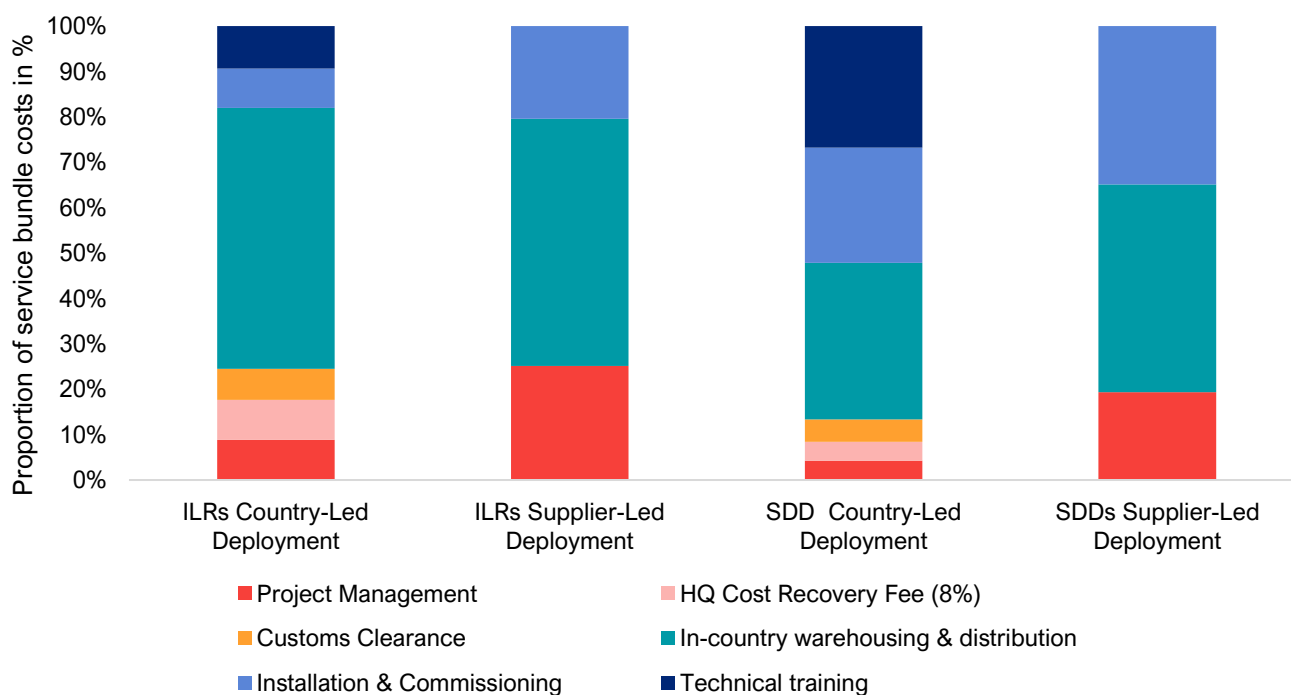


Figure H.3.2c: Service-bundle cost breakdown for country-led vs supplier-led modality in percentages



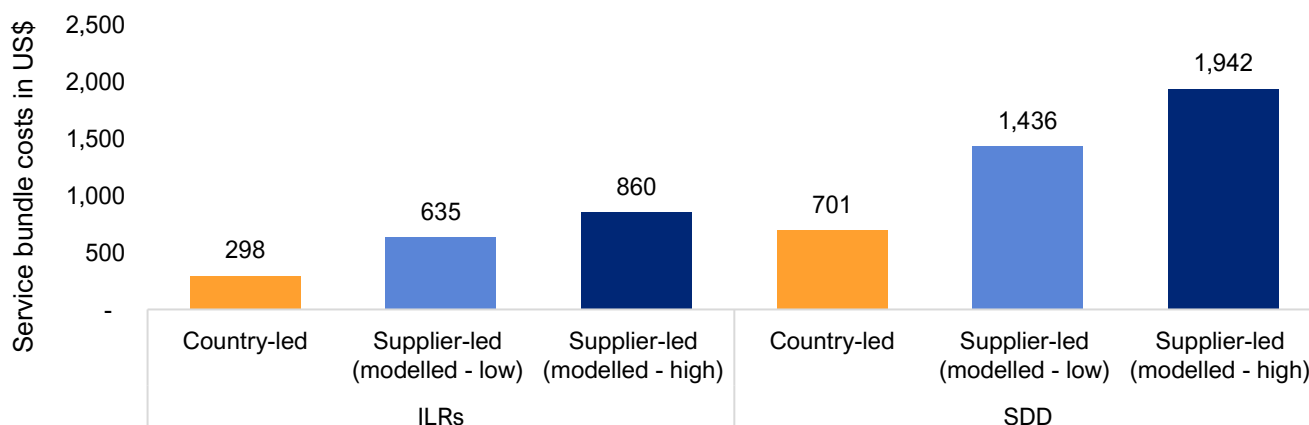
The comparison of the actual CCEOP1 budget for the equipment and service-bundle, with the average supplier-led costs vs the actual country-led modality costs, allowed for the calculation of cost savings achieved under the country-led approach. Switching to the country-led modality enabled Kenya to purchase an additional 181 CCE units (151ILRs and 30 SDDs) compared to what could have been procured through a supplier-led approach.

⁶⁵ Please note that in the supplier-led costing the technical training is covered under installation and commissioning.

