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Strengthening Cold Chain Equipment Maintenance Systems:

Lessons and Approaches from the Rapid Response and Repair (R3) Initiative in Malawi


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R3 Maintenance Prototypes



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BACKGROUND

Reliable and functional cold chain equipment (CCE) is essential for storing and transporting vaccines within recommended temperature ranges so they remain effective for immunization. When CCE fails, vaccines can lose potency and may need to be discarded, leading to stockouts. If vaccines that have lost potency are used, children may remain susceptible to vaccine-preventable disease and community trust in immunization services may decline.

Advances in remote temperature monitoring (RTM) have made it easier to identify equipment failures and temperature excursions. However, identifying a problem does not ensure it will be resolved. Maintenance systems must also be able to mobilize resources, technical support and decision-making processes that translate information into action.



Vaccines must be stored and transported within recommended temperature ranges to remain effective.

Strengthening Cold Chain Maintenance

Effective CCE maintenance depends on four interconnected functions:

- Clear maintenance processes
- Timely access to resources
- Practical technical support
- Routine use of data for decision-making

Together, these functions help teams identify, prioritize, finance and resolve maintenance needs efficiently. The R3 initiative tested four complementary prototypes designed to strengthen these functions and help translate maintenance information into action.

THE RAPID REPAIR AND RESPONSE INITIATIVE

Recognizing the need to strengthen the systems that translate information on CCE performance into maintenance action, the Rapid Response and Repair (R3) initiative was launched through a Gavi-funded partnership with the governments of Malawi, Rwanda and Tanzania and codesigned by Nexleaf Analytics and country stakeholders. R3 was built on a simple principle: maintenance should be treated as a core component of cold chain management rather than a reactive activity.

Four complementary approaches were piloted to address operational challenges across the broader CCE maintenance system: the R3 Playbook, which consolidates maintenance processes, tools and workflows; the Rapid Response Fund (RRF), which mobilizes resources for urgent maintenance and repair needs; the Cold Chain Technician Mentorship and Supportive Supervision model, which strengthens practical maintenance skills through coaching and peer learning; and Data Review Meetings, which provide routine forums for reviewing maintenance and RTM data, monitoring corrective actions and supporting evidence-based decision-making.

R3

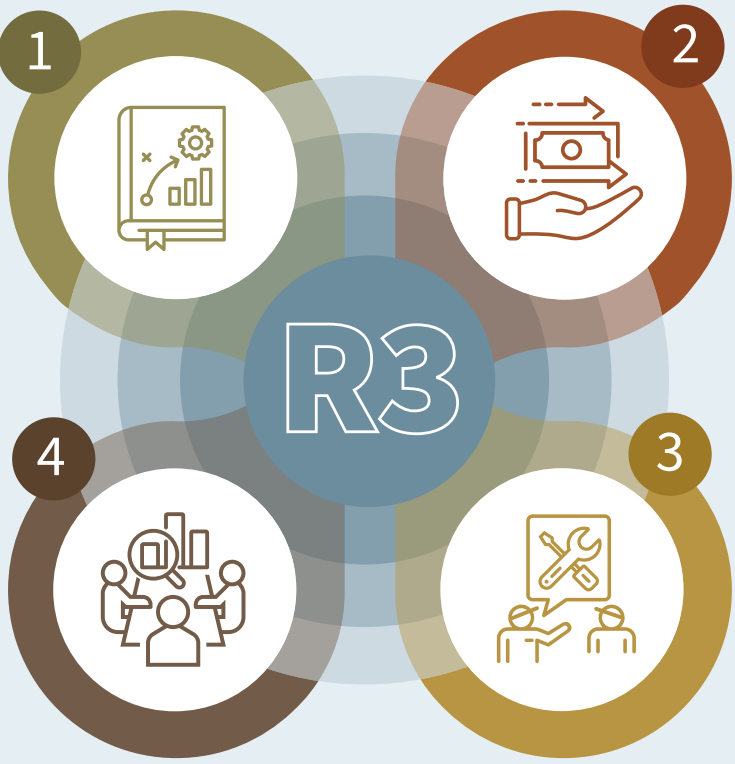
R3 was built on a simple principle: maintenance should be treated as a core component of cold chain management rather than a reactive activity.

Four interventions, referred to as **prototypes**, were developed and piloted:

R3 Playbook

Standardized guidance, tools and workflows for CCE maintenance and repair.

The R3 Playbook serves as the operational backbone and primary reference document supporting the other three prototypes.



Rapid Response Fund (RRF)

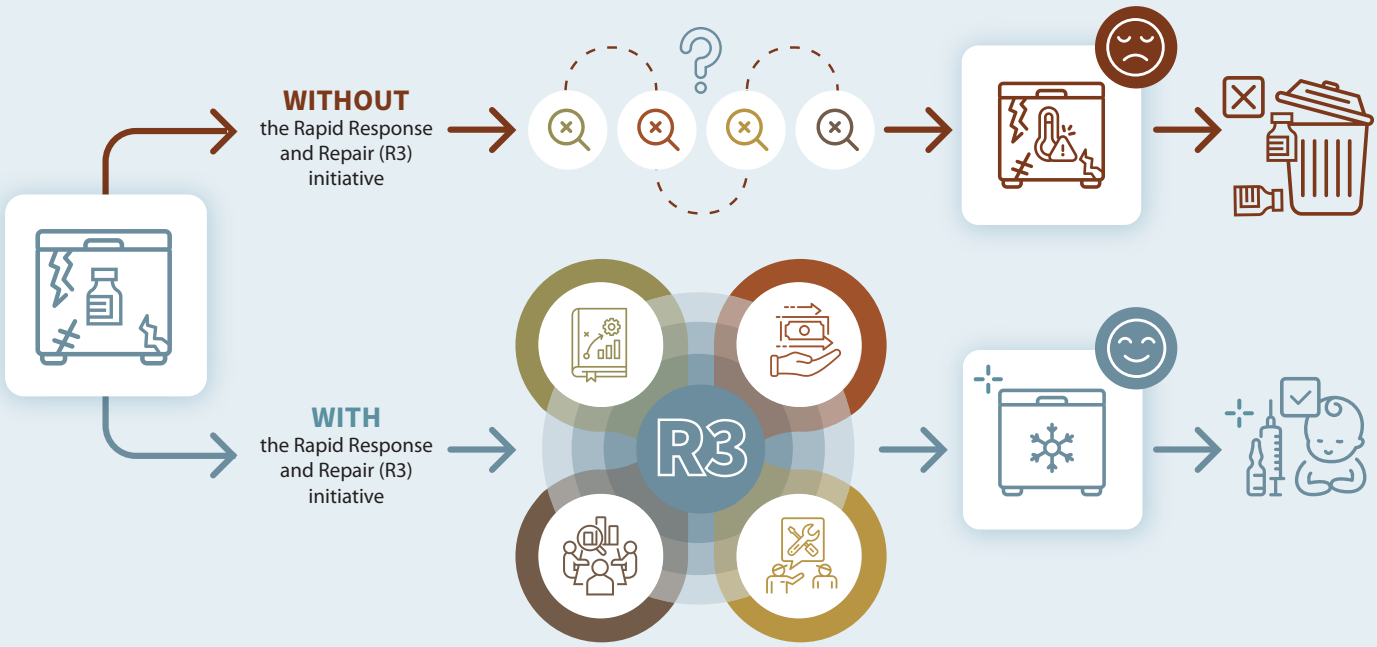
A structured mechanism for mobilizing resources for urgent maintenance and repair needs.

Data Review Meetings

Routine forums for reviewing maintenance and RTM data, monitoring corrective actions and supporting evidence-based decision-making.

Cold Chain Technician Mentorship and Supportive Supervision Model

A field-based approach that strengthens practical maintenance skills through mentoring, coaching and peer learning.



Malawi Context

This work built on VillageReach's longstanding partnership with Malawi's Ministry of Health to strengthen immunization supply chains, cold chain systems and data use, creating a strong foundation for testing approaches that focused on improving how maintenance issues were identified, prioritized, financed and resolved. Despite these investments, repair delays and prolonged equipment downtime remained common. The challenge was not identifying maintenance needs. It was consistently turning information into action.. Maintenance procedures were not always clearly documented or followed, repair funds were difficult to access, supportive supervision opportunities were limited, and maintenance data was not routinely used for decision-making.



To strengthen the CCE maintenance system, VillageReach led implementation of the R3 initiative in collaboration with the Ministry of Health's (MoH) Expanded Programme on Immunization (EPI), Lilongwe Technical College and Clinical Research Education and Management Services, a Malawi-based nonprofit that supported monitoring, evaluation and learning.

About this Series

Implementation of the R3 initiative generated practical lessons, tools and approaches that continue to inform efforts to strengthen CCE maintenance systems. The initiative draws on VillageReach's experience strengthening immunization supply chains, cold chain systems and data use across multiple countries. A key lesson from this work is that information alone does not drive action; effective systems also require clear processes, accountability and coordination. These briefs describe the four R3 prototypes, lessons from implementation in Malawi and considerations for adaptation in other settings.

Unless otherwise noted, observations presented in these briefs reflect implementation experience, stakeholder perspectives and lessons learned during testing of the prototypes rather than formal impact evaluation findings.

The 4 prototypes represent approaches that countries can adapt to their own governance structures, maintenance systems, resource environments and immunization priorities.

R3 Playbook



Photo credit: Paul Joseph Brown

BACKGROUND

The **R3 Malawi Playbook** was developed as a **single operational resource** to support more coordinated and consistent management of CCE and RTM systems. Rather than introducing a new maintenance model, the Playbook documents, organizes and strengthens maintenance processes that already exist within the system. While the Playbook was developed specifically for Malawi's context, similar versions were also developed in Rwanda and Tanzania, each tailored to local maintenance systems and operating realities.

RATIONALE FOR THE PLAYBOOK

Stakeholder consultations revealed a lack of standardized documentation for key CCE maintenance processes, resulting in inconsistent implementation and limited visibility across the system. To address this, the Ministry of Health (MoH), VillageReach, Nexleaf and other stakeholders developed the R3 Malawi Playbook, a consolidated reference resource that brings together maintenance workflows, tools, guidance and escalation processes to support more consistent and coordinated CCE maintenance management.

Effective cold chain equipment (CCE) maintenance depends on more than availability of data and technical repair skills. It requires data use, clear processes, defined responsibilities and coordinated action across multiple levels of the system. This technical brief describes the Rapid Response and Repair (R3) Playbook developed and tested in Malawi to strengthen maintenance coordination and support more consistent management of CCE and remote temperature monitoring (RTM) systems. As the foundational prototype within the R3 initiative, the Playbook provides the operational guidance, workflows and tools that connect and support implementation of the broader package of maintenance interventions.

APPROACH

How the Playbook Works

The Playbook maps the entire maintenance workflow, from issue identification through resolution and follow-up. It provides step-by-step guidance on the actions required at each stage and clearly defines who is responsible for carrying them out. It integrates guidance on preventive maintenance schedules, spare parts management, rapid repair processes, communication standards, RTM implementation, budgeting, supervision, technician development and maintenance monitoring.

The Playbook provides step-by-step guidance on the entire maintenance workflow, from issue identification through resolution and follow-up.

The Playbook guides users through five critical stages:

1. **Routine monitoring and detection:** *Spotting and reporting equipment issues early.*
2. **Escalation:** *Moving the issue up the chain of command quickly and correctly.*
3. **Repair and maintenance:** *Executing the necessary technical fixes.*
4. **Supervision:** *Overseeing the quality and timeliness of the response.*
5. **Performance review:** *Analyzing outcomes to improve system reliability.*

Importantly, the Playbook adopts a bottom-up orientation, beginning with facility-level detection and response before moving through district and national support functions. This differs from more centralized maintenance approaches by empowering facilities to identify and initiate action on maintenance issues, while providing clear escalation pathways for support when local resolution is not possible.



Photo credit: Innocent Mainjeni

Audience

The Playbook is intended for stakeholders involved in CCE maintenance, from facility staff and cold chain technicians to district and national EPI managers. Effective implementation depends on shared ownership across the system.

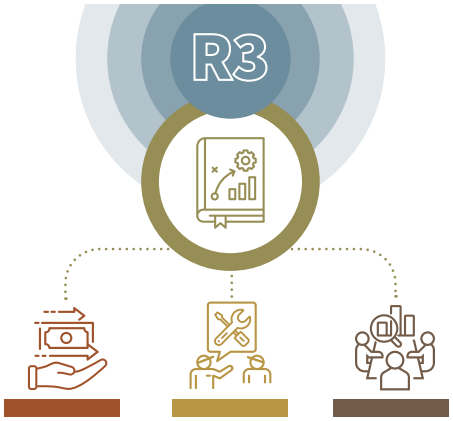
How It Can Be Used and Sustained

The Playbook is designed to inform routine maintenance activities rather than operate as a standalone intervention. It can be used during preventive maintenance visits, supportive supervision, repair activities, technician training, maintenance planning exercises and routine performance reviews. The pilot demonstrated strong stakeholder support for maintaining the Playbook as a reference document. Ongoing implementation will rely on continued refinement based on user feedback and incorporation of lessons emerging from

district implementation. The Malawi MoH has committed to continue using the Playbook as a reference resource for CCE maintenance and management, with future updates expected as maintenance policies, procedures and operational needs evolve.

Relationship to Other R3 Prototypes

The Playbook functions as the backbone of the R3 approach. It documents the workflows, tools and responsibilities that support implementation of the Rapid Response Fund (RRF), Cold Chain Technician Mentorship and Supportive Supervision and Data Review Meeting prototypes.



"The R3 playbook is a perfect one-stop reference that will standardize how best we can approach CCE maintenance and repair related challenges, as it provides clear, concise and well packaged technical knowledge that will ensure speedy detection, reporting, escalation and resolution of CCE issues."