H.3.3.Laos

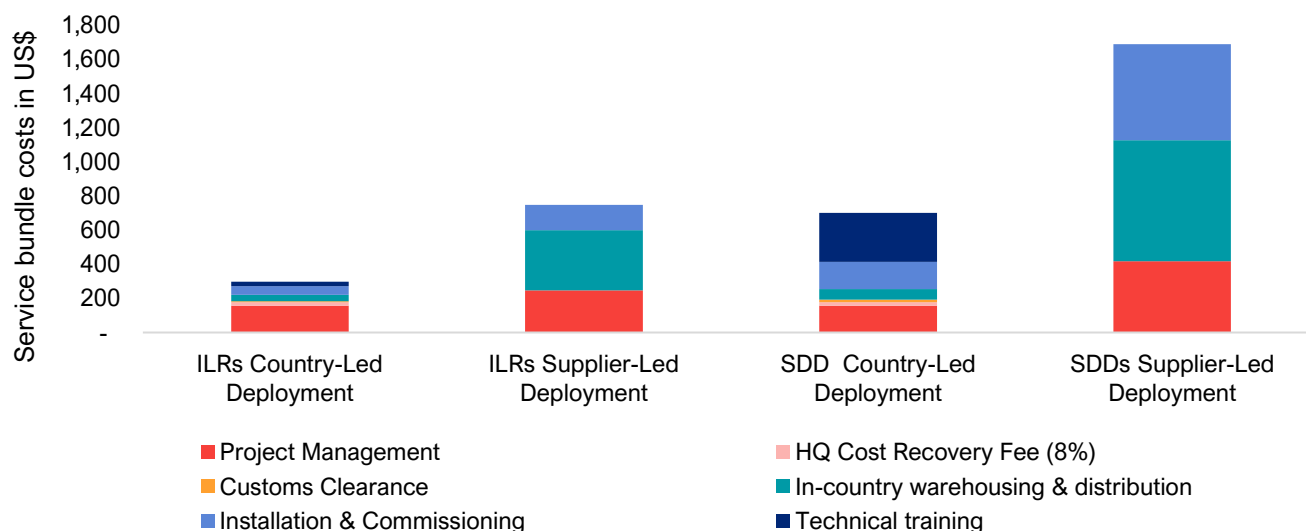
The costing analysis in Laos, as illustrated in Figure H.3.3a below, shows that the service-bundle cost with the country-led deployment are around 53-65% (low and high modelled amount, respectively) cheaper than with the supplier-led deployment in the case of ILRs, and between 51-64% (low and high modelled amount, respectively) cheaper in the case of SDDs.

Figure H.3.3a: Service-bundle cost per unit by ILR and SDD for country-led vs supplier-led deployment



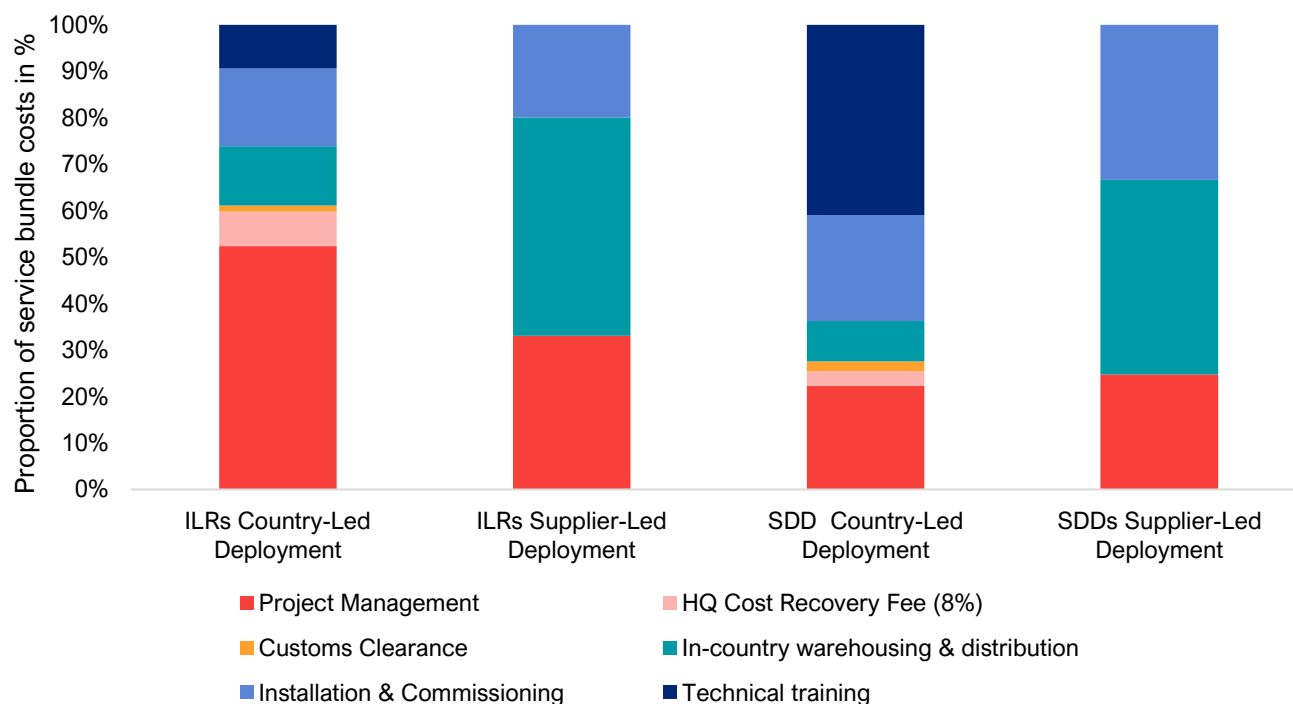
Moreover, when comparing the different service-bundle cost components, project management is the component that most drives the increase in cost under the supplier-led deployment model: US\$ 156 per unit in the country-led modality compared to US\$ 247 and US\$ 418 for ILRs and SDDs, respectively, in the supplier-led deployment. Moreover, in-country warehousing and distribution costs are higher in the supplier-led deployment modality: US\$ 38 and US\$ 61 for ILRs and SDDs, respectively, in the country-led modality, compared to US\$ 351 and US\$ 708 for ILRs and SDDs, respectively, in the supplier-led modality. Figures H.3.3b and H.3.3c provide an overview of the service-bundle cost breakdown for country-led versus supplier-led modality.