- EPI Coordinator

EXPECTED OUTPUTS AND PROPOSED INDICATORS

Expected outputs of the Playbook include standardized maintenance procedures, escalation pathways, supervision tools, reporting templates, budgeting resources, RTM guidance and maintenance monitoring tools for facility, district and national stakeholders. These resources are intended to support more consistent planning, implementation, documentation and monitoring of maintenance activities. Over time, these resources are intended to support improved coordination, accountability and maintenance management across the health system.

IMPLEMENTATION TIMELINE

The R3 initiative was implemented in two phases. The pilot phase, from Nov. 2025 to Feb. 2026, involved desk research, key informant engagements, orientation to the R3 approach and development and testing of tools in 16 facilities across Mchinji and Mangochi districts. Continuous feedback from national, district and facility-level MoH staff informed multiple iterations of the prototypes and supporting tools. The scale-up phase (March 2026 to June 2026) expanded implementation to additional facilities in the two pilot districts and engaged 18 additional districts across Malawi. This phase provided an opportunity to validate lessons from the pilot, refine workflows and identify broader system-wide challenges affecting CCE maintenance and management.

Through implementation, several recurring challenges emerged, including limited routine use of CCE data, technical capacity gaps, lack of dedicated maintenance financing, administrative barriers to accessing available resources and inconsistent maintenance workflows. Lessons from implementation of the Rapid Response Fund, mentorship and supportive supervision model and Data Review meetings were incorporated into the final Playbook, helping ensure it reflected practical maintenance needs and operational realities identified during implementation.

By the end of the R3 project implementation in Malawi, over 120 MoH staff engaged with the R3 playbook (including national EPI cold chain managers, national EPI supply chain officers, national EPI monitoring and evaluation officers, zonal cold chain technical assistants, regional vaccine logistics officers, regional physical asset management officers, EPI coordinators, health management information system officers, district maintenance officers, district cold chain technicians and health facility EPI focal persons).

LESSONS FROM MALAWI

Implementation of the Playbook generated several lessons that may be useful for countries seeking to strengthen CCE maintenance systems or adapt similar approaches. These lessons reflect both the strengths and limitations observed during implementation and highlight considerations for future adaptation and scale.

KEY LESSON 1

Document existing practices before creating new guidance.

Development of the Playbook revealed that many maintenance processes already existed within the system but relied heavily on institutional knowledge rather than documented procedures. Capturing and standardizing these practices created a stronger foundation for consistency, onboarding and accountability. Countries developing similar resources should begin by documenting existing workflows and practices before introducing new guidance.

KEY LESSON 2

Adoption requires more than technical guidance.

Stakeholders strongly supported the idea of a consolidated maintenance reference document. However, implementation demonstrated that guidance created value only when it was accessible, practical and embedded into routine work. Orientation sessions, validation workshops and ongoing use during supervision activities were important for encouraging adoption and consistent application of the Playbook.

KEY LESSON 3

Workforce realities should shape system design.

The pilot reinforced the importance of understanding who is responsible for maintenance activities and the technical capacity within the system. In Malawi, many CCE maintenance responsibilities are carried out by Disease Control and Surveillance Assistants (DCSAs) who received on-the-job training rather than formal refrigeration engineering training. This influenced both the structure and level of detail included in the Playbook. Countries should ensure maintenance guidance reflects the knowledge and responsibilities of the workforce expected to use it.

KEY LESSON 4

Adaptation is more important than replication.

Implementation demonstrated that maintenance systems are highly context specific. Governance structures, reporting pathways, workforce composition and decision-making authority vary considerably across countries. While the Playbook provided a useful framework in Malawi, successful adaptation elsewhere will depend on tailoring content, workflows and responsibilities to local operational realities rather than directly replicating the Malawi model.

ASSOCIATED TOOLS AND TEMPLATES DEVELOPED FOR THE PLAYBOOK

The tools listed below were developed or adapted to support implementation in Malawi. While some are specific to the Malawi context, they illustrate the types of resources countries may consider when developing a similar playbook. Where appropriate, countries adapting this approach may choose to develop a similar consolidated maintenance resource tailored to their own operational context.

Tool	Purpose
Malawi EPI CCE maintenance and RRF Management Flow	Presents the structure of CCE maintenance from the national to the local level and the existing repair escalation pathways
Communication Flow and Timelines	Supports clear documentation of roles and responsibilities of CCE stakeholders in the ecosystem
Maintenance Monitoring and Forecasting Toolkit	Keeps track of past maintenance related information to support future estimation of CCE resource requirements
Monthly CCT Reporting Form	Documents key CCE technical areas for progress consideration
CCE Maintenance Log	A manual documented physically attached to each CCE, documenting when fixes occurred and any spare parts replaced
Resource Requisition Form	Documents maintenance resource requests
CCE Supervision and Mentorship Checklist	Detailed guidance of how CCTs approach CCE mentorship pre-visit, during visit and plans after visits
RTM Troubleshooting Guide	A collection of key RTM diagnostic issues and details on how to resolve them
Preventive Maintenance Checklists	Information on key issues that need to be considered routinely (from daily to quarterly) to ensure proactive assurance of CCE functionality

Rapid Response Fund (RRF)



Photo credit: Homeline Media

OVERVIEW

Timely CCE maintenance depends not only on technical expertise, but also on access to the resources needed to complete repairs. Transportation, spare parts, fuel, technician support and operational funding all influence how quickly equipment can be returned to service. Even when maintenance processes, technicians and monitoring systems are in place, delays in mobilizing these resources can prolong equipment downtime.

Ensuring that maintenance resources are available when needed is therefore a critical component of effective cold chain management. The RRF was developed to address this challenge by providing a structured mechanism for mobilizing resources for urgent CCE maintenance and repair needs. The prototype tested a structured process for requisitioning, approving, disbursing and reconciling resources needed to address urgent maintenance issues.

During implementation in Malawi, the RRF used project-supported funding from Gavi to test the feasibility of a structured maintenance financing mechanism. The longer-term vision is that similar approaches could be supported through government financing, pooled partner funding mechanisms or other sustainable maintenance financing arrangements.

Effective cold chain equipment (CCE) maintenance depends not only on technical expertise, but also on data use and timely access to the resources required to complete repairs. This technical brief describes the Rapid Response and Repair (R3) Rapid Response Fund (RRF) prototype developed and tested in Malawi to strengthen the mobilization of resources for urgent maintenance and repair needs. It outlines the approach, implementation experience and lessons learned from establishing a structured process for resource requisition, approval, disbursement and reconciliation and offers considerations for adaptation in other settings.

RATIONALE FOR THE RRF

Stakeholder consultations revealed that maintenance issues often remained unresolved not because they were unidentified, but because transportation, spare parts, fuel and operational funding could not be mobilized quickly enough to support repairs. Requests frequently moved through multiple approval processes, resulting in prolonged equipment downtime. To address this challenge, the RRF tested a structured financing workflow that established clear procedures for issue identification, resource requisition, approval, disbursement, repair execution and reconciliation.

The RRF establishes procedures for issue identification, technical assessment, resource requisition, approval, disbursement, repair execution and reconciliation.

APPROACH

How it Works

The RRF establishes a structured workflow that guides maintenance issues from identification through financing, repair and reconciliation. Maintenance needs identified at health facility level are assessed, escalated when necessary, funded through an established approval process and tracked through completion and reconciliation. The workflow is illustrated below.

The RRF establishes a structured workflow that guides maintenance issues from identification through resolution.

Issue detection and initial assessment

The process begins when a maintenance issue is identified at a health facility or through a RTM alert. Facility staff conduct basic troubleshooting and, if the issue cannot be resolved locally, escalate it to the district cold chain technician for assessment.

Validation and resource request

The cold chain technician assesses the issue and determines whether additional action is required. If district resources are insufficient, the District EPI Coordinator submits a requisition to the national cold chain team for approval. Requests may include transportation, spare parts, technical services or other inputs needed to complete repairs. The Fund Manager is copied on the request to facilitate rapid action if approval is granted.

Resource mobilization and repair

Following approval, existing EPI inventory is reviewed and RRF support is provided only for resources not already available. Approved funds are disbursed to suppliers and personnel responsible for completing repairs. The process includes defined timelines for approval, disbursement, repair and reporting.

Accountability and reconciliation

After repairs are completed, expenditures and supporting documentation are reviewed to confirm that approved resources were used appropriately and that equipment functionality has been restored. RTM data and other verification mechanisms support oversight, accountability and reporting.

Audience

EPI focal persons, cold chain technicians, district leadership, national EPI managers and designated fund managers.

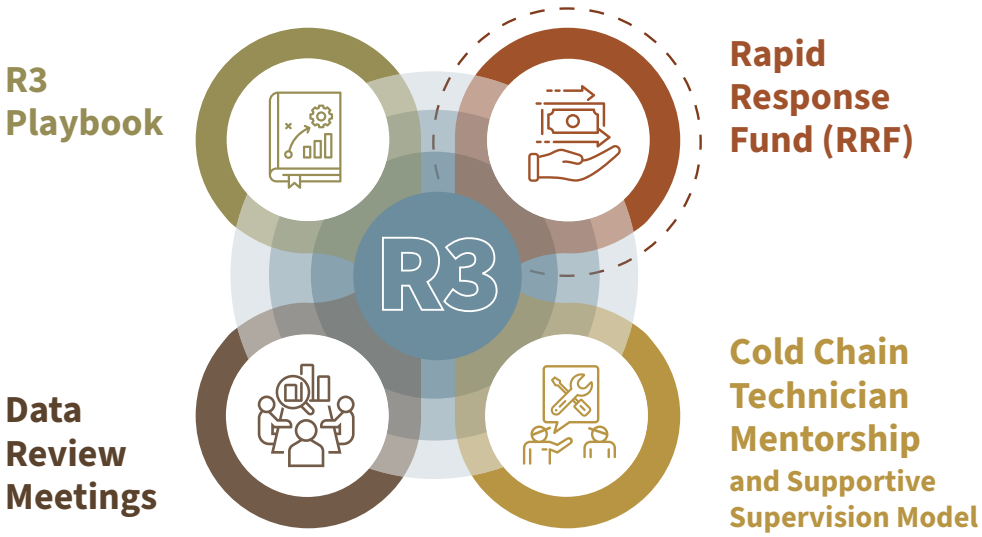
How it Can Be Used and Sustained

The RRF is intended to complement existing maintenance financing mechanisms by providing a structured pathway for addressing urgent maintenance needs that cannot be resolved through routine district resources. Future sustainability will depend on integration within government financing mechanisms, pooled partner funding or other long-term funding arrangements.

Long-term sustainability depends on integration into government and pooled funding mechanisms.

Relationship to Other R3 Components

The RRF functions as part of the broader R3 approach. Maintenance issues identified through Data Review meetings or mentorship activities may trigger RRF requests, while the Playbook documents the workflows, roles and tools that support implementation.



"RRF has been helpful in our district. Most issues pertaining to CCE repairs have now been conducted. We have also seen a heightened conduct of preventive maintenance in our district which was very unusual in the past. RRF has enhanced the proactivity and response time to CCE issues as we were assured of readily available resources to address any issues that come up with certainty."