Figure H.3.1b: Service-bundle cost breakdown for country-led vs supplier-led modality⁶⁶



⁶⁶ Please note that in the supplier-led costing the technical training is covered under installation and commissioning.

Figure H.3.1c: Service-bundle cost breakdown for country-led vs supplier-led modality in percentages



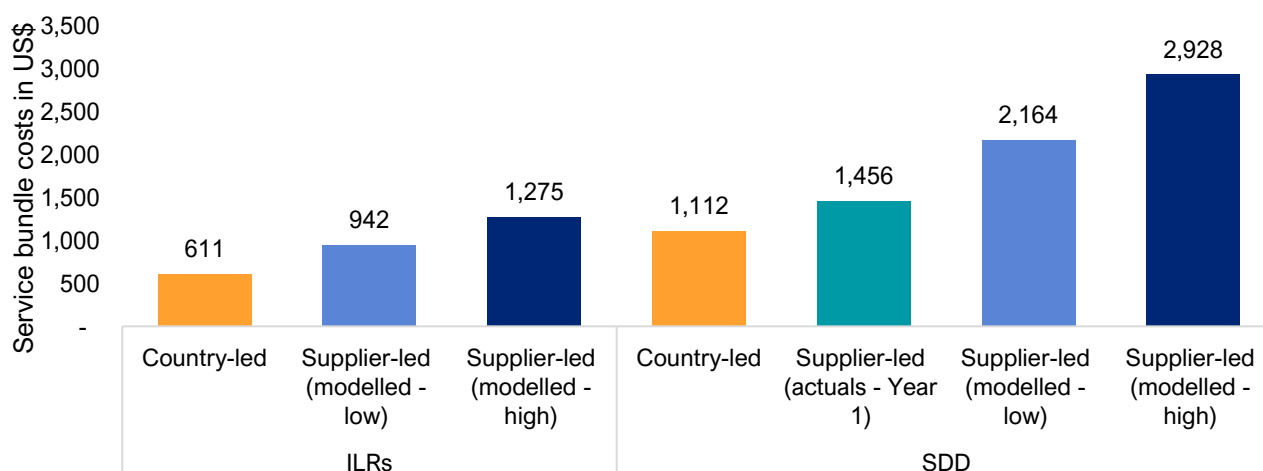
The comparison of the actual CCEOP1 budget for the equipment and service-bundle, with the average supplier-led costs vs the actual country-led modality costs, allowed for the calculation of cost savings achieved under the country-led approach. Switching to the country-led modality enabled Laos to purchase an additional 80 CCE units (66 ILRs and 13 SDDs) compared to what could have been procured through a supplier-led approach.

H.3.4.Sudan

The costing analysis in Sudan, as illustrated in Figure H.3.4a below, shows that the service-bundle cost with the country-led deployment are around 35-52% (low and high modelled amount, respectively) cheaper than with the supplier-led deployment in the case of ILRs, and between 49-62% (low and high modelled amount, respectively) cheaper in the case of SDDs.

Given Sudan Year 1 deployment for SDDs was done through a supplier-led approach, the analysis shows that compared to the Year 1 actual supplier-led costs, the country-led deployment for SDDs was 24% cheaper in the case.

Figure H.3.4a: Service-bundle cost per unit by ILR and SDD for country-led vs supplier-led deployment



Moreover, when comparing the different service-bundle cost components, project management is the component that most drives the increase in cost under the supplier-led deployment model: US\$ 222 per unit in the country-led modality compared to US\$ 400 and US\$ 981 for ILRs and SDDs, respectively, for supplier-led deployment. Moreover, in-country warehousing and distribution costs are higher in the supplier-led deployment modality: US\$ 120 and US\$ 482 for ILRs and SDDs, respectively, in the country-led modality, compared to US\$ 544 and US\$ 970 for ILRs and SDDs, respectively, in the supplier-led modality. Figures H.3.4b and H.3.4c provide an overview of the service-bundle cost breakdown for country-led versus supplier-led modality.

Figure H.3.4b: Service-bundle cost breakdown for country-led vs supplier-led modality⁶⁷

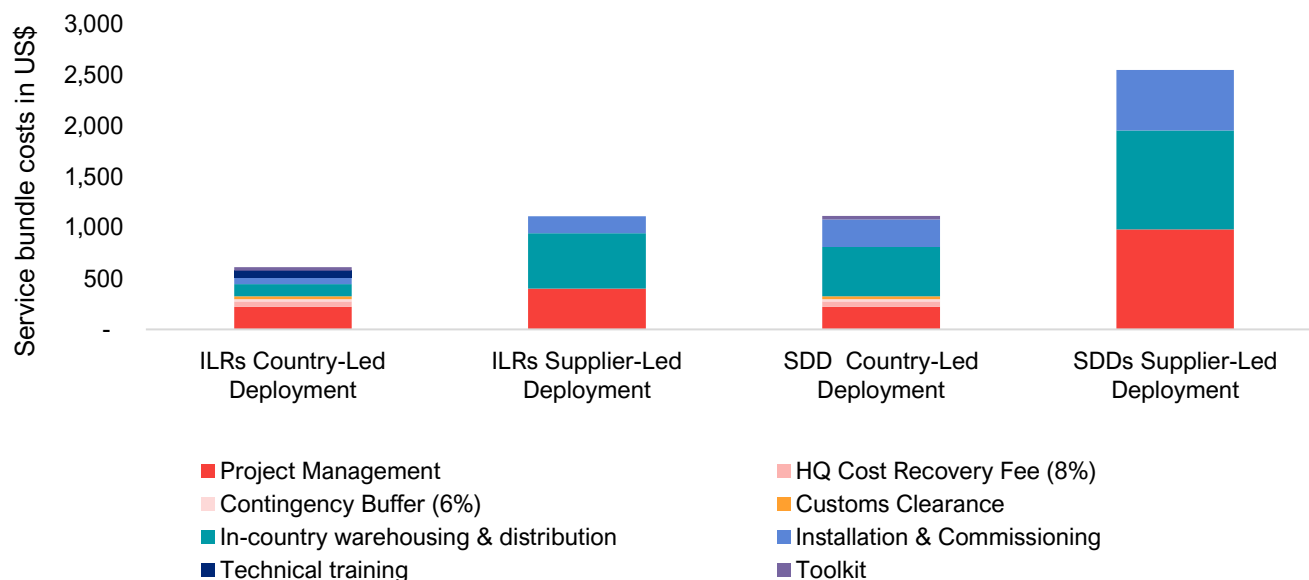
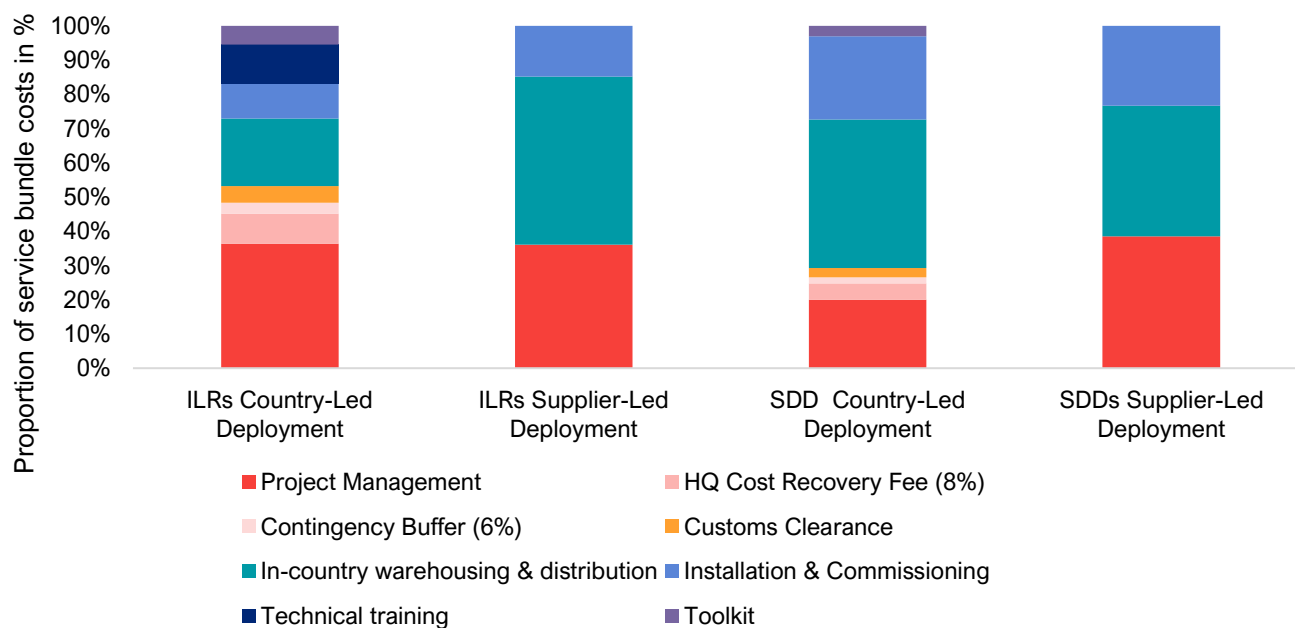


Figure H.3.4c: Service-bundle cost breakdown for country-led vs supplier-led modality in percentages