- District Cold Chain Technician

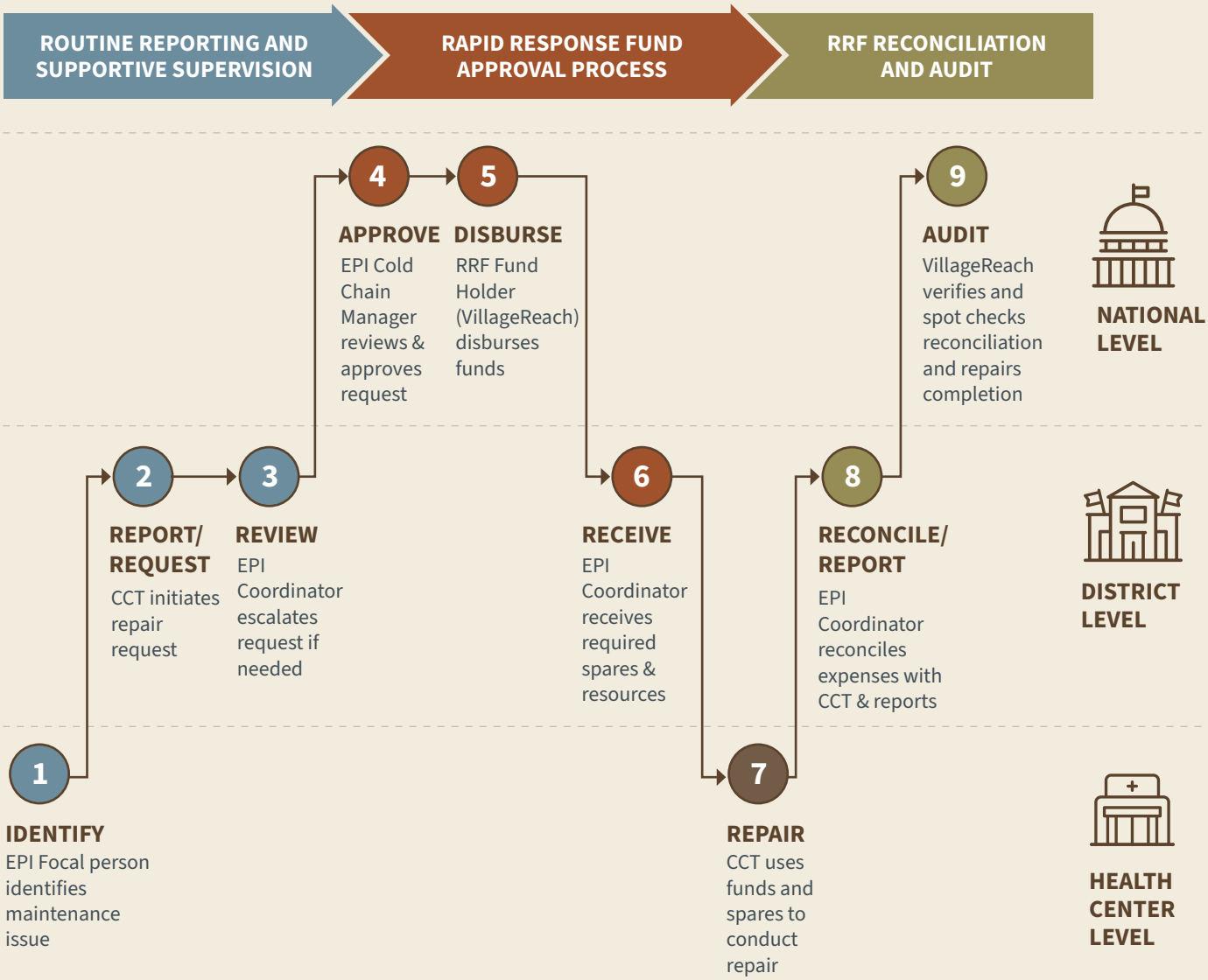

Photo credit: Homeline Media

EXPECTED OUTPUTS AND RESULTS

The RRF prototype developed and tested pathways for requisition, approval, disbursement, repair execution and reconciliation, strengthening the connection between maintenance issue identification and maintenance response. The prototype also generated information on maintenance financing needs, repair costs and resource utilization that can support future planning, budgeting and resource allocation.

To maximize accessibility in a low-digital infrastructure environment, the prototype relied primarily on simple Excel-based tools that were shared electronically for review and approval across different levels of the system. This approach enabled implementation using commonly available software while maintaining required documentation and oversight processes.

The workflow illustrates the full escalation pathway for a CCE issue, from identification through resolution and reporting. In practice, however, many issues are resolved at the health center, district, or national level and do not require escalation through every step. Escalation to the Rapid Response Fund is only necessary when the required spare parts, technical support, or maintenance funds cannot be sourced at the current level.



LESSONS FROM MALAWI

Implementation of the RRF generated several lessons that may be useful for countries seeking to strengthen maintenance financing systems. These lessons reflect practical experiences from implementation in Malawi and highlight important considerations for adaptation, sustainability and scale-up.

KEY LESSON 1

Maintenance financing challenges are often management challenges.

The pilot demonstrated that maintenance delays were frequently driven by unclear responsibilities, approval pathways and accountability mechanisms rather than a lack of awareness of maintenance needs. Countries considering similar approaches should review governance, decision-making authority and coordination structures alongside maintenance financing systems.

KEY LESSON 2

Clearly documented financing workflows reduce uncertainty and improve responsiveness.

Establishing defined processes for resource requests, approvals, disbursement and reconciliation helped stakeholders understand how urgent maintenance needs should be managed. Clear documentation of roles, responsibilities and timelines reduces confusion and strengthens accountability.

KEY LESSON 3

Balancing flexibility with accountability is essential.

Maintenance financing mechanisms must be able to respond quickly while maintaining appropriate financial oversight. During implementation, administrative and procurement requirements occasionally slowed response times, demonstrating the importance of designing systems that support both efficiency and accountability.

KEY LESSON 4

Visibility into spare parts inventories is critical for rapid maintenance response.

Even when maintenance requests and funding approvals moved quickly, repair timelines could still be affected by spare-part availability. Countries implementing similar approaches should strengthen inventory visibility and forecasting processes to minimize avoidable delays and support more efficient repairs.

KEY LESSON 5

Maintenance financing is most effective when linked to maintenance data and routine review processes.

Resource allocation discussions were most effective when informed by equipment performance data, maintenance priorities and unresolved issues. Connecting financing mechanisms to broader maintenance management and review processes can improve prioritization, planning and decision-making.

ASSOCIATED TOOLS AND TEMPLATES

The tools listed below were developed or adapted to support implementation in Malawi. While some are specific to Malawi's context, they illustrate the types of resources countries may consider when adapting a similar approach.

Tool	Purpose
Resource Requisition Form	Documents maintenance resource requests
Resource Reconciliation Form	Supports financial accountability and reporting
RRF Workflow Diagram	Clarifies approval and escalation pathways
Maintenance Issue Assessment Template	Supports validation of maintenance needs
Expenditure Tracking Tool	Tracks resource utilization
Maintenance Cost Monitoring Tool	Supports maintenance planning and forecasting
Approval and Authorization Templates	Documents decision-making processes
Financial Reconciliation Checklist	Supports accountability and audit readiness

During implementation, RRF resources supported procurement of spare parts, RTM accessories and maintenance supplies needed to address identified repair needs.

Cold Chain Technician Mentorship and Supportive Supervision


Photo credit: Wolff Mugos

OVERVIEW

The CCT Mentorship and Supportive Supervision prototype was developed to address a common gap in maintenance systems: knowing what to do does not always translate into being able to do it effectively in real-world operational settings.

In Malawi, many CCTs are Disease Control and Surveillance Assistants (DCSAs), frontline public health workers who support a range of community health and immunization activities. DCSAs assume cold chain maintenance responsibilities through task-shifting and on-the-job training rather than formal refrigeration engineering training. While formal training remains important, technicians often have limited opportunities to apply their knowledge through structured, hands-on learning focused on real maintenance challenges.

The approach strengthened technician capacity through mentorship, practical problem-solving, peer learning and field-based supportive supervision. Although direct mentorship focused on district-level CCTs, the approach was designed to enable mentored technicians to cascade skills and knowledge to health facility personnel through routine supervision activities.

Effective cold chain equipment (CCE) maintenance depends not only on having trained personnel, but also on their ability to apply knowledge and skills in real-world operational settings. This technical brief describes the Rapid Response and Repair (R3) cold chain technician (CCT) Mentorship and Supportive Supervision approach developed and tested in Malawi to strengthen practical maintenance competencies through coaching, peer learning and field-based support.

RATIONALE FOR CCT MENTORSHIP AND SUPPORTIVE SUPERVISION

Consultations conducted during prototype development highlighted two key challenges: limited opportunities for practical, hands-on skill development and supervision approaches that did not consistently support technical learning. As a result, some technicians lacked confidence in diagnosing, troubleshooting and resolving complex CCE issues, particularly when faced with unfamiliar equipment problems.

Health facility staff and district stakeholders described many supervision visits as focused primarily on documenting equipment status and completing checklists rather than strengthening problem-solving skills and maintenance practices. These visits were often viewed as compliance activities rather than opportunities for coaching, mentoring and continuous learning.

To address these challenges, the pilot tested a mentorship model centered on practical, field-based learning. Four national-level mentors, representing Ministry of Health (MoH) Expanded Programme on Immunization (EPI), Lilongwe Technical College and VillageReach, were paired with seven district CCTs across two implementation districts. During facility visits, mentors provided hands-on coaching while CCTs applied maintenance skills in real-world conditions.