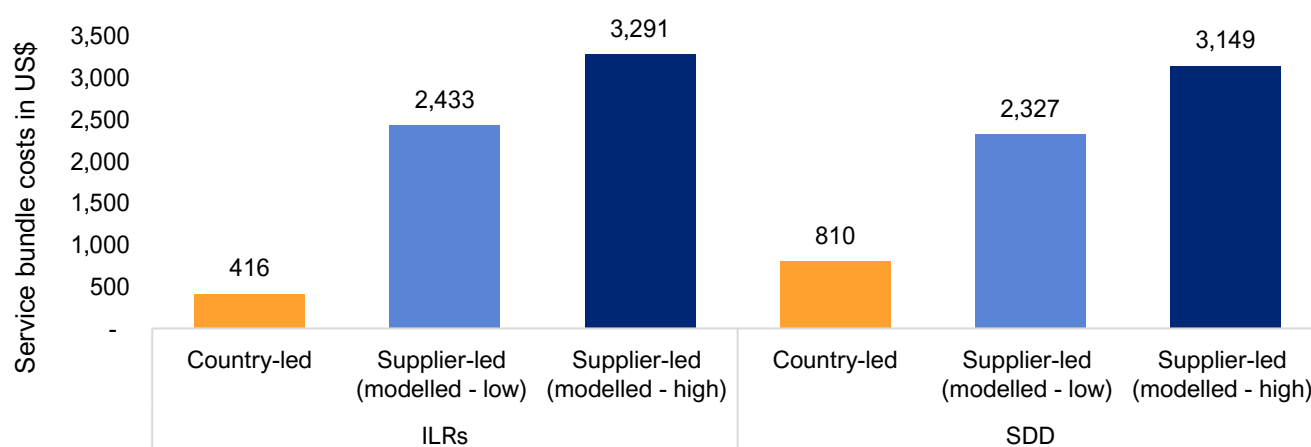
⁶⁷ Please note that in the supplier-led costing the technical training is covered under installation and commissioning.

The comparison of the actual CCEOP1 budget for the equipment and service-bundle, with the average supplier-led costs vs the actual country-led modality costs, allowed for the calculation of cost savings achieved under the country-led approach. Switching to the country-led modality enabled Sudan to purchase an additional 166 CCE units (128 ILRs and 38 SDDs) compared to what could have been procured through a supplier-led approach.

H.3.5.Syria Damascus

The costing analysis in Syria Damascus, as illustrated in Figure H.3.5a below, shows that the service-bundle cost with the country-led deployment are around 83-87% (low and high modelled amount, respectively) cheaper than with the supplier-led deployment in the case of ILRs, and between 65-74% (low and high modelled amount, respectively) cheaper in the case of SDDs.

Figure H.3.5a: Service-bundle cost per unit by ILR and SDD for country-led vs supplier-led deployment



Moreover, when comparing the different service-bundle cost components, project management is the component that most drives the increase in cost under the supplier-led deployment model: US\$ 203 per unit in the country-led modality compared to US\$ 2,333 and US\$ 1,360 for ILRs and SDDs, respectively, in the supplier-led deployment. Moreover, in-country warehousing and distribution costs are higher in the supplier-led deployment modality: US\$ 103 and US\$ 117 for ILRs and SDDs, respectively, in the country-led modality, compared to US\$ 371 and US\$ 796 for ILRs and SDDs, respectively, in the supplier-led modality. Figures H.3.5b and H.3.5c provide an overview of the service-bundle cost breakdown for country-led versus supplier-led modality.

Figure H.3.5b: Service-bundle cost breakdown for country-led vs supplier-led modality⁶⁸

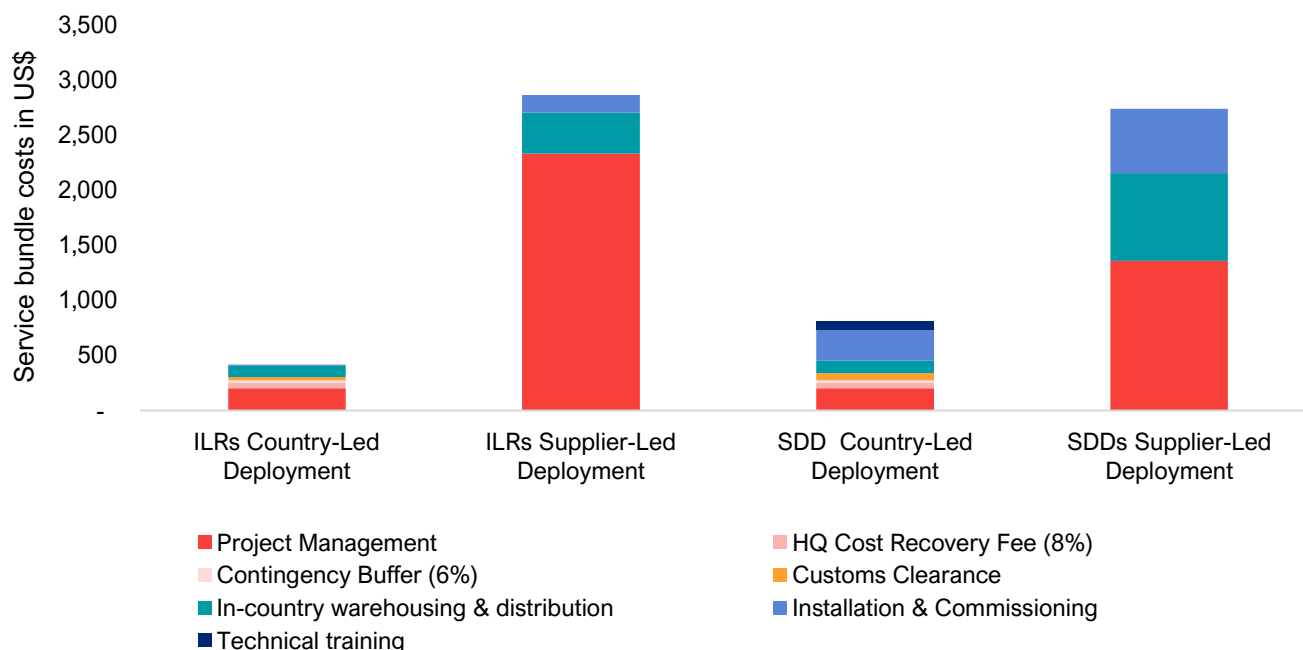
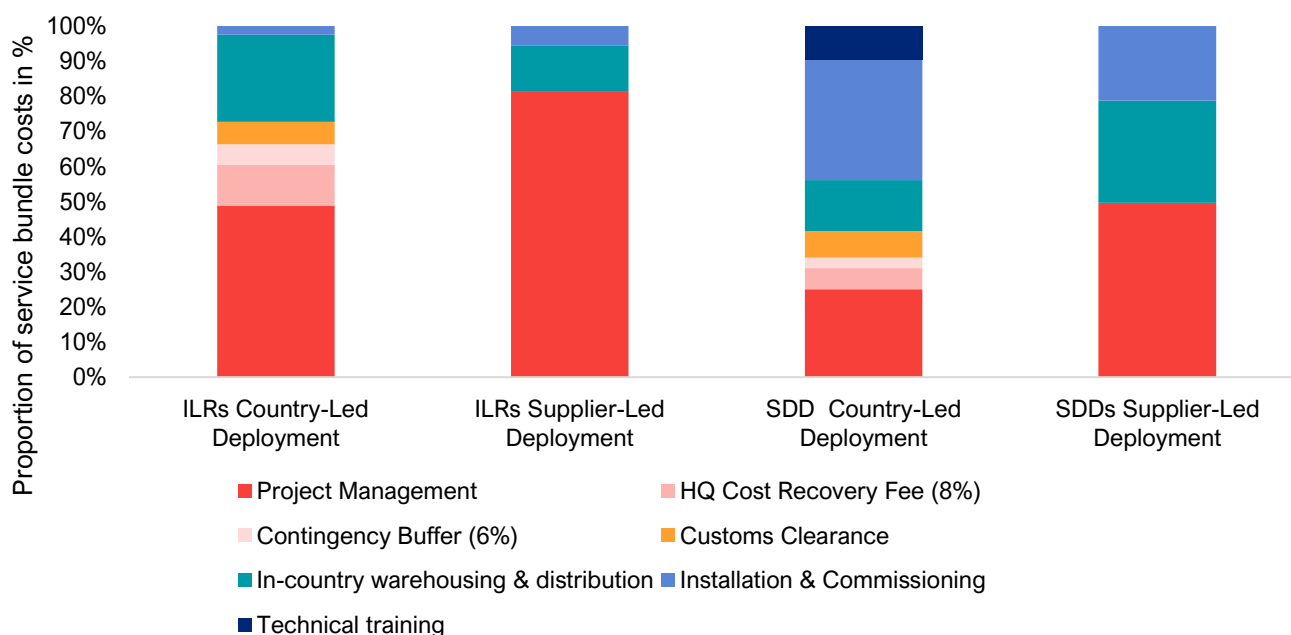


Figure H.3.5c: Service-bundle cost breakdown for country-led vs supplier-led modality in percentages²¹



The comparison of the actual CCEOP1 budget for the equipment and service-bundle, with the average supplier-led costs vs the actual country-led modality costs, allowed for the calculation of cost savings achieved under the country-led approach. Switching to the country-led modality enabled Syria Damascus to purchase an additional 50 CCE units (11 ILRs and 40 SDDs) compared to what could have been procured through a supplier-led approach.

⁶⁸ Please note that in the supplier-led costing the technical training is covered under installation and commissioning.

Appendix I **OVERVIEW OF THE CCEOP1 REPORTING STATUS**

Appendix I provides an overview of the reporting status as provided to the evaluators. Table I.1 shows the status of the different reporting requirements, highlighting that some case study countries have incomplete or missing reporting. Table I.2 shows the difference in the number of CCE across different documents provided to the evaluators.

Table I.1: Status of reporting requirements⁶⁹

Country	Progress Report to Gavi	UNICEF Annual Financial Statement	Pre-P11	Technicians training Report	Installation Reports
Afghanistan					
Kenya					
Laos					
Sudan					
Syria Damascus					
Yemen					

Legend: Red = reporting missing / Orange = reporting incomplete (e.g. only available for one year or some documents available) / Green = reporting completed at least for final year

⁶⁹ Please note that this is based on the documents made available to the evaluators.

Table I.2: Number of planned and completed CCE deployments across countries across different sources⁷⁰

Country	# CCE as per initial ODP shared with CEPA	# of procured CCE as per COP	# of deployed CCE as per Gavi information ⁷¹	# of deployed CCE as per final ODP shared by UNICEF CO	Comments
Afghanistan	1,452	1,281	1,281	1,300	The final progress reports confirm the installation of 1,300 CCE.
Kenya	1,559	2,061	3,152	2,061	Gavi included the CCEOP Y1 supplier-led CCE in their number.
Laos	967	539	539	879	The final ODP shared by UNICEF CO contains also the number of CCE procured through additional HSS funding. When these are removed the total CCEOP1 number is 539
Sudan	541	1,139	541	1,139 (193 installed)	Sudan's latest progress report confirms that 193 CCE have been installed and 946 are in progress.
Syria	594	186	186	187 (79 installed)	
Yemen	617	753	638	638 (608 deployed, 30 pending)	

⁷⁰ Please note that this is based on the documents made available to the evaluators.