The mentored CCTs subsequently used the same mentorship approach and tools during supportive supervision visits with health facility staff, extending learning beyond the initial mentees. Through this cascading model, mentorship activities ultimately reached 167 health workers across fourteen facilities and two district hospitals. During scale-up, the approach was expanded to eighteen additional districts, with an average of three CCTs mentored per district.

Field-based mentorship strengthened CCT problem-solving skills and created a scalable model for practical coaching, strengthening technical skills and extending learning across districts.

APPROACH

How it Works

The prototype was designed around key design principles:

- Learning should be linked to real maintenance challenges.
- Mentorship should identify specific knowledge gaps and track progress toward competency over time.
- Data should guide where and what type of support is provided.
- Learning should continue beyond formal site visits for it to be impactful.

The prototype incorporated structured preparation, field visits, follow-up activities, peer-learning mechanisms and competency assessments. Existing supervision tools were reviewed and consolidated into a technically focused mentorship checklist. WhatsApp groups were established to facilitate peer exchange among technicians and EPI facility personnel. It involves:

Preparation

Mentors and technicians review maintenance information from Inventory Management Tool (IMT), ColdTrace, QR-code systems, DHIS2 and other available sources to identify facilities requiring support. Site selection and visit planning are informed by equipment status, anticipated repair needs and available resources.

Field Mentorship

Mentors accompany technicians during facility visits, providing opportunities for troubleshooting, preventive maintenance, diagnostics, repair activities and review of maintenance practices. The visits emphasize hands-on engagement rather than classroom instruction.

Follow-Up and Peer Learning

Progress monitoring discussions, competency assessments and peer-learning platforms help reinforce learning between visits and support continued problem-solving.

Audience

The prototype involved seven district technicians, four national mentors, district EPI teams, health facility staff and maintenance personnel across fourteen health facilities and two district hospitals.

How it Can Be Used and Sustained

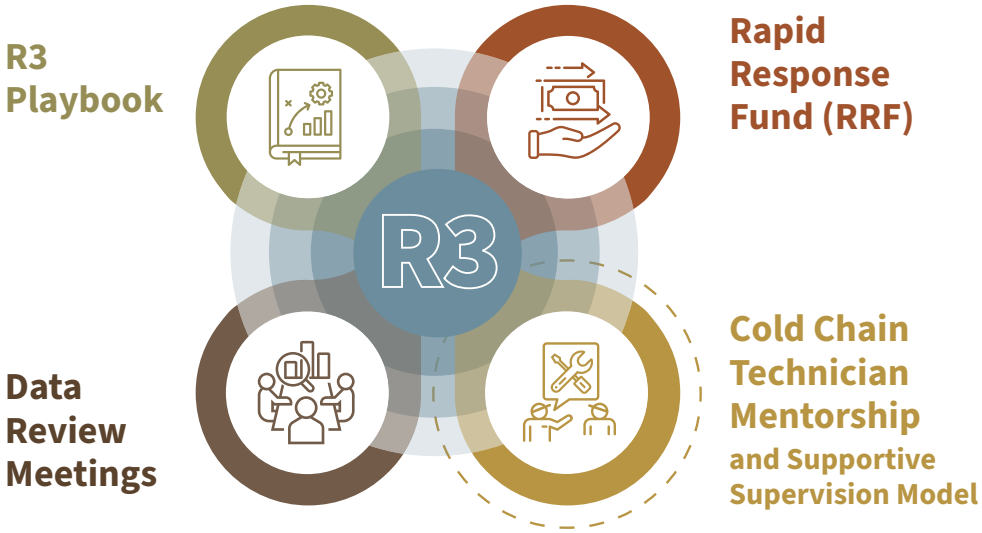
Mentorship is designed as a recurring process rather than a one-time training event. The model is designed around repeated field engagements, follow-up discussions and progress monitoring to support continuous skill development over time. The MoH also uses WhatsApp groups primarily for communication and information sharing across peers. These platforms could also be used to share technical updates and support ongoing learning. Continued implementation will depend on integration within existing supervision and workforce development structures and ongoing support for peer-learning and mentorship activities.

"This is the first time in my district having all CCE in a functional state and also having almost 100% of our RTMDs transmitting data. I call it an amazing development. This must go on and on!"

- District Cold Chain Technician

Relationship to Other R3 Components

The prototype was intentionally linked to other R3 components to help ensure that issues identified during mentorship visits could be addressed. Maintenance problems observed during facility visits could be escalated through the Rapid Response Fund (RRF) process when additional resources were required. Maintenance data reviewed through Data Review Meetings also helped inform mentorship priorities and site selection. The Playbook provided reference guidance on competencies, maintenance workflows and troubleshooting approaches that reinforced mentorship activities.



EXPECTED OUTPUTS AND RESULTS

The mentorship approach provides technicians with structured opportunities to apply maintenance knowledge in real-world settings. Implementation generates mentorship records, facility assessments, competency assessments and follow-up action plans that can be used to monitor progress and identify ongoing learning needs. The approach is intended to strengthen practical maintenance competencies while supporting ongoing supervision and professional development of personnel responsible for CCE management.

LESSONS FROM MALAWI

Implementation of the mentorship and supportive supervision model generated several lessons that may be useful for countries seeking to strengthen cold chain maintenance capacity. These lessons reflect practical experiences from implementation in Malawi and highlight important considerations for adaptation, sustainability and scale-up.

KEY LESSON 1

Hands-on mentorship is more effective than classroom-style supervision.

Stakeholders consistently valued opportunities to learn through real maintenance challenges. Direct engagement during facility visits allowed technicians to strengthen practical troubleshooting, preventive maintenance and repair skills in ways that traditional supervision approaches could not.

KEY LESSON 2

Maintenance data enables targeted technical support.

Remote temperature monitoring (RTM) and maintenance data helped identify facilities experiencing the greatest equipment challenges, allowing mentorship activities to be directed where support was most needed. Using data to prioritize visits improved efficiency and relevance of technical support.

KEY LESSON 3

Mentorship expands learning across the system.

Direct mentorship focused on district-level CCTs, who subsequently applied the same tools and approaches during supportive supervision visits with facility staff. This cascading model extended learning beyond the original cohort of mentees and created opportunities for ongoing knowledge transfer throughout the system.

KEY LESSON 4

Mentorship is most effective when linked to broader maintenance systems.

The greatest value was achieved when mentorship activities were connected to maintenance financing, data review and issue-resolution mechanisms. Linking technical support to systems capable of addressing identified challenges increased the likelihood that maintenance issues would be resolved.

ASSOCIATED TOOLS AND TEMPLATES

The tools listed below were developed or adapted to support implementation in Malawi and include structured supervision resources, maintenance data systems and peer-learning mechanisms used to strengthen field-based capacity. While some tools are specific to Malawi's context, they illustrate the types of resources countries may consider when adapting a similar mentorship approach.