⁷¹ As per Gavi email shared 10th June 2025

Appendix J **BARRIERS & ENABLERS**

Table J.1: Enablers and barriers across case study countries

Country	Enablers	Barriers
Afghanistan	• Previous country experience of country-led CCE deployment • Good collaboration with UNICEF CO and NGOs in delivery of health services (helped with transport) • Good technicians' capacity (60+ trained cold chain technicians – but high turnover this regime change) • Existing cold chain expansion plan for 2016-2022 (helped finalise ODP quickly)	• COVID-19 (border closure with Pakistan restricted equipment arrival) • Government change (regime change in 2021) • Weak reporting (no online CCE inventory system, delays in receiving installation reports) • Weak curative maintenance (warranty challenge) • Deviations of equipment (some health facilities lost electricity and needed SDDs instead)
Kenya	• Country leadership (willingness to switch to delinking) • Good technicians' capacity (350+ biomedical engineers at national, country and sub-county levels focused on cold chain) • Good coordination (functional PMT and sufficient staff)	• COVID-19 (border closures and movement restrictions) • Government change (2022 elections) • Weak curative maintenance (lack of clarity on warranty and spare parts)
Laos	• Country leadership (willingness to switch to delinking) • Good technicians' capacity (technicians had already received training in 2019) • Good coordination (functional PMT and sufficient staff) • Good financial management capacity at UNICEF CO	• COVID-19 (border closures and movement restrictions) • Weak reporting (too many stakeholders involved leading to significant managerial efforts for reconciliation of numbers) • Weak curative maintenance (lack of clarity on warranty and spare parts) • Monsoon season (leads to geographical and terrain logistics challenges during that season)
Sudan	• Good technicians' capacity (but high turnover since conflict) • Good coordination (functional PMT established in 2017)	• COVID-19 (border closures and movement restrictions) • Conflict (2023 outbreak) • Weak curative maintenance (spare parts delays and installation faults)
Syria Damascus	• Good coordination (functional PMT) • Good local service provider capacity (has been installing equipment for the past 10 years)	• COVID-19 (border closures and movement restrictions) • Conflict (ongoing security issues) • Government change (regime change in 2024) • Weak curative maintenance (LTA contractor still responsible for 80% of repairs)
Yemen	• Good UNICEF CO capacity (ensuring collaboration with MoH in South Yemen and North Yemen) • Good technician capacity	• COVID-19 (border closures and movement restrictions) • Conflict (ongoing active conflict) • Weak curative maintenance

Appendix K **QUANTITATIVE CRITERIA FOR COUNTRY** **ELIGIBILITY SCREENING MECHANISM**

As described in Recommendation 1, we recommend an initial capacity threshold check be incorporated for all countries as a screening mechanism to determine countries eligible to apply for the country-led deployment modality. Ideally, this step would be conducted prior to the application process to invite only countries to apply that have sufficient enablers in place. The key rationale would be to ensure that countries that do not have key enablers in place do not go through the application process (and get rejected) or go ahead under the modality but are not able to implement it successfully. In this Appendix K, we describe the suggested quantitative threshold options and their rationale.

The stakeholder consultations and the document review suggest that the EVM assessments could represent an international standardised, clear and transparent data source for the quantitative threshold. The EVM is in fact a tool and process, developed by WHO and UNICEF, that assesses each component of the immunisation supply chain, such as vaccine arrival, storage or management, looking for strengths and weaknesses. In the EVMs, an area of vaccine management is considered “effective” if the criterion scores equal or more than 80%.⁷²

As outlined in Section 2.3.1, this evaluation has identified three key enabling factors that are suited to be quantified: (i) good coordination capacity (ii) good CCE technician capacity; (iii) sufficient financial resources across the cold chain system. The first enabling factor could be quantified by measuring NLWG maturity (as proxy for coordination strength) using data from SCIP tool.⁷³ The second and third enabling factors could be quantified through the EVM assessment. We have analysed the EVM country assessments and have identified the following parameters as relevant for a quantitative threshold for the country-led deployment eligibility. Table K.1 presents these EVM assessment parameters along with the rationale for their inclusion.

Based on this assessment and the analysis of the Gavi countries that would meet the threshold for eligibility according to the different EVM parameters (see Table K.2 for the full analysis), we would suggest that Gavi considers using a combination of the **EVM financial resources** and **human resources scoring** as a quantitative criterion for a country’s eligibility to the CCEOP country-led deployment.

⁷² WHO (2025) Effective Vaccine Management, Setting the standard <https://evm2.who.int/Public/Requirements>

⁷³ CEPA does not have access to this data and, therefore, has not reviewed it for robustness or comprehensiveness.

Table K.1: EVM assessment parameters and rationale

EVM assessment parameters	Description	Rationale		# of Gavi countries that would meet the >80% score
		Pros	Cons	
Overall EVM national scoring	The overall EVM national scoring compiles the scoring of the different criteria assessed at the national vaccine storage, regional vaccine storage, province vaccine storage and health facility level.	All countries have an overall EVM scoring and not only countries that have conducted the EVM2.0 assessment.	- Includes also aspects which may not be directly relevant for country capacity to manage cold chain (e.g. vaccine arrivals, waste management). - Would be too stringent as a criterion.	13
Maintenance and repair human resources scoring	The maintenance and repair criteria human resource scoring assesses specifically the availability of staff assigned carry out routine maintenance checks and repair cold chain equipment (in addition to building maintenance staff and auto mechanics available to carry maintenance checks and repair buildings and vehicles).	Represents the closest proxy to the good CCE technician capacity.	Captures availability and not training / performance of staff and could lead potentially to biases (e.g., the analysis of this parameter for the Gavi countries shows that some low-income and fragile countries which should have low scores, have very high scores, higher than low-middle-income countries suggesting potential bias)	33
Financial resources scoring	The financial resources category assesses that across all criteria (equipment, storage, infrastructure, transportation, maintenance, repair, management etc.) there are sufficient funds for operations, including staff salary, internet connection,	Represents a good proxy for a functioning system which can be leveraged for the country-led deployment cost savings.		19

	electricity, vehicles, storage, maintenance etc.			
Human resources scoring	The human resources category assesses that across all criteria (equipment, storage, infrastructure, transportation, maintenance, repair, management etc.) there are sufficient human resources in terms of HCWs, technicians, supervisors etc and that all these positions are established.	Represents a good proxy for good CCE technician capacity and also good HCW capacity	Captures also HR for other EVM activities (though this may be acceptable given that installation also relies on the wider EPI ecosystem)	34

Table K.2: EVM assessment parameters and rationale

Country Name	Total EVM score	Maintenance and repair human resources score	Human resources	Financial resources
Afghanistan	81	93	85	73
Bangladesh	84	96	83	99
Benin	80	93	82	93
Burkina Faso	83	95	90	85
Burundi	84	96	92	90
Cambodia	80	91	84	100
Cameroon	75	92	84	76
Central African Republic	64	85	80	65
Chad	76	97	85	59
Comoros	67	95	84	27
Congo	60	93	76	63
CIV	70	76	77	93
DRC	68	84	82	38
Djibouti	48	64	54	100
Eritrea	77	88	87	97
Gambia	74	90	85	72
Ghana	74	90	88	59
Guinea	65	69	71	60
Guinea-Bissau	68	96	84	73
Haiti	64	86	76	43
Kenya	84	97	92	85

Kyrgyzstan	79	67	85	100
Laos	78	92	87	78
Lesotho	72	54	73	73
Liberia	77	96	85	66
Madagascar	68	88	75	95
Malawi	86	88	93	81
Mali	80	97	92	82
Mauritania	60	76	72	79
Nepal	80	65	82	80
Niger	84	96	88	94
Nigeria	78	95	90	78
Pakistan	76	96	87	92
Papua New Guinea	58	82	71	74
Rwanda	86	95	90	98
Sao Tome and Principe	78	96	86	57
Senegal	81	94	89	77
Sierra Leone	64	76	82	38
Solomon Islands	61	70	66	76
Somalia	65	77	71	73
South Sudan	71	94	83	6
Sudan	73	75	75	28
Tajikistan	76	69	79	87
Tanzania, United Republic of	73	90	85	40
Togo	75	93	84	74
Uzbekistan	72	67	81	95
Zambia	70	79	84	55
Total number of countries >80% score	13	33	34	19

In addition to the EVM assessment criteria, we have also looked at other potential quantitative criteria. For example, the Gavi income-classification could be used as an alternative. Only transition countries (preparatory and accelerated) could be made eligible, as transitioning countries should exhibit more country ownership and, generally, also have a higher capacity than initial self-financing countries. However, this could restrict the choice for countries and potentially exclude some countries in the initial self-financing phase who may have the capacity to carry out the country-led deployment.

We have also reviewed other databases (including WHO and UNICEF publicly available data) but consider them less suitable to capture any of the four key enabling factors.

Appendix L MAPPING OF FINDINGS BY COUNTRY

Table L.1 below provides an overview of what country case studies supported the specific finding. A tick ✓ characterises that the finding is supported by the country; a tick in brackets (✓) characterises partial support and no tick means the country did not directly support the findings. Insights from Yemen were classified largely as partial given the weaker evidence for the country.

		YEMEN	AFGHANISTAN	GUINEA	GUINEA-BISSAU	LIBERIA	SIERRA LEONE
Application & Review process	Finding 1A: The application and review process for the CCEOP1 country-led deployment programme was inefficient and cumbersome, and along with the fragile and conflict setting of many of the pilot countries, contributed to lengthy approval timelines for most countries.	(✓)	✓	(✓)	✓	✓	(✓)
	Finding 1B: The review process for the CCEOP1 country-led deployment programme effectively identified key risks and appropriate mitigation measures, though maintenance-related risks were not emphasised.	✓	✓	✓	✓	✓	(✓)
Legal agreements	Finding 2: The legal agreements and accompanying accountability framework largely worked well in managing roles and responsibilities, risks and ensuring accountability. These could have benefitted from consolidating all relevant/ final documents as standard annexes.	✓	✓	✓	✓	✓	(✓)
Fund management	Finding 3: The funds transfer process between Gavi, UNICEF and the government largely worked well on the back of sufficient financial management capacity of UNICEF CO and effective coordination with the Ministry of Health. However, the reprogramming of unspent funds was cumbersome and lengthy.	✓	✓	✓	(✓)	(✓)	(✓)
Reporting	Finding 4A: Programmatic reporting did not work well due to fragmented reporting requirements, non-standardised templates, involvement of multiple stakeholders, poor timeliness and inadequate monitoring capacity. The implication is that there are incomplete and inconsistent updates on the deployment status, limiting the ability for Gavi to exercise oversight.	✓	✓	✓	✓	✓	(✓)
	Finding 4B: Financial reporting was suboptimal as the standard UNICEF						

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UK

Queens House
55-56 Lincoln's Inn Fields
London WC2A 3LJ

T. +44 (0)20 7269 0210

E. info@cepa.co.uk

www.cepa.co.uk

Australia

Level 20, Tower 2 Darling Park
201 Sussex Street
Sydney NSW 2000

T. +61 2 9006 1308

E. info@cepa.net.au

www.cepa.net.au



Cepa-ltd



@cepald