Core Implementation Tools	Purpose
CCE Supervision and Mentorship Checklist	Guiding questions and an accompanying guidance narrative of the foundational elements that need to be considered in supervision execution.
Mentorship Visit Planning Guide	A compilation of key issues that need to be considered in planning for the mentorship visit.
Pre- and Post-Mentorship Assessment Tools	Highlights key expectations before mentorship visit and how those expectations are met by facility staff including any existing gaps.
Mentorship Visit Report Template	Provides a snapshot into the major highlights of how the visit was received by the CCTs.
Facility Action Planning Tool	Captures identified actions, accountability and execution timelines.

Data Sources Used to Guide Mentorship	Description
ColdTrace Dashboard	A real-time temperature monitoring platform managed by Nexleaf Analytics.
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Cold Chain Data Review Meetings



Photo credit: Innocent Mainjeni

OVERVIEW

Cold chain maintenance systems generate substantial amounts of information through remote temperature monitoring (RTM) platforms, maintenance records, supervision visits, technician reports and routine facility reporting. However, the availability of information alone does not improve maintenance performance. Information must be routinely reviewed, translated into decisions and acted upon.

The **Cold Chain Data Review Meetings** were developed to strengthen the use of maintenance information in operational decision-making. While the name emphasizes data review, the primary purpose of the approach is to transform maintenance information into action through structured decision-making, accountability and follow-through. The approach provides a structured forum through which personnel responsible for cold chain management, maintenance, logistics and immunization services can review performance data, identify priority issues, assign responsibilities, monitor progress and escalate unresolved challenges.

Rather than functioning as a standalone intervention, Data Review Meetings serve as a **cross-cutting mechanism** that connects maintenance information to maintenance action and supports implementation of the broader R3 package.

Effective cold chain equipment (CCE) maintenance depends not only on collecting information, but also on using it to inform decisions and drive action. This technical brief describes the Rapid Response and Repair (R3) Data Review Meetings tested in Malawi to strengthen maintenance decision-making, accountability and follow-through.

RATIONALE FOR THE DATA REVIEW MEETINGS

The prototype was piloted from Nov. 2025 to Feb. 2026 in 16 facilities across two districts and subsequently refined and expanded during scale-up activities from March 2026 to June 2026. During stakeholder consultations and prototype implementation, participants identified a gap between identifying maintenance issues and taking action to address them. Maintenance concerns were often documented through ColdTrace, maintenance reports, supervision activities, technician records and facility reporting systems but were not consistently reviewed, assigned for follow-up or tracked to resolution.

Stakeholders noted that maintenance issues could be identified repeatedly without clear mechanisms for assigning responsibility, monitoring follow-up actions or escalating unresolved issues. As a result, opportunities for timely intervention were missed and visibility into recurring challenges and system-wide priorities remained limited.

To address these challenges, the pilot introduced structured district-level Data Review Meetings involving cold chain technicians, district Expanded Programme on Immunization (EPI) coordinators, facility representatives and other maintenance stakeholders. Meetings were held on a routine basis and focused on reviewing maintenance information, identifying priority issues, documenting actions, assigning responsibilities and monitoring implementation of previous commitments. Supporting tools included meeting agendas, action trackers, issue logs and meeting minutes templates to strengthen accountability and follow-through. Implementation tested whether a structured review process could improve visibility into maintenance issues and create clearer pathways for action and escalation.

Meetings focused on reviewing maintenance information, identifying priority issues, documenting actions, assigning responsibilities and monitoring implementation.

"Thanks for the data review meetings. We now have better coordination between the district and health facility team which helps us to safeguard vaccine integrity. Health facilities now are able to know the status of their CCEs, their challenges and get immediate support when issues arise!"

- Health Facility EPI Focal Person



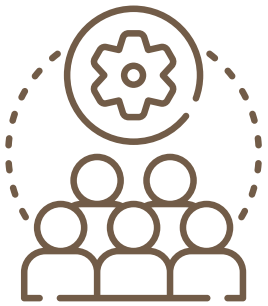
Photo credit: Paul Joseph Brown

APPROACH

The design principles were co-developed by VillageReach and Nexleaf based on findings from stakeholder consultations and implementation experience.

The Data Review Meetings approach was built around four principles:

- Information should drive action.
- Accountability should be clearly assigned.
- Follow-up should be routine and documented.
- Escalation pathways should be visible and understood.



Through a structured review process, the approach helps transform maintenance information into decisions, actions and accountability. Participants review maintenance data, identify priority issues, assign responsibilities, monitor progress and escalate unresolved challenges to promote timely resolution.

Compile maintenance information

Before each meeting, maintenance information is compiled from multiple sources, including ColdTrace dashboards, maintenance logs, technician reports, supervision findings, facility reports and Rapid Response Fund (RRF) requests. Bringing information together in a single forum provides participants with a more complete view of equipment performance, maintenance needs and unresolved issues.

Review and prioritize issues

Participants review available information to identify priority issues requiring attention. Discussions focus on equipment performance concerns, unresolved maintenance issues, emerging trends, resource requirements and progress on actions from previous meetings. This helps ensure that the most urgent or consequential issues are addressed first.

Assign actions and responsibilities

For each priority issue, participants agree on the actions required, who is responsible for completing them and the expected timeline for follow-up. Any issues requiring escalation are identified and documented. Agreed actions are recorded using standardized action trackers and meeting records to support accountability.

Monitor follow-up

Subsequent meetings review progress against agreed actions, identify barriers to implementation and determine whether additional support or escalation is needed. This creates a continuous cycle of review, action and accountability.

Audience

In Malawi, participants included district EPI coordinators, cold chain technicians, facility representatives and other stakeholders involved in cold chain management and maintenance oversight. Depending on the issues under discussion, meetings may also include representatives responsible for logistics, procurement, finance, supervision or maintenance planning.

How it Can Be Used and Sustained

To be effective over time, Data Review Meetings should be integrated into existing maintenance and EPI management structures. Holding meetings at regular, predictable intervals alongside other coordination activities helps ensure continuity and reduces the risk that they become ad hoc or deprioritized. Success also depends on engaging the right stakeholders. Meetings should include individuals who generate maintenance information as well as those with the authority and capacity to act on it. Maintaining a stable core group of participants, while allowing flexibility to involve others as needed, helps strengthen ownership and coordination.

Discussions should move beyond reviewing data to identifying actions, assigning responsibilities and setting timelines. Simple tools such as action trackers, meeting minutes, agendas, presentation templates and issue logs should be routinely updated and reviewed to support accountability, monitor progress and keep unresolved issues visible until they are addressed.

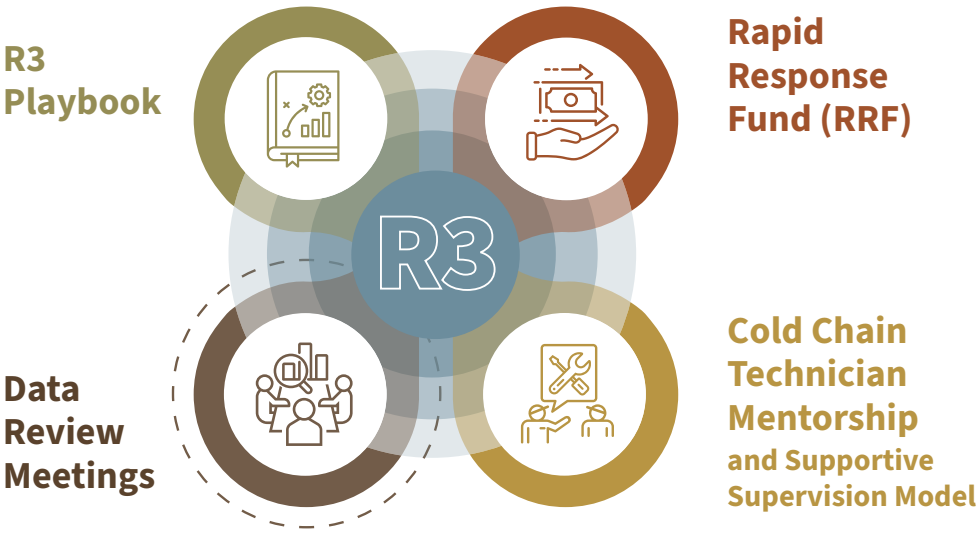
The Data Review Meetings approach and supporting tools were shared with the Malawi Ministry of Health (MoH) for consideration within routine maintenance and EPI management processes. While long-term implementation decisions remain with the ministry, the approach and supporting tools were shared for consideration within routine maintenance and EPI management processes.

Relationship to Other R3 Components

Data Review Meetings serve as a cross-cutting coordination mechanism within the broader R3 approach, linking information, decision-making and action across its different components. Within these meetings, stakeholders can review how maintenance processes and responsibilities outlined in the Playbook are being followed in practice, creating a space to reflect on adherence and identify gaps. Additionally, the meetings help surface maintenance issues that require additional resources, allowing participants to determine when support from the RRF may be needed and to track the progress of actions financed through it. They also provide an opportunity to identify facilities or technicians who may benefit from additional mentorship or supportive supervision, ensuring that technical support is directed where it is most needed. In this way, Data Review Meetings create a continuous link between information and response, helping ensure that insights generated in one part of the system can prompt timely action in another.

"The WhatsApp groups have been helpful in helping us open up and willing to learn as well as being eager to support one another on the common issues that we encounter. The data review meetings have been more like a refresher training opportunity for me."

- Health Facility EPI Focal Person



EXPECTED OUTPUTS AND RESULTS

Implementation of the approach generates:

- Meeting agendas that guide discussions and ensure key topics are consistently addressed.
- Meeting minutes that capture decisions, discussions and agreed next steps.
- Action trackers that document responsibilities and timelines for follow-up.
- Issue logs that record ongoing maintenance challenges and their status.
- Escalation records that track issues requiring higher-level attention.
- Maintenance performance summaries that provide an overview of trends and priorities.

Together, these tools support a structured process for reviewing maintenance information, documenting decisions and monitoring progress on agreed actions. The approach is intended to improve visibility into maintenance priorities, support more informed decision-making and strengthen follow-up on unresolved issues.

LESSONS FROM MALAWI

Implementation of the Data Review Meetings approach generated several lessons that may be useful for countries seeking to strengthen maintenance decision-making and accountability systems.

KEY LESSON 1

Accountability is more valuable than data alone.

Stakeholders consistently reported that the greatest value of the meetings was not the discussion of data itself, but the creation of clear accountability for follow-up actions. Assigning responsibilities and reviewing progress against previous commitments helped ensure issues remain visible until resolved.

KEY LESSON 2

Clear documentation supports action.

Action trackers, meeting minutes and issue logs helped ensure that maintenance concerns translate into tangible actions. Participants emphasized that meetings were most effective when focused on problem-solving and implementation rather than reporting alone.

KEY LESSON 3

Routine review processes help identify broader system challenges.

The meetings created opportunities to discuss recurring issues affecting CCE performance, including challenges such as limited maintenance financing and resource constraints. This helped stakeholders address root causes rather than only responding to individual equipment failures.

KEY LESSON 4

Bringing the right stakeholders together improves coordination.

Bringing together district leadership, EPI personnel, technicians and other system actors improved visibility into maintenance issues and promoted shared responsibility for resolving them. This created stronger alignment between decision-makers and those responsible for implementation.

ASSOCIATED TOOLS AND TEMPLATES

The tools listed below were developed or adapted to support implementation in Malawi and include structured supervision resources, maintenance data systems and peer-learning mechanisms used to strengthen field-based capacity. While some tools are specific to Malawi's context, they illustrate the types of resources countries may consider when adapting a similar mentorship approach.

Core Implementation Tools	Purpose
CCE Supervision and Mentorship aQChecklist	Guiding questions and an accompanying guidance narrative of the foundational elements that need to be considered in supervision execution.
Mentorship Visit Planning Guide	A compilation of key issues that need to be considered in planning for the mentorship visit.
Pre- and Post-Mentorship Assessment Tools	Highlights key expectations before mentorship visit and how those expectations are met by facility staff including any existing gaps.
Mentorship Visit Report Template	Provides a snapshot into the major highlights of how the visit was received by the CCTs.
Facility Action Planning Tool	Captures identified actions, accountability and execution timelines.

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Conclusion



Photo credit: Homeline Media

The R3 initiative demonstrated that strengthening CCE maintenance requires more than technical repair capacity alone. Implementation in Malawi highlighted the importance of four interconnected functions: clear maintenance processes, timely access to resources, practical technical support and routine use of data for decision-making. While each prototype addressed a different maintenance challenge, together they contributed to a more coordinated and responsive maintenance system. Together, the four prototypes demonstrate that investments in equipment, technology and workforce capacity are most effective when paired with clear processes, accountability and systems that turn information into Together, the four prototypes demonstrate that investments in equipment, technology and workforce capacity are most effective when paired with clear processes, accountability and systems that turn information into action.

The R3 Playbook, RRF, Cold Chain Technician Mentorship and Supportive Supervision model and Data Review Meetings were designed to function as complementary components rather than standalone interventions. Collectively, they helped strengthen maintenance coordination, improve access to repair resources, build technician capacity and support more consistent use of maintenance information to drive action.

Implementation in Malawi reinforced that many maintenance challenges are rooted not only in technical constraints, but also in gaps related to processes, accountability, resource mobilization and system management. The lessons, tools and approaches described in this series are not intended as fixed models for replication. Rather, they provide practical examples that countries can adapt to their own maintenance systems, governance structures and operational realities.

As countries continue to invest in immunization systems, strengthening maintenance systems for CCE remains critical to ensuring vaccines are available where and when they are needed. The experience from Malawi demonstrates that targeted investments in maintenance management can help improve equipment functionality, support frontline health workers and strengthen the reliability of immunization services.



Effective maintenance requires more than repairs; it requires systems, financing, skills, and data use.

Countries can adapt these lessons to strengthen their own maintenance systems.

VillageReach transforms health care delivery to reach everyone.

